North American Commission

# NAC(08)6

Overview Of Fisheries And Stock Status Of Atlantic Salmon In Eastern Canada For 2007

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## Summary of stock status

- Continued low numbers of adult salmon in eastern Canada
- Decline has been more severe for large (and 2SW) salmon compared to small salmon.
- Returns in 2007 of large salmon unchanged from recent ten years and third lowest of time series.
- Returns of small salmon declined sharply (-17%) from 2006.
- Lower returns of small salmon in 2007 and the continued low abundance of salmon overall cannot be attributed to changes in freshwater production. Where monitored, smolt production has generally remained unchanged over the past ten years.
- In 2007, conservation limits were met or exceeded in 36% of 64 assessed rivers.
- Return rates of salmon in monitored stocks remain low, which is considered to be the most important factor limiting adult salmon abundance.
- Despite major changes in fisheries management, returns have continued to decline in the southern areas and many populations are threatened with extirpation.

#### 1) FISHERIES IN 2007

Catch in 2007 for Canada was 112 t, for St. Pierre & Miquelon was 2 t, and at West Greenland was 25 t. Catch in 2007 for Canada and for the total North Atlantic is the lowest of record.

Nominal catch of Atlantic salmon (t, round fresh weight) in the North Atlantic. Data for 2006 are finalized values, data for 2007 are provisional and are taken from the ICES Working Group on North Atlantic salmon report for April 2008.

		NA	С							Total
			St.P.		NEAC		High seas	fisheries		North
Year	Canada	USA	& M.	Total	Total	Faroes	East Gr	WestGr	Other	Atlantic
1980	2,680	6	-	2,686	5,434	536	< 0.5	1,194	277	10,127
1981	2,437	6	-	2,443	4,909	1,025	< 0.5	1,264	313	9,954
1982	1,798	6	-	1,804	4,471	606	< 0.5	1,077	437	8,395
1983	1,424	1	3	1,428	5,873	678	< 0.5	310	466	8,755
1984	1,112	2	3	1,117	4,769	628	< 0.5	297	101	6,912
1985	1,133	2	3	1,138	5,533	566	7	864	-	8,108
1986	1,559	2	3	1,563	6,183	530	19	960	-	9,255
1987	1,784	1	2	1,787	4,830	576	< 0.5	966	-	8,159
1988	1,310	1	2	1,313	5,284	243	4	893	-	7,737
1989	1,139	2	2	1,143	4,060	364	-	337	-	5,904
1990	911	2	2	915	3,420	315	-	274	-	4,924
1991	711	1	1	713	2,822	95	4	472	-	4,106
1992	522	1	2	525	3,329	23	5	237	-	4,119
1993	373	1	3	377	3,296	23	-	-	-	3,696
1994	355	0	3	358	3,581	6	-	-	-	3,945
1995	260	0	1	261	3,278	5	2	83	-	3,629
1996	292	0	2	294	2,750	-	0	92	-	3,135
1997	229	0	2	231	2,074	-	1	58	-	2,364
1998	157	0	2	159	2,219	6	0	11	-	2,396
1999	152	0	2	154	2,073	0	0	19	-	2,246
2000	153	0	2	155	2,728	8	0	21	-	2,913
2001	148	0	2	150	2,876	0	0	43	-	3,069
2002	148	0	2	150	2,495	0	0	9	-	2,654
2003	141	0	3	144	2,303	0	0	9	-	2,456
2004	161	0	3	164	1,977	0	0	15	-	2,156
2005	139	0	3	142	1,999	0	0	14	-	2,155
2006	137	0	3	140	1,878	0	0	22	-	2,040
2007	112	0	2	114	1,394	0	0	25	-	1,533

Harvest (fish which are retained) and catches (including harvests and fish caught–and–-released in recreational fisheries) are categorized in two size groups: small salmon and large salmon.

<u>Small salmon</u>, generally 1SW, in the recreational fisheries refer to salmon less than 63 cm fork length, whereas in commercial fisheries, it refers to salmon less than 2.7 kg whole weight.

