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Status of Atlantic Salmon Stocks  
of Scotia-Fundy Region, 1989

by

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**ABSTRACT**

The status in 1989 of Atlantic salmon stocks in Salmon Fishing Areas (SFAs) 19, 20, and 21 of the Atlantic coast of Nova Scotia, SFA 22 of the Bay of Fundy, Nova Scotia, and SFA 23 of the Bay of Fundy, New Brunswick, was reviewed.

The return in 1989 of 1SW fish to the LaHave (SFA 21) and Saint John (SFA 23) counting facilities was 5% and 31% above the 1984-1988 mean count whereas the Liscomb River (SFA 20) fishway count was down 32% from the 1984-1988 mean. Counts by divers and at fishways suggest that the Grand and Middle rivers (SFA 19), LaHave River above Morgan Falls (SFA 21) and Big Salmon and Alma rivers (SFA 23) attained minimum target escapements. Data for the Liscomb River (SFA 20), Point Wolfe and Saint John rivers (SFA 23) indicate that target escapements were not attained.

Recreational catches of 1SW fish were 25% below the 1984-1988 mean in SFA 20 and 21% above the mean in SFA 21. Catch estimates were not yet available for SFAs 19, 22 and 23.

Forecast of the fishway count of wild Liscomb River MSW salmon in 1990 is 72 fish, 12% less than the 1984-1989 mean count. The LaHave River forecast to Morgan Falls in 1990 is for 574 fish or 14% greater than the 1984-1989 mean count. Forecast of the Saint John River wild MSW count to Mactaquac is 6,325 fish which is 46% greater than the 1984-1989 mean count. Forecast of wild 1SW returns to Mactaquac in 1990 is 7,393 fish, 9% greater than the 1984-1989 mean count, and almost equal to the 1988 forecast. LaHave River 1SW and Saint John River 1SW and MSW forecasts exceed minimum target spawning requirements, the Liscomb River MSW forecast is below requirements.

### Résumé

On examine l'état des stocks de saumon de l'Atlantique des zones de pêche du saumon (ZPS) 19, 20 et 21, situées sur la côte Atlantique de la Nouvelle-Ecosse, de la ZPS 22, se trouvant du côté néo-écossais de la baie de Fundy et de la ZPS 23, située du côté néo-brunswickois de la baie de Fundy.

En 1989, les remontées d'unibermarins aux postes de dénombrement de la rivière LaHave (ZPS 21) et du fleuve Saint-Jean (ZPS 23) ont été respectivement supérieures de 5 % et de 31 % à la moyenne, tandis que dans la passe migratoire de la rivière Liscomb (ZPS 20), le dénombrement révélait une diminution de 32 % par rapport à la moyenne de 1984-1988. D'après les recensements réalisés par des plongeurs et ceux effectués aux passes migratoires, les échappées-cibles minimales auraient été atteintes dans les rivières Grand et Middle (ZPS 19), LaHave en amont des chutes Morgan (ZPS 21), ainsi que Big Salmon et Alma (ZPS 23). Les chiffres portant sur les rivières Liscomb (ZPS 20) et Point Wolfe (ZPS 23) ainsi que sur le fleuve Saint-Jean révèlent que les échappées-cibles n'ont pas été atteintes dans ces endroits.

Les prises récréatives d'unibermarins ont été inférieures de 25 % à la moyenne de 1984-1988 dans la ZPS 20 et supérieures de 21% à cette moyenne dans la ZPS 21. On ne disposait pas encore des estimations pour les ZPS 19, 22 et 23.

