SURPLUSES TO SALMON SPAWNING REQUIREMENTS IN GULF N.B. RIVERS

by

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ABSTRACT

This document reports estimates of spawning requirements for Atlantic salmon, and available information on harvests between 1986 and 1990, for the Restigouche, Eel, Tabusintac, Miramichi, Richibucto, and Buctouche Rivers. Data sufficient for the determination of harvestable surpluses exist for only the Restigouche and Miramichi Rivers. Mean surpluses (1986-1990) on the Restigouche River have been 858 multi-sea winter fish (MSW) and 9044 one-sea winter fish (1SW). Surpluses on the Miramichi River have been 47 MSW and 75412 1SW fish. Average harvests have exceeded these surpluses on both rivers for MSW, but not 1SW fish.

RESUME

Le présent document donne une évaluation des besoins en matière de frai du saumon de l'Atlantique. On y retrouve les données disponibles sur les taux de capture entre 1986 et 1990, pour les rivières Restigouche, Eel, Tabusintac, Miramichi, Richibucto et Bouctouche. Ce n'est que pour les rivières Restigouche et Miramichi que nous avons des données suffisantes pour déterminer les surplus exploitables. Les surplus moyens (de 1986 à 1990) dans la rivière Restigouche était de 858 saumons pluribermarins (PBM) et de 9044 saumons unibermarins (UBM). Les surplus dans la rivière Miramichi étaient de 47 saumons PBM et de 75 412 saumons UBM. Les prises moyennes de saumon PBM dans les deux rivières ont dépassé ces surplus mais non celles du saumon UBM.

INTRODUCTION

The purpose of this research document is to synthesize available information on salmon returns, harvests, and surpluses to spawning requirements for Gulf N.B. Rivers which have native bands living on them. These rivers and their associated native bands are: Miramichi River (Burnt Church Band, Redbank Band, Eel Ground Band), Restigouche River (Eel River Band, Restigouche Band), Eel River (Eel River Band), Richibucto River (Big Cove Band, Indian Island Band), Buctouche River (Buctouche Band), and Tabusintac River (Burnt Church Band). Data on the Nepisiquit River (Pabineau Band) and Morell River (Morell Band) are to be presented elsewhere (K. Davidson, personal communication).

Data are reported for the years 1986-1990. The spawning requirement is calculated assuming, (1) an egg requirement of 2.4 eggs per square meter of rearing habitat, and (2) that all eggs are provided by multi-sea-winter (MSW) salmon, with 1SW salmon required only to balance the sex ratio.

METHODS

DFO - Gulf Region collects data on returns and harvests in the Miramichi River, and harvests in the Restigouche River. Data on sex ratios and fecundities are also available for salmon in these two rivers. Little information is available for the smaller N.B. Gulf rivers. Area of rearing habitat for each river was taken from Anon. (1978). MSW and 1SW spawning requirements for the smaller rivers were estimated assuming sex ratios and fecundities similar to the nearest big river (i.e., Restigouche River for the Eel River; Miramichi River for the Tabusintac, Richibucto, and Buctouche Rivers). This assumption is probably invalid for some stocks. The Eel River stock, for example, may well differ from the Restigouche stock in biological characteristics, as it does in run timing (late versus early for Restigouche stock).

The estimation of number of spawners needed was made as follows:

MSW required = egg requirement/# eggs per MSW fish
where # eggs per MSW fish = 5,593 (Miramichi River) or
5,852 (Restigouche River)
(These fecundities were derived as the egg requirements for the Miramichi and Restigouche Rivers, divided by their respective MSW requirement. These numbers are not average female fecundities.)

1SW required = MSW required X [ratio of 1SW required to MSW required in index river]

index rivers are: Miramichi R., requirement = 22600 1SW/23600 MSW

Restigouche R., requirement = 2600 1SW/12200 MSW

Information on harvests in the small rivers is also scarce. DFO Conservation and Protection (C&P) officers provided information on presence/absence of angling and native harvests on each river between 1986 and 1990 and estimates of the angling harvest in the Tabusintac River. Provincial angling statistics (FISHSYS) are collected for the Tabusintac and Buctouche Rivers, but not Eel or Richibucto Rivers. These data are considered unreliable for small rivers, but in the absence of better data, are reported here for the Buctouche River.

Run timing is reported as being early (fish moving through estuary before September) or late (September or later).

RESULTS AND DISCUSSION

Estimated spawning requirements, and harvests between 1986 and 1990, for each river are given in Tables 1-6. Calculated surpluses to spawning requirements for each river are as follows.

1. Restigouche River

In each of the last 5 years, spawning requirements for MSW and egg requirements have not been met, but requirements for 1SW have been exceeded (Table 1). Based on average returns in 1986-1990, surplus may be 9044 1SW salmon and 858 MSW salmon in the future.

2. Eel River

No data are available on number of fish spawning, eggs deposited, or available surplus in the Eel River between 1986 and 1990 (Table 2).