<u>Large salmon</u>, generally MSW, in recreational fisheries are greater than or equal to 63 cm fork length and in commercial fisheries refer to salmon greater than or equal to 2.7 kg whole weight.

The harvest of 112 t in 2007 was comprised by number of 37,540 small salmon and 10,256 large salmon; the lowest value of record for small salmon and the third lowest value for large salmon, since 1985.

	Si	mall	L	arge	Т	Total	
Year	(t)	(number)	(t)	(number)	(t)	(number)	
1985	593	333,084	540	122,621	1,133	455,705	
1986	780	417,269	779	162,305	1,559	579,574	
1987	833	435,799	951	203,731	1,784	639,530	
1988	677	372,178	633	137,637	1,310	509,815	
1989	549	304,620	590	135,484	1,139	440,104	
1990	425	233,690	486	106,379	911	340,069	
1991	341	189,324	370	82,532	711	271,856	
1992	199	108,901	323	66,357	522	175,258	
1993	159	91,239	214	45,416	373	136,655	
1994	139	76,973	216	42,946	355	119,919	
1995	107	61,940	153	34,263	260	96,203	
1996	138	82,490	154	31,590	292	114,080	
1997	103	58,988	126	26,270	229	85,258	
1998	87	51,251	70	13,274	157	64,525	
1999	88	50,901	64	11,368	152	62,269	
2000	95	55,263	58	10,571	153	65,834	
2001	86	51,225	61	11,575	148	62,800	
2002	99	53,464	49	8,439	148	61,903	
2003	81	46,768	60	11,218	141	57,986	
2004	94	54,253	68	12,933	161	67,186	
2005	83	47,368	56	10,938	139	58,307	
2006	82	46,747	55	11,248	137	57,995	
2007	64	37,540	48	10,256	112	47,796	
2007 as % of previous five							
year average Previous five	-27%	-25%	-16%	-6%	-23%	-21%	
year average	88	49,720	57	10,955	145	60,675	

Harvest (weight, number) of Atlantic salmon by size group, 1985 to 2007.

No commercial fisheries occurred in Canada in 2007.

Fisheries are principally managed on a river-by-river basis and, in areas where retention of large salmon is allowed, it is closely controlled. Three user groups exploited salmon in Canada in 2007

- Aboriginal peoples,
- residents fishing for food in Labrador, and
- recreational fishers.

Most catches (95%) in Canada now take place in rivers or in estuaries. The remainder of the catches which occur in coastal waters are for the Labrador subsistence fisheries which are mainly

located close to river mouths. There was an estimated 6 t of coastal catch in 2007 (5% of the total catch of 112 t).

			Location of fishery / Lieu de pêche						
		River /	eau douce	Estuar	y / estuaire	Coastal / côtier			
Fishery /			% of location		% of location		% of location		
Pêcherie		kg	/ par endroit	kg	/ par endroit	kg	/ par endroit		
Recreational / sportif		62,785	100%						
Aboriginal & Resident food / aborigène et alimentation	NB NS PEI Québec Labrador	7,488 0	41% 0%	4,531 45 6 10,776 20,451	100% 100% 100% 59% 77%	6,005	23%		
Total		70,273	63%	35,808	32%	6,005	5%		

Landings by user group and location of fishery in 2007.

## **Aboriginal Fisheries**

The Supreme Court of Canada affirmed the constitutional right of the Aboriginal Peoples of Canada to fish for food, social and ceremonial purposes (FSC). The priority right to fish for FSC purposes over all other users can only be superceded by conservation of the resource.

In Québec and in DFO Gulf Region, Aboriginal peoples' food fisheries took place subject to agreements or through permits issued to the bands. The permits generally stipulate gear, season, and catch limits.

In Labrador (SFAs 1 and 2), food fishery arrangements in 2007 were developed with Nunatsiavut (fishing in northern Labrador coastal communities and Lake Melville),

Innu Nation (fishing in Natuashish and in Lake Melville from the community of Sheshatshiu), and Labrador Métis Nation (fishing in southern Labrador from Fish Cove Point to Cape St. Charles).

By agreement with First Nations there were no food fisheries for salmon in Newfoundland in 2007.