Pour 1990, la prévision de redibermarins sauvages aux installations de dénombrement de la rivière Liscomb est de 72 poissons, soit 12 % de moins que la moyenne de 1984-1989. En ce qui concerne la rivière LaHave, la prévision aux chutes Morgan s'établit à 574 poissons, ce qui représente une augmentation de 14 % par rapport à la moyenne de 1984-1989. A Mactaquac (fleuve Saint-Jean), le nombre de redibermarins sauvages devrait atteindre 6 325, soit 46 % de plus que la moyenne de 1984-1989. Les prévisions de remontées d'unibermarins sauvages à Mactaquac sont de 7 393 poissons, chiffre supérieur de 9 % à la moyenne et pratiquement égal aux prévisions de 1988. Enfin, les prévisions d'unibermarins dans la rivière LaHave ainsi que de redibermarins et d'unibermarins dans le fleuve Saint-Jean dépassent les besoins-cibles en reproducteurs, tandis que les prévisions de redibermarins dans la rivière Liscomb sont inférieures aux besoins.

## INTRODUCTION

This document is background to the status of Atlantic salmon stocks of the five Salmon Fishing Areas (SFAs) 19 to 23 of Scotia-Fundy Region and as such documents sport landings, fishway counts and forecast of returns in 1990.

## METHODS

Sport fishery data for 1989 in SFAs 19 to 22 (Nova Scotia) were derived where possible from an analysis of Nova Scotia salmon license stubs. Data received from anglers up to November 6 in each of the past five years (1984-1988) were used to provide a correction factor to account for response bias and to assist in the projection of recreational catches for each SFA. As a means of testing the validity of the "correction factors", estimated retained catch of 1SW fish based on cards returned up to November 6 were regressed on totals (estimated from 90+% of cards returned) for the years 1984-1988.

Confidence limits for the 1989 projected catches were calculated for those SFAs with significant regressions by forcing the relationship through zero (no intercept) and using the weighted averages and associated standard errors to arrive at the 95% C.L. Catch data were not available for all of SFA 23. Landings for the Saint John and Big Salmon rivers were provided by Department of Fisheries and Oceans fishery officers (DFO) and biologists of the New Brunswick Department of Natural Resources and Energy (DNRE).

Recreational landings, 1974-1986, for all SFAs of Scotia-Fundy Region appear in the "Redbook" series (DFO, Halifax) and O'Neil et al. (1985; 1986; 1987; 1989). Sport landings for SFAs 19-22, 1974-1982, were adjusted upward to a Nova Scotia license stub equivalency (1983-1987) based on a DFO:license stub comparison in 1983 which showed that DFO catches were lower. It was assumed that DFO catches for that earlier period were also underestimated.

Monitoring of upstream migrating wild and hatchery origin adult salmon, over a significant time frame, is limited to four counting facilities in Scotia-Fundy Region: 1) Liscomb River in SFA 20, 2) LaHave and 3) Tusket rivers in SFA 21, and 4) Saint John River in SFA 23. Counts of returning hatchery origin fish from the same fishways and the number of smolts from which they originated are provided as an index of marine mortality.

Juvenile densities were determined by electrofishing in three river systems, Saint Mary's (SFA 20), Stewiacke (SFA 22) and Big Salmon (SFA 23) rivers. Densities on the St. Mary's and Big Salmon rivers were determined by the removal method from within small barriered sites. Densities of age 1+ and older parr on the Stewiacke River were determined by mark-recapture methods in large unbarriered sites. Age 0+ parr densities on the Stewiacke were estimated by dividing the count of the 'mark-run' by the capture efficiency estimated for age 1+ parr.

Forecast of wild multi sea-winter (MSW) returns for 1990 were based on regressions of wild MSW counts on wild one sea-winter (1SW) counts of the same smolt class at the Liscomb and LaHave facilities. The MSW run destined to

Mactaquac, Saint John River, was forecasted from the ratio of estimated total returns of wild MSW and LSW salmon destined for Mactaquac and the LSW returns of 1989 (Marshall 1990).