3. Tabusintac River

No data are available on number of fish spawning, eggs deposited, or available surplus in the Tabusintac River between 1986 and 1990 (Table 3).

4. Miramichi River

Between 1986 and 1990, spawning requirements were met twice for MSW salmon, and were exceeded in all years for 1SW (Table 4). Egg requirements were met in all years if eggs from 1SW fish are considered, but not based on MSW eggs alone. Average surplus to

requirements over the past 5 years has been 47 MSW salmon and 75412 1SW salmon.

Beginning in 1992, information required for the calculation of surpluses in each of the two main branches of the Miramichi River will be collected. Targets and harvests in each branch between 1986 and 1990 are provided in Tables 4a and 4b.

5. Richibucto River

No data are available on number of fish spawning, eggs deposited, or available surplus in the Richibucto River between 1986 and 1990 (Table 5).

6. Buctouche River

No data are available on number of fish spawning, eggs deposited, or available surplus in the Buctouche River between 1986 and 1990 (Table 6).

Literature Cited

Anonymous, 1978. Biological conservation subcommittee report. Prepared for the Atlantic Salmon Review Task Force.

Randall, R.G. 1984. Number of salmon required for spawning in the Restigouche River, N.B. CAFSAC Res. Doc. 84/16.

Randall, R.G. 1985. Spawning potential and spawning requirements of Atlantic salmon in the Miramichi River, New Brunswick. CAFSAC Res. Doc. 85/68.

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TABLE 1 RESTIGOUCHE RIVER (SFA 15)

Target: 71.4 X 10^6 eggs; 12,200 MSW, 2,600 1SW salmon(Randall 1984)

Year	1986	1987	1988	1989	1990	Mean
Angling Harvest						
Quebec (source PQ MLCP)						
MSW	1418	873	1007	1006	893	1039
1SW	498	591	692	450	549	556
New Brunswick (source: DFO C+P in "Redbook")						
MSW[a]	238	160	182	241	171	198
1SW	4915	4414	6084	2851	3559	4365
Total Angling Harvest						
MSW	1656	1033	1189	1247	1064	1238
1SW	5413	5005	6776	3301	4324	4964
Native Harvest						
Quebec-Restigouche Band (source: band)						
MSW	1145	986	921	1081	1135	1054
1SW	4	5	3	12	16	8
New Brunswick-Eel River Band (source: band)						
MSW	431	916	509	568	471	579
1SW	26	95	70	151	120	92
Total Native Harvest						
MSW	1576	1902	1430	1649	1606	1633
1SW	30	100	73	163	136	100
Poaching and Disease						
MSW	2355	1553	2116	1694	1423	1828
1SW	1762	1630	2206	1075	1408	1616
Charlo Hatchery Broodstock						
MSW	37	40	18	89	82	53
1SW	0	0	0	0	0	0
Total Returns						
MSW	16293	11607	14652	12237	10499	13058
1SW	12618	11740	15831	7840	10192	11644
Spawning Escapement						
MSW	10669	7079	9899	7558	6324	8306
1SW	5413	5005	6776	3301	4324	4964
% of Egg Target Met	89	59	83	63	53	70

[a] mortalities associated with catch and release of MSW in N.B.

Run timing: Early.

Methodology: Returns are estimated from angling catches with an assumed exploitation rate of 0.5. Poaching and disease is estimated as 16% of MSW and 14% of 1SW salmon available to anglers (see Randall et al. 1988).

TABLE 2 EEL RIVER (NB) (SFA 15)

Target: 1.1 X 10^6 eggs (173 MSW, 37 1SW salmon)

Year	1986	1987	1988	1989	1990	Mean
Angling Harvest						
MSW	-	-	-	-	-	-
1SW	-	-	-	-	-	-
Native Harvest						
MSW	-	-	-	-	-	-
1SW	-	-	-	-	-	-

Run timing: late.

Methodology: Rearing area surveys not conducted but estimated from drainage area and proportion of rearing area to drainage area for surveyed rivers in the same geographic area (Anon. 1978). Biological characteristics assumed were based on samples from Restigouche stocks. There has not been any reported angling in the Eel River in recent years. The Eel River Native Band fishes 2 trap nets and a number of gillnets in the mouth of the Eel River, 5 km south of Dalhousie, at the mouth of the Restigouche River, during May, June, and July. Salmon caught are assumed to be Restigouche stock because of the early run timing of salmon in the Restigouche River and consequently these harvests are included in the Restigouche assessments.

TABLE 3 TABUSINTAC RIVER (SFA 16)

Target: 1.9 x 10^6 eggs (334 MSW, 320 1SW salmon)

Year	1986	1987	1988	1989	1990	Mean
Angling Harvest						
MSW[1]	-	-	-	-	-	-
1SW[2]	221	156	354	700	314	349
Native Harvest						
MSW	-	-	-	-	-	-
1SW	-	-	-	-	-	-

[1] MSW angling catch is hook and release
[2] 1SW angling catch includes kept and released fish

Run timing: late August through October.