Harvest by Aboriginal peoples with recreational licenses are reported under the recreational harvest categories.

Harvests in 2007 are provisional. The increase in harvests in 2004 to 2006 are attributed to the reporting of harvests of the Labrador Metis Nation in the aboriginal fishery rather than as resident food fishery.

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		% large / % grands					
Year /	Harvest /	By weight /	By number /				
Année	Récolte (t)	par le poids	par nombre				
2003	44.3	72	49				
2004	60.8	66	44				
2005	56.7	57	34				
2006	61.4	60	39				
2007	47.6	61	40				

Reported aboriginal fishery harvests in eastern Canada.

#### **Residents fishing for food in Labrador**

The resident food fishery in Labrador was initiated in 2000. The Labrador residents fishing occurs in Lake Melville and the southern Labrador coastal communities from Cartwright to Cape St. Charles. The Labrador residents fishery includes non-aboriginal peoples and the fishery permitted a retention to a maximum of four salmon of any size while fishing for sea-run speckled trout and arctic charr. The estimated total catch of salmon for the fishery in 2007 was 1.7 t, about 733 fish.

Harvest in the Labrador resident food fishery.

		Number of fish /	% large by number
	Harvest /	Nombre de	/% grand par
Year / Année	Prélèvement (t)	poissons	nombre
2000	5.6	2,300	21%
2001	5.0	2,100	24%
2002	5.9	2,700	17%
2003	6.8	3,000	21%
2004	2.2	880	25%
2005	2.7	1,150	20%
2006	2.6	1,052	27%
2007	1.7	733	13%

#### **Recreational Fisheries**

Licenses are required for all persons fishing recreationally for Atlantic salmon. Gear is generally restricted to fly fishing and there are restrictive daily/seasonal bag limits. Recreational fisheries management in 2007 varied by area from complete closures of all fisheries to retention of both small and large salmon. Except in Québec and Labrador (SFA 1 and some rivers of SFA 2), only small salmon could be retained in the recreational fisheries. A large portion of the Maritime provinces and Anticosti Island were closed to salmon angling. This management plan was similar to that of 2004 to 2006, with a few river-specific differences.

Total recreational harvest of small and large salmon in 2007 of 30,247 fish was the lowest of record. A total of 26,750 small salmon and 3,497 large salmon were harvested.



Total harvest of salmon by size group in the recreational fisheries of eastern Canada, 1974 to 2007.

The percentage of the catches and harvests (by number of fish) in the bright salmon recreational fisheries in 2007 by province (and separately for Labrador and insular Newfoundland) are presented below. Almost 70% of the small salmon catches and 63% of the small salmon harvests were reported from Newfoundland and Labrador in 2007. Quebec has the largest percentage of the catch and harvests of large salmon. Of note, there are no complete recreational catch and harvest data for New Brunswick since 1997 and the values tabled are estimates of the proportion of the returns based on data from the early 1990s.

	Sma	11	Large		
	Catch	Harvest	Catch	Harvest	
Newfoundland & Labrador	68%	63%	18%	7%	
Québec	9%	14%	37%	93%	
New Brunswick	20%	22%	38%	0%	
Prince Edward Island	0%	0%	0%	0%	
Nova Scotia	2%	1%	6%	0%	
Total (number of fish)	49,884	26,750	23,183	3,497	

The percentage of the catch and the percentage of the harvest by size group within the provinces of eastern Canada in 2007.

The practice of catch and release in rod fisheries has become increasingly common on both sides of the Atlantic. In 2007, an estimated 179,000 salmon (size groups combined) were reported released in North Atlantic.

Within Canada, about 43,000 salmon (20,000 large and 23,000 small) were estimated to have been caught and released in 2007. This represents about 59% of the total number caught, including retained fish. Most of the fish released were in Newfoundland (49%), followed by New Brunswick (30%), Québec (15%), Nova Scotia (5%), and Prince Edward Island (0.2%). Expressed as a proportion of the fish caught, Nova Scotia anglers released the highest percentage (89%), followed by Prince Edward Island (88%), New Brunswick (69%), Newfoundland (55%), and Québec (48%).