A forecast of maiden LSW fish to the Stewiacke River sport fishery (SFA 22) in 1990 was by way of a regression of sport-caught recruit/spawner ratio on July precipitation at Stewiacke in the year in which recruits were pre-smolts and more simply by regression of LSW recruit eggs (yr i) on contributing stock eggs \*July precipitation year i-2 (Amiro 1989). The wild LSW return destined for Mactaquac (SFA 23) in 1990 was forecasted from a regression of LSW returns on egg depositions from which they were derived (Marshall 1990).

## RESULTS and DISCUSSION

### SFA 19 (Cape Breton East)

No reliable estimate of the recreational catch can be projected from license stubs returned through Nov. 6, 1989, (regression of estimated catch from stubs received through Nov. 6 on final estimate of catch, 1984-1988, was not significant;  $p > 0.05$ ).

Fishway counts on the Grand River, Richmond County, 1989 numbered 415 LSW and 105 MSW fish. These counts approximated those of 1988 (477 LSW and 101 MSW fish), the first year of operation, but are known from seining operations to exclude some MSW fish which ascend the falls adjacent to the fishway during high water. Preliminary estimates of sex ratio, fecundity, escapement (Amiro and Longard 1989) and salmon-producing substrate (4,618 units  $> 0.12\%$  grade) suggest that eggs were adequate to meet a target of 2.4 eggs/m<sup>2</sup> in both years.

Underwater counts of salmon in the entire Middle River, Victoria Co., September 28, 1989, totalled 21 LSW and 52 MSW fish of which 79% were of early-run hatchery origin. Repeated counts in only a portion of the river, October 25, 1989, revealed 12 LSW and 348 MSW fish of which hatchery fish were only 7%. Proportionate estimation of the numbers of fish in uncounted areas suggests that the target escapement of 2.4 eggs/m<sup>2</sup> for 8,646 units of salmon-producing substrate  $> 0.12\%$  grade would just have been met.

### SFA 20 (Eastern Shore)

The 1989 estimated catch of LSW fish is  $1,673 \pm 133$  (95% C.L.) or 75% of the 1984-1988 mean (Table 1). An estimated  $609 \pm 48$  MSW salmon were reported released in 1989 which is 45% below the 1984-1988 mean.

The count of 532 wild LSW fish at the Liscomb Falls fishway was 12% higher than 1988 but was not significantly different than the 1984-1988 mean of 788 LSW fish (Table 2a). A preliminary estimate of the LSW recreational catch in Liscomb River, however, is only 9 fish (Table 4). The return rate to the fishway of hatchery-origin LSW fish was 0.60, one-half of the 1986 value and one-quarter of those observed in 1987 (Table 3).

A total of 75 wild MSW salmon was counted at the Liscomb fishway in 1989,

90% of the 1984-1988 mean. The count was only 11 fish more than the 64 MSW fish predicted in 1988 from the regression of MSW on LSW counts. In 1987, only 88 of a predicted 235 MSW fish returned. The regression equation  $Y = 0.15X - 7.37$  ( $r=0.88$  ;  $p < 0.01$ ) used in 1987 (Marshall et al. 1988) and the 532 LSW fish counted at the fishway during 1989 forecast a count of 72 MSW salmon in 1990.

The Liscomb River, with the exception of the 1,982 wild LSW returns in 1987, appears to have plateaued at 500-700 LSW and 50-125 wild MSW returns, since 1983-1984 (Table 2a). Counts of wild (Table 2a) and hatchery adults (Table 3) in 1989 are about one-half the estimated total river target of 1,908 LSW and 280 MSW fish (Semple and Cameron In press) for an estimated  $1.6 \times 10^6 \text{ m}^2$  of habitat, some of which is significantly impacted by acidification.

Densities of age-0+ and age-1+ parr for eight sites on the West River Saint Mary's, 1989, averaged 9.7 and 4.5 juveniles/100  $\text{m}^2$ . These densities are 89 and 123% of the respective mean values of 10.85 (range 3.4-17.0) and 3.65 (range 2.2-5.9) per 100  $\text{m}^2$  for the years 1978-1988. Higher densities have been observed on the Saint Mary's than those of 1989 but none have yet approached the 'normal' index densities (Elson 1967) of 29 age-0+ and 24 age-1+ parr for New Brunswick rivers.