Methodology: Rearing area surveys have been conducted (Anon. 1978). Biological characteristics based on characteristics of Miramichi River stock. There was a native gillnet fishery in the river in 1991, but not during 1986-90.

TABLE 4 MIRAMICHI RIVER (SFA 16)

Target: 132.0 x 10^6 eggs; 23,600 MSW, 22,600 1SW (Randall 1985)

Year	1986	1987	1988	1989	1990	Mean
Angling Harvest (source: N.B. DNRE "Fishsys")						
MSW[1]	428	358	303	358	278	345
1SW	26163	20765	30620	24426	21372	24669
Native Harvests						
Burnt Church Band; Miramichi Bay (source: band)						
MSW	18	21	78	78	107	60
1SW	16	16	52	31	15	26
Redbank Band; Northwest Miramichi (source: band)						
MSW	336	615	175	400	300	365
1SW	1064	885	450	800	900	820
Eel Ground Band; NW Miramichi (source: band)						
MSW	287	262	95	62	202	182
1SW	908	373	442	254	1195	634
Total Native Harvest						
MSW	641	898	348	540	609	607
1SW	1988	1274	944	1085	2110	1480
Total Returns						
MSW	31285	19421	21745	17211	28574	23647
1SW	117549	84816	121919	75231	90548	98013
Spawning Escapement						
MSW	30216	18056	20980	16160	27588	22600
1SW	89398	62777	90278	49565	70924	72588
% of egg target met[a]						
	174	142	150	101	157	147

[1] assuming 3% hook-and-release mortality
[a] from all sea ages

Run timing: Salmon return to the Miramichi between May and November with peaks in May-August, and September-November. Both the native fishery and angling fishery target the early run. The early run alone has not met the spawning requirements for MSW in any of the last 5 years. However, the early runs have met the spawning requirements for 1SW salmon in each of the last 5 years.

Methodology: Returns to the Miramichi are estimated from catches in an estuarial salmon trap operated by DFO. Tag-recapture estimates of returns made annually to verify that the trap efficiency has not changed significantly since calibration. On average between 1986 and 1990, 91 MSW salmon have been used for enhancement purposes.

TABLE 4a NORTHWEST MIRAMICHI (SFA 16)

Target: 41.0 x 10^6 eggs; 7,316 MSW, 7,006 1SW salmon

Year	1986	1987	1988	1989	1990	Mean
Native Harvest						
Red Bank Band; NW Miramichi (source: band)						
MSW	336	615	175	400	300	365
1SW	1064	885	450	800	900	820
Eel Ground Band; NW Miramichi (source: band)						
MSW	287	262	95	62	202	182
1SW	908	373	442	254	1195	634
Total Native Harvest						
MSW	623	877	270	462	502	547
1SW	1972	1258	892	1054	2095	1454
Angling Harvest (source: DNRE "Fishsys")						
MSW[1]	115	63	92	84	67	84
1SW	9537	7095	9827	7568	6825	8170

[1] 3% assumed hook-and-release mortality.

TABLE 4b SOUTHWEST MIRAMICHI (SFA 16)

Target: 88.0 X 10^6 eggs (15,730 MSW, 15,063 1SW salmon)

Year	1986	1987	1988	1989	1990	Mean
Native Harvest						
MSW	0	0	0	0	0	0
1SW	0	0	0	0	0	0
Angling Harvest (source: DNRE "Fishsys")						
MSW[1]	313	295	210	274	211	261
1SW	16626	13670	20786	16858	14555	16499

[1] 3% assumed hook-and-release mortality.

TABLE 5 RICHIBUCTO RIVER (NB) (SFA 16)

Target: 2.9 X 10^6 eggs (526 MSW, 504 1SW salmon)

Year	1986	1987	1988	1989	1990	Mean
Angling Harvest						
MSW	-	-	-	-	-	-
1SW	-	-	-	-	-	-
Native Harvest						
MSW	-	-	-	-	-	-
1SW	-	-	-	-	-	-

Run timing: late.

Methodology: Rearing area surveys not conducted but estimated from drainage area and proportion of rearing area to drainage area for surveyed rivers in the same geographic area (Anon. 1978). Biological characteristics assumed were based on samples from Miramichi stocks. There have been both angling catches and native harvests during the 1986-1990 period, the size of which have not been recorded (pers. comm. DFO C.& P.).

TABLE 6 BUCTOUCHE RIVER (NB) (SFA 16)

Target: 1.1 X 10^6 eggs (191 MSW, 183 1SW salmon)

Year	1986	1987	1988	1989	1990	Mean
Angling Catch						
MSW[1]	1	0	0	2	1	1
1SW	60	0	0	0	16	15
Native Harvest						
MSW	-	-	-	-	-	-
1SW	-	-	-	-	-	-

[1] 3% assumed hook-and-release mortality.

Run timing: late.

Methodology: Rearing area surveys conducted (Anon. 1978). Biological characteristics assumed were based on samples from Miramichi stocks. There has not been a native harvest from the Buctouche River during the period 1986-1990.