Year	Ne	wfoundla	and	N	ova Scoti	a		Nev	v Brunsw	ick		Prince	Edward	sland		Quebec			CANADA*	
							Small	Small	Large	Large										
	Small	Large	Total	Small	Large	Total	Kelt	Bright	Kelt	Bright	Total	Small	Large	Total	Small	Large	Total	SMALL	LARGE	TOTAL
1984				939	1,655	2,594	661	851	1,020	14,479	17,011							2,451	17,154	19,605
1985		315	315	1,323	6,346	7,669	1,098	3,963	3,809	17,815	26,685			67				6,384	28,285	34,669
1986		798	798	1,463	10,750	12,213	5,217	9,333	6,941	25,316	46,807							16,013	43,805	59,818
1987		410	410	1,311	6,339	7,650	7,269	10,597	5,723	20,295	43,884							19,177	32,767	51,944
1988		600	600	1,146	6,795	7,941	6,703	10,503	7,182	19,442	43,830	767	256	1,023				19,119	34,275	53,394
1989		183	183	1,562	6,960	8,522	9,566	8,518	7,756	22,127	47,967							19,646	37,026	56,672
1990		503	503	1,782	5,504	7,286	4,435	7,346	6,067	16,231	34,079			1,066				13,563	28,305	41,868
1991		336	336	908	5,482	6,390	3,161	3,501	3,169	10,650	20,481	1,103	187	1,290				8,673	19,824	28,497
1992	5,893	1,423	7,316	737	5,093	5,830	2,966	8,349	5,681	16,308	33,304			1,250				17,945	28,505	46,450
1993	18,196	1,731	19,927	1,076	3,998	5,074	4,422	7,276	4,624	12,526	28,848							30,970	22,879	53,849
1994	24,442	5,032	29,474	796	2,894	3,690	4,153	7,443	4,790	11,556	27,942	577	147	724				37,411	24,419	61,830
1995	26,273	5,166	31,439	979	2,861	3,840	770	4,260	880	5,220	11,130	209	139	348		922	922	32,491	15,188	47,679
1996	34,342	6,209	40,551	3,526	5,661	9,187						472	238	710		1,718	1,718	38,340	13,826	52,166
1997	25,316	4,720	30,036	713	3,363	4,076	3,457	4,870	3,786	8,874	20,987	210	118	328	182	1,643	1,825	34,748	22,504	57,252
1998	31,368	4,375	35,743	688	2,476	3,164	3,154	5,760	3,452	8,298	20,664	233	114	347	297	2,680	2,977	41,500	21,395	62,895
1999	24,567	4,153	28,720	562	2,186	2,748	3,155	5,631	3,456	8,281	20,523	192	157	349	298	2,693	2,991	34,405	20,926	55,331
2000	29,705	6,479	36,184	407	1,303	1,710	3,154	6,689	3,455	8,690	21,988	101	46	147	445	4,008	4,453	40,501	23,981	64,482
2001	22,348	5,184	27,532	527	1,199	1,726	3,094	6,166	3,829	11,252	24,341	202	103	305	809	4,674	5,483	33,146	26,241	59,387
2002	23,071	3,992	27,063	829	1,100	1,929	1,034	7,351	2,190	5,349	15,924	207	31	238	852	4,918	5,770	33,344	17,580	50,924
2003	21,379	4,965	26,344	626	2,106	2,732	1,555	5,375	1,042	7,981	15,953	240	123	363	1,238	7,015	8,253	30,413	23,232	53,645
2004	23,430	5,168	28,598	828	2,339	3,167	1,050	7,517	4,935	8,100	21,602	135	68	203	1,291	7,455	8,746	34,251	28,065	62,316
2005	33,129	6,598	39,727	933	2,617	3,550	1,520	2,695	2,202	5,584	12,001	83	83	166	1,116	6,445	7,561	39,476	23,529	63,005
2006	30,491	5,694	36,185	1,014	2,408	3,422	1,071	4,186	2,638	5,538	13,433	128	42	170	1,091	6,185	7,276	37,981	22,505	60,486
2007	17,168	3,892	21,060	883	1,471	2,354	1,106	2,963	1,850	7,040	12,959	63	41	104	951	5,392	6,343	23,134	19,686	42,820

Catch and release estimates by size group in the recreational fisheries of eastern Canada.