#### **SFA 21 (Southwest N.S.)**

The 1989 estimated retained catch of LSW fish was  $3,749 \pm 190$  (95% C.L.) or 21% above the 1984-1988 mean (Table 1). An estimated  $1,146 \pm 58$  MSW salmon were reported released in 1988, 12% above the 1984-1988 mean.

A count of 2,084 wild LSW fish at the Morgan Falls fishway (LaHave River) was 105% of the 1984-1988 mean (Table 2a). The estimated recreational catch of LSW fish in the LaHave River was 2,301 or 145% of the 1988 catch and 126% of the 1984-1988 mean catch (Table 4). The hatchery return rate of LSW fish to the fishway was 3.15%, second highest of the 11-year data set (Table 3).

A total of 501 wild MSW salmon was counted at Morgan Falls during 1989, which was close to the 1984-1988 mean of 505 MSW salmon (Table 2a). The wild MSW count at the fishway was 75% of the 672 MSW salmon predicted by a regression of MSW on LSW counts and, unlike the 1988 count does fall within the 95% confidence limits of the estimate. The count of wild (Table 2a) and hatchery (Table 3) adults at Morgan Falls approximates the average spawner target of 2,815 LSW and 497 MSW fish for the entire river (Cutting et al. 1987).

The regression equation  $Y = 0.27X + 11.35$  ( $r=0.89$ ;  $p < 0.001$ ), first used in 1987, and the 2,084 LSW fish counted at Morgan Falls during 1989 forecasts a count of 574 MSW salmon in 1990.

#### **SFA 22 (Upper Bay of Fundy)**

No reliable estimate of the recreational catch can be projected from license stubs returned through November 6, 1989. This shortcoming is because the sport fishery is most active in the fall just prior to the season close date of October 31. A catch of 844 maiden LSW fish had been forecast by a model

developed for the Stewiacke River (Amiro 1987) which utilized a recruit/spawner index modified by precipitation the summer previous to smoltification. It had correctly indicated the downward trend that catches followed in 1986 and 1987 and the upward trend in 1988, but underestimated the magnitude of the changes.

Densities of age-1+ and age-2+ parr from 29 sites on the Stewiacke River, 1989, averaged 17.2 and 6.3 fish/100 m<sup>2</sup> -- 75% and 92%, respectively of the mean values 1984-1988. Densities of fry in 1989 were higher than 1987 or 1988.

New forecast models (Amiro 1989) resulting from changes in the angling catch reporting system and the use of July precipitation rather than July-to-October average precipitation predicted that only 234 LSW fish would have been caught in 1989. The LSW catch in 1990 could be about 1,200 fish.

### SFA 23 (South Western N.B.)

No estimate of the recreational catch of the entire SFA was available by November 6.

Because of low sport catches and escapements in 1987 and 1988 in the inner Bay of Fundy rivers of SFA 23, managers closed the Point Wolfe and Alma rivers to angling. Angling on the Big Salmon River was restricted to hook-and-release until late August, after which it yielded some 150 LSW fish - four to five times that caught in the full 1988 season. Fall diver observations on the Big Salmon River indicated a total escapement of about 1,000 fish, 2.5 to 3.5 times that in 1988 and a number approaching minimum spawning requirements. Forty-five fish sampled during a broodstock collection, October 20, 1989, revealed that 75% of all fish were maiden LSW and 22% were repeat spawners. These proportions are in sharp contrast to over 3,000 fish sampled 1965-1973 among which only 25% were maiden LSW fish (Amiro and McNeill 1986). The relative lack of repeat spawners in 1989 confirms the low escapement of maiden LSW fish in 1987 and 1988.

Total age-1+ and age-2+ parr densities averaged 19.6/100 m<sup>2</sup> for four sites on the Big Salmon River. The mean age-0+ parr density on the same sites was 41.4/100 m<sup>2</sup>. These values are 47% and 64%, respectively, of those obtained from the same sites in 1982. The LSW sport catch 1986-1988, the years from which the 1989 juvenile densities were recruited, averaged 20% of the 1970-1988 mean of 311 LSW fish. The catch for 1979-1981 from which the 1982 densities were recruited was 170% of the mean.

Diver counts on the Point Wolfe River, conducted by Parks Canada staff, indicate a six-fold increase between 1988 and 1989 in the number of smaller fish thought to be LSW maiden grilse (Table 2b). The number of salmon or larger fish thought to be repeat spawners reflect the low number of maiden fish in 1987 and 1988. The 157 grilse and 17 salmon would not provide equivalent eggs to those of the target spawner requirement<sup>1</sup> of 139 grilse and 63 salmon. A grilse count of 250 fish on the Alma River, 1989, (Table 2b) mirrors the increase seen on the Big Salmon River and, with the 41 salmon counted, exceeds the minimum target

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<sup>1</sup> F. Granger, Parks Canada, Fundy National Park, Alma, N.B. EOA 1B0.

requirement of 60 grilse and 29 salmon.

Early estimates of the LSW sport catch for outer Bay of Fundy rivers, 1989, are restricted to the Saint John River system. The estimated retention of 3,200 LSW fish was similar to that of 1988. The count of wild LSW fish at Mactaquac in 1989 was the highest recorded but only 4% greater than that of 1988. Total estimated returns of LSW fish destined for Mactaquac in 1989 (Marshall 1990) were 16% higher than the forecast. Return of LSW fish of smolts originating from Mactaquac was 0.76%, the second lowest on record (Table 3).

A count of 3,854 wild MSW salmon at Mactaquac in 1989 was double that of 1988 (Table 2a), in part because there were no MSW removals by the Kingsclear Band. Estimates of MSW fish destined for Mactaquac (4,072) were only 65% of the 1989 forecast (Marshall 1989). Spawning requirements above Mactaquac are estimated at 4,400 MSW fish; wild and hatchery MSW spawners were estimated to number 3,147 fish or 72% of requirement.

Forecasts of wild LSW fish returning to the Saint John and destined for Mactaquac in 1990 were derived from the equation  $\text{LnLSW} = 6.596 + 0.402 \text{ Ln Eggs}$  ( $r^2 = 0.45$ ;  $p = 0.008$ ) where 'Eggs' is the adjusted number of eggs five years previous. Forecasts are for 7,393 wild LSW fish destined for Mactaquac in 1990. The forecast of MSW fish returning to Mactaquac in 1990 based on the mean of the MSW and LSW ratios for returns in 1981-1983 and 1986-1989, but scaled to LSW returns in 1989 is for 6,325 MSW fish.

#### SYNOPSIS

With one exception, counting facility and river spawner counts in 1989 were nearly equal to or higher than 1988 counts in all SFAs of Scotia-Fundy Region. The exception was the LSW returns to Morgan Falls (LaHave River) which were down 15%, but angling catch was up almost 50%. Relative to the 1984-1988 mean, LSW counts at fishways (Table 2a) ranged from 32% below (Liscomb) to 31% above (Saint John). Counts of MSW salmon at the same facilities were nearly equal to or slightly below (1-13%) the 1984-88 mean counts. Wild MSW returns to these counting facilities were 65-117% of forecast numbers.

Counts by divers and at fishways suggest that 5 of 8 rivers or portions there of, Grand and Middle (SFA 19), LaHave (SFA 21) and Big Salmon and Alma (SFA 23) attained minimum target escapements. Data for the Liscomb (SFA 20), Point Wolfe and Saint John (SFA 23) rivers indicate that the target numbers of spawners were not attained.