\* totals for all years prior to 1997 are incomplete and are considered minimal estimates blank cells indicate no information available

#### **Other fisheries**

#### St. Pierre & Miquelon

Based on a report from the Ministry of Agriculture and Fisheries, the following observations were made relative to the 2007 salmon fishery at St. Pierre et Miquelon:

- Fishermen indicated that the fishery in 2007 was poor.
- Fish arrived later than usual in 2007
- Catches were a mixture of small and large salmon from the start of the fishery, in contrast to other years when large salmon were captured first
- Effort was considered to have been similar to previous years but catches were substantially less than recent years.

This fishery catches salmon of both Canadian and USA origin. Based on samples collected in 2004, 100% were of North American origin of which 98% originated in Canada and 2% originated in the USA.

Reported harvest in 2007 was 1.9 t, decrease of 1.6 t (-44%) from 2006 and the lowest value since 1997.

Year /	Professional Licenses /	Recreational Licenses (kg) /	Total (kg)
Année	Pêcheurs professionels(kg)	Pêcheurs plaisanciers	
2000	1 134	1 133	2 267
2001	1 544	611	2 155
2002	1 223	729	1 952
2003	1 620	1 272	2 892
2004	1 499	1 285	2 784
2005	2 243	1 044	3 287
2006	1 730	1 825	3 555
2007	970	977	1 947

*Reported harvest (kg) by licence type in St. Pierre & Miquelon, 2000 to 2007.* 

## West Greenland fishery in 2007

Reported harvest in 2007 was 24.6 t representing about 6,300 fish

- 16.6 t were reported sold on the open markets and to hotels, restaurants or institutions
- 8.1 tons were reported kept for private consumption
- sampling from Qaquortoq indicated under-reporting at that location only (960 kg sampled, 801 kg reported)
- reported landing of 24.6 t, adjusted landing for assessment of 24.8 t

A total of 132 people reported fishing in 2007 but it was indicated that this is probably less than half of the people fishing.

Based on samples collected from the fishery, 82% of the samples were of North American origin. When weighted by catch, 6100 fish (76%) were estimated to have been of North American origin, 1900 fish (24%) were of European origin.

Tags from fish in eastern Canada were reported from the fishery in 2007: one salmon tagged as wild smolt from Miramichi River in 2006 and one salmon tagged as an adult spawner from Miramichi River in the fall of 2006.

### 2) STOCK STATUS FOR EASTERN CANADA

There are about 700 rivers in eastern Canada which are considered to have or have had anadromous Atlantic salmon populations. The rivers are distributed from 52.7° to 71.7°W and 43.6° to 58.8°N. This includes 223 rivers in the three Maritime provinces (New Brunswick, Nova Scotia, Prince Edward Island), 109 rivers in Quebec, 267 rivers in Insular Newfoundland, and 90 rivers in Labrador.



Stock status is inferred from a number of indicators including returns and spawners of adult salmon, smolt production, and juvenile indices. Returns and spawners are compared to the defined conservation limits for the rivers.

#### Total abundance of salmon

An approximation of the total abundance of salmon of all age groups was obtained by adding the returns from each region (Scotia-Fundy, Gulf, Quebec, Newfoundland, Labrador), the commercial fishery catches of Newfoundland and Labrador, and the commercial catch of salmon of North American origin at West Greenland. These numbers are different from those calculated at ICES for the following reasons:

- large salmon above include two-sea-winter, three-sea-winter and repeat spawners
- the numbers are not corrected for natural mortality between commercial fisheries and returns to rivers (if we were to correct for this, the estimates would be slightly higher).

This is shown in the graph below.



The low abundance of adult salmon continued into 2007.