The survival of hatchery-reared smolts released in 1988, to LSW returns at counting facilities, was 50% or less of the previous two years at Liscomb (SFA 20) and the second lowest on record (1988 being the lowest) for the Saint John River. Survival to Morgan Falls on the LaHave (SFA 21) was the second highest of an eleven year data set.

Recreational catches could only be estimated for SFAs 20 and 21. Catch of LSW fish relative to the 1984-1988 mean was down 25% for SFA 20 and up 21% for



SFA 21. The catches (releases) of MSW salmon were 45% below and 12% above the 1984-1888 means for SFA 20 and 21, respectively.

Forecast of MSW salmon returning to counting facilities in 1990, relative to 1989 forecasts are 13% higher on the Liscomb, SFA 20, 15% lower on the LaHave, SFA 21, and approximately equal on the Saint John River, SFA 23.

Escapement of LSW fish to inner Bay of Fundy rivers of SFA 22 and inner SFA 23 increased in 1989 relative to the previous two years. Poor LSW returns in 1987 and 1988 and the improved LSW escapement in 1989 have contributed to an unusually high proportion of LSW fish in the escapement for Big Salmon River. Forecast of LSW returns for the Stewiacke River (SFA 22) in 1990 suggests an increase over forecast LSW returns for 1989.

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Table 1. Numbers of 1SW and MSW salmon retained and released and effort by SFA in the sport fisheries of Scotia-Fundy Region, 1974-1989\*.

Year	SFA 19			SFA 20			SFA 21			SFA 22			SFA 23			
	Catch			Catch			Catch			Catch			Catch			
	1SW	MSW	Effort	1SW	MSW	Effort	1SW	MSW	Effort	1SW	MSW	Effort	1SW	MSW	Effort	
	Ret.	Rel.	in rod-days	Ret.	Rel.	in rod-days	Ret.	Rel.	in rod-days	Ret.	Rel.	in rod-days	Ret.	Rel.	in rod-days	
1974	416	588	5,231	3,462	434	18,922	2,462	397	9,732	2,004	714	7,133	1,312	1,798	16,897	
1975	117	213	1,894	694	94	6,405	1,416	656	6,093	818	293	3,521	1,888	1,691	17,078	
1976	278	445	3,244	2,652	219	14,038	2,474	321	11,784	1,931	537	8,476	3,150	2,498	20,511	
1977	768	561	4,885	1,639	422	10,882	3,434	643	14,910	296	898	8,911	2,040	2,553	22,792	
1978	257	456	7,567	396	272	9,396	460	481	7,168	1,681	334	5,844	843	924	17,128	
1979	281	304	11,502	2,178	267	16,903	2,969	374	10,907	1,258	490	12,529	3,034	927	21,420	
1980	997	795	20,306	3,555	469	19,286	2,773	1,104	18,774	151	526	6,162	2,734	2,860	28,947	
1981	1,265	496	6,636	2,556	581	23,364	4,324	1,248	28,023	1,045	379	6,622	1,963	1,473	30,423	
1982	857	523	12,752	1,657	201	21,354	1,847	494	20,846	983	444	8,382	3,129	2,361	45,520	
1983	330	426	11,964	1,363	400	19,533	524	326	21,651	2,402	386	16,764	2,210	1,103	40,311	
1984	822	108	358	8,761	1,745	128	282	14,426	2,159	232	316	18,868	966	29	257	10,226
1985	1,016	0	833	7,751	2,559	0	1,715	17,578	2,790	0	1,567	18,863	1,634	0	578	11,619
1986	804	0	1,976	8,907	2,271	0	1,622	20,150	3,110	0	1,583	23,240	830	0	843	11,710
1987	890	0	1,390	8,143	1,773	0	686	13,251	4,395	0	799	24,593	255	0	311	6,347
1988	873	0	1,580	10,359	2,758	0	1,280	21,434	3,022	0	846	27,222	574	0	175	6,788
1989	N/A**	0	N/A**	N/A**	1,673a	0	609a	15,221	3,749a	0	1,146a	19,011	N/A**	0	N/A**	N/A**
95% C.I.				±133			±48		±190			±58				
Mean																
1974-83	557	481		2,015	336				2,268	604			1,257	500		2,230
Mean																
1984-88	881	1,227		2,221	1,117				3,095	1,022			852	433		3,654

\* SFA's 19-22 based on DFO estimates 1974-1982 adjusted by differential between DFO and Nova Scotia license stub returns, 1983; i.e., 1.52, 1.32, 1.36, and 1.04 and license stub returns since 1983. SFA 23 based on DFO estimates.