Important points about the estimated abundance:

- Abundances between 1972 and 1990 show large annual variations
- Maximum estimated abundance of salmon was about 1.6 million fish, all age groups
- Abundance of Atlantic salmon, all age groups combined was about 500 thousand fish from 1997 to 2003.
- In 2007, there were an estimated 575 thousand fish.

Large salmon abundance peaked at over 800 thousand fish but since 1999, there are fewer than 140 thousand animals of this size group, ages combined.

- Large salmon abundance has declined by 89% over the past 35 years.
- In 2007, there were an estimated 130,000 large salmon.
- Returns in 2007 of large salmon were unchanged from recent ten years and the third lowest of time series.
- Differences between returns to regions and total abundance represent removals in marine fisheries of Newfoundland and Labrador and West Greenland.
- In the Maritime provinces and Quebec, these large salmon are the egg-bearing females.





Small salmon (grilse) abundance declined from peaks of about 900 thousand fish to as low as 300 thousand fish in the 1990's.

- Small salmon abundance has declined by 50% over the past 35 years. •
- There has been a slight upturn in small salmon abundance to about 500 thousand fish since • 2005.
- In 2007, there were an estimated 450,000 small salmon. •
- Returns of small salmon declined sharply (-17%) from 2006 due to reduced marine survival. •



#### Small salmon

Declines in large salmon returns have been most severe in the Maritime provinces of eastern Canada. The upturn in small salmon abundance has occurred in Labrador and Newfoundland but not in the southern areas of eastern North America. The only upturn post commercial fishery closures has been noted in the small salmon returns to Labrador whereas returns to all other areas have remained the same or declined. Returns to the southern area (Scotia-Fundy) have remained at the lowest levels of the time series.







## **Spawners Relative To Conservation**

## Conservation objectives

Conservation limits have been defined for all management regions of eastern Canada and correspond to an egg deposition per unit area of freshwater productive habitat. By geographic area, the conservation requirements are:

• Maritime provinces : 240 eggs per 100 m<sup>2</sup> of fluvial habitat, expected to maximize freshwater production

• Insular Newfoundland : 240 eggs per 100 m<sup>2</sup> of fluvial area plus 368 eggs per ha of pond area or 105 eggs per ha of pond area for northern peninsula. This level is expected to maximize freshwater production.

• Québec: 168 eggs per 100 m<sup>2</sup> of units of productive habitat (habitat is weighted by productive capacity). This rate is expected to optimize harvest potential of adults.

• Labrador: 190 eggs per 100 m<sup>2</sup> of fluvial habitat. Fluvial habitat areas for many rivers remain to be measured.

## Spawners relative to conservation

Estimated total spawners of 2SW salmon to each of the five regions in eastern Canada in 2007 were below the regional 2SW conservation requirements.

In 2007, river-specific spawning escapements relative to conservation were available from 63 rivers, compared to 70 rivers in 2006. High water conditions in the fall of 2007 prevented assessments in several rivers.



In 2007, 36% of the assessed rivers met or exceeded the conservation limits, compared to 50% of the 70 assessed rivers in 2006. Severe underescapement (<50% of conservation limit) was observed in 38% of the assessed rivers in 2007, in contrast to 29% of the assessed rivers in 2006. Most of the rivers with severe deficits in spawners were in the southern areas and in rivers under colonization or development (upper Exploits, Terra Nova, Pabos, Jacques Cartier,...).

Overall, fewer rivers met or exceeded conservation in 2007 relative to 2006. Since 2000, generally less than 50% of the assessed rivers have met or exceeded the river-specific conservation limits in eastern Canada.

Percentage of assessed	2000	2001	2002	2003	2004	2005	2006	2007
rivers exceeding CL	43%	38%	29%	44%	54%	45%	50%	36%

In the Maritime provinces, conservation limits were met or exceeded in only 4 of the 13 (31%) assessed rivers, same number as in 2006 (4 of 16 assessed rivers). Large deficits in spawning escapement were noted in the other nine rivers in 2007, compared with only seven of 16 rivers in 2006.