\*\* Estimates of 1989 totals were not available by November 6.

a Preliminary; Conversion factors used to project 1989 catches : SFA 20 = 0.768; SFA 21 = 0.56.

Table 2a. Counts of wild Atlantic salmon from fishway traps in SFA's 20, 21, and 23, Scotia-Fundy Region.

Year	SFA 20 Liscomb		SFA 21 LaHave		SFA 23 Saint John	
	LSW	MSW	LSW	MSW	LSW	MSW
1974			29	2	3,389	4,775
1975			38	5	5,725	6,200
1976			178	23	6,797	5,511
1977			292	25	3,504	7,247
1978			275	67	1,584	3,034
1979	60		856	67	6,234	1,993
1980	111	0	1,637	288	7,555	8,157
1981	76	6	1,866	366	4,571	2,441
1982	252	10	799	256	3,932	2,262
1983	520	15	1,129	213	3,623	1,712
1984	606	48	2,043	384	7,353	7,011
1985	507	87	1,343	638	5,331	6,391
1986	736	117	1,579	584	6,347	3,656
1987	1,614	88	2,529	532	5,097	3,088
1988	477	76	2,449	386	8,062	1,930
1989	532	75	2,084	501	8,417	3,854
Mean (1) to 1983	204	8	710	131	4,691	4,333
Mean (2) 1984-88	788	83	1,989	505	6,438	4,415
%						
1989 (1)	261%	938%	294%	382%	179%	89%
1989 (2)	68%	90%	105%	99%	131%	87%

Table 2b. Number of Atlantic salmon, grilse and salmon counted by under-water observation in the Point Wolfe &amp; Alma rivers, SFA 23, 1985-1989. (F. Granger, pers. comm.).

Year	Point Wolfe		Alma	
	Grilse	Salmon	Grilse	Salmon
1985	196	4		
1986	66	29		
1987	36	39		
1988	25	24	33	24
1989	157	17	250	41

Table 3. Estimated numbers of 1SW and 2SW returns from hatchery-reared smolts released at or above counting facilities on Scotia-Fundy rivers, 1975-88.