In Quebec, conservation limits were achieved in 38% of the 32 assessed rivers, in contrast to 54% of the 35 assessed rivers in 2006. Large deficits were observed in 31% of the assessed rivers in 2007 (compared with 17% in 2006) but these rivers were closed to retention of large salmon in the recreational fishery. In the 12 assessed rivers where retention of large salmon in the recreational fishery was allowed, conservation limits were exceeded in 9 of them (75%). In the other three rivers, the percent of conservation achieved ranged from 72% to 98%, in 2007.



In Newfoundland and Labrador, the conservation limits were exceeded in 37% of the 19 assessed rivers, compared with 63% of 19 rivers in 2006. The rivers which met or exceeded the conservation limits were all in the northern areas of this region. Large deficits (<50% of conservation) were noted in 26% of the assessed rivers in 2007, compared with only 4% of the rivers in 2006. For Labrador, conservation was exceeded in 2 of the 4 assessed rivers in 2007, compared to all four rivers exceeding conservation in 2006.



#### **Freshwater production**

Wild smolt production was estimated in 11 rivers in 2007. Relative to 2006, smolt production increased (>10% change) in five rivers, decreased in two rivers and remained unchanged in four rivers. The relative smolt production, scaled to the size of the river using the conservation egg requirements, was highest in the rivers of Québec and low in the southern rivers of the Scotia Fundy. In nine rivers monitored over at least the past ten years, there has generally been no change in smolt production with the exception of Campbellton River (Newfoundland) (decline) which showed a decline. Smolt production remains low in the southern areas which are consistent with the low spawning escapements to these rivers.

Juvenile salmon abundance monitored annually in a number of southern region and Gulf rivers show trends consistent with stock status. In the rivers of the southern Gulf, densities of juveniles have increased since 1985 in response to increased spawning escapements. Abundances of juveniles in the Atlantic coast rivers of Nova Scotia and Bay of Fundy rivers are low and have declined with decreasing spawning escapement. In the most recent survey (2002), young-of-the-year salmon were absent from 30 of 34 rivers sampled in the Inner Bay of Fundy, a stock which is presently listed as "Endangered" under Canada's Species at Risk Act.

## Sea survival

Survival rates of the 2006 smolts returning as small salmon (or 1SW salmon) in 2007 were below the values of the 2005 smolts in all nine rivers assessed. Survival rates were 18% to 86% below those of 2005. 2SW salmon survival rates were also generally lower.

	% to 1SW / au stade madeleineau				
	Smolt year				
River / rivière	2006	2005	2004		
Western Arm Brook (Newfoundland)	3.8	15.1	5.9		
Campbellton (Newfoundland)	5.6	9.2	11.4		
Conne (Newfoundland)	3.3	4.0	2.5		
St-Jean (Quebec)	0.3	0.4	0.7		
LaHave (Nova Scotia)	1.5	8.0	1.1		
NAshwaak (New Brunswick)	1.8	12.7	5.1		
Saint John Hatchery (New Brunswick)	0.2	0.6	0.4		

Time series of return rates of smolts to 1SW and 2SW adults provide insights into temporal changes in marine survival of wild and hatchery 1SW and 2SW stocks. Specifically:

- Return rates in 2007 to many rivers were among the lowest of the time series and were low compared to historical levels,
- Return rates of fish to home waters did not increase as expected after closure of the commercial fisheries in 1984 and subsequently in 1992,
- 1SW return rates in MSW salmon stocks (Scotia-Fundy, Gulf, Quebec) are lower than those in predominantly 1SW salmon stocks of Newfoundland,

• 1SW return rates in MSW salmon stocks of the Scotia-Fundy and Gulf exceed those of 2SW salmon but 2SW returns rates are greater than 1SW return rates in Québec populations, and

Summary of	Summary of return rates of monitored stocks for the last five years									
Origin	Age	Decion	Retu	Return rate						
Origin	group	Region	Mean (%)	Range (%)	of stocks					
Wild	1SW	Scotia-Fundy	4.22	1.13 to	2					
				12.73						
		Gulf	3.29	1.90 to 6.40	2					
		Québec	0.73	0.27 to 1.49	2					
		Newfoundland	5.65	1.30 to	5					
				15.10						
Wild