Sea-age	River	Smolts (1000's) Returns %	Smolt Year													
			1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1SW	LaHave	Smolts <sup>a</sup>				83.9	21.9	61.4	29.0	2.0	19.6	7.2	5.6	23.4	26.9	15.5
		Ret (i+1)				1,064	336	1,181	621	27	250	102	135	573	1,056	489
		%				1.27	1.54	1.92	2.14	1.32	1.27	1.42	2.42	2.45	3.92	3.15
	Tusket	Smolts						11.3	29.4	15.8	52.1	10.0	22.6	55.7	30.3	48.1
	Ret (i+1)						110	108	102+	41+	51+	71	735	348+	314	
	%						0.97	0.37	0.64+	0.08+	0.51+	0.31	1.32	1.15+	0.65	
	Liscomb	Smolts				47.4	57.7	26.9	42.4	43.8	58.2	50.0	29.6	19.0	31.3	48.4
		Ret (i+1)				485	931	241	827	594	331	175	766	523	431	288
		%				1.02	1.61	0.90	1.95	1.35	0.57	0.35	2.59	2.75	1.38	0.60
	Saint John	Smolts <sup>b</sup>	324.2	297.4	293.1	196.2	244.0	232.3	189.1	172.2	144.5	206.5	89.1	191.5	113.4	142.4
		Ret (i+1)	9,074	6,992	3,044	3,827	10,793	4,730	2,732	1,337	1,410	1,899	773	3,006	762	1085
		%	2.80	2.35	1.04	1.95	4.42	2.04	1.44	0.78	0.97	0.92	0.87	1.57	0.67	0.76
2SW	LaHave	Smolts <sup>a</sup>				83.9	21.9	61.4	29.0	2.0	19.6	7.2	5.6	23.4	26.9	
		Ret (i+2)				385	116	102	64	0	63	49	54	54	164	
		%				0.46	0.53	0.17	0.22	0.00	0.32	0.68	0.97	0.23	0.61	
	Tusket	Smolts						11.3	29.4	15.8	52.1	10.0	22.6	55.7	30.3	
	Ret (i+2)						12	16+	6+	17+	8	11	59+	65		
	%						0.11	0.05+	0.04+	0.03+	0.08	0.05	0.11+	0.21		
	Liscomb	Smolts				47.4	57.7	26.9	42.4	43.8	58.2	50.0	29.6	19.0	31.3	
		Ret (i+2)				51	49	41	63	42	49	108	54	44	71	
		%				0.11	0.08	0.15	0.15	0.10	0.08	0.22	0.18	0.23	0.23	
	Saint John	Smolts <sup>b</sup>	324.2	297.4	293.1	196.2	244.0	232.3	189.1	172.2	144.5	206.5	89.1	191.5	113.4	
		Ret (i+2) <sup>c</sup>	2,725	2,534	1,188	2,992	2,612	1,531	539	963	799	714	403	678	374	
		%	0.84	0.85	0.40	1.52	1.07	0.66	0.28	0.56	0.55	0.35	0.45	0.35	0.33	

<sup>a</sup> Estimated "good quality" smolts.  
<sup>b</sup> Smolts > 12 cm.  
<sup>c</sup> Incl. some repeat spawners.  
+ Potentially higher.

Table 4. Recreationally caught and retained 1SW and MSW bright salmon on select Nova Scotia rivers, 1974 - 1989.\* (N/A - Not available).

Year	Liscomb		LaHave		Tusket		Stewiacke		St. Mary's	
	1SW	MSW	1SW	MSW	1SW	MSW	1SW	MSW	1SW	MSW
1974	47	0	850	92	26	6	1087	355	1734	216
1975	4	1	581	224	11	21	442	180	238	73
1976	66	9	1012	110	10	10	940	198	1386	128
1977	67	2	1468	232	21	12	104	370	605	158
1978	9	0	175	167	8	8	545	75	199	128
1979	85	1	1365	107	5	0	681	239	1521	87
1980	233	11	1273	520	76	58	41	203	1969	201
1981	46	7	1637	442	138	68	531	89	1133	359
1982	79	6	785	180	35	2	307	97	747	81
1983	52	6	259	200	29	15	1341	237	663	175
1984	66	0	1486	0	104	0	351	0	709	0
1985	88	0	1686	0	60	0	829	0	1182	0
1986	262	0	1844	0	181	0	428	0	1126	0
1987	316	0	2562	0	463	0	114	0	524	0
1988	142	0	1585	0	174	0	222	0	1263	0
1989**	9	0	2301	0	121	0	N/A***	0	345	0
Means										
1974-83	68.8	4.3	940.5	227.4	35.9	20	601.9	204.3	1019.5	160.6
1984-88	174.8	0	1832.6	0	196.4	0	388.8	0	960.8	0

\* Numbers for years 1974-82 adjusted to Nova Scotia license stub equivalents by factors; SFA 20 - 1.32 (Liscomb and St. Mary's); SFA 21 - 1.36 (LaHave and Tusket); SFA 22 - 1.04 (Stewiacke).

\*\* Preliminary

\*\*\* 1989 projection factor too variable when based on data received up to Nov. 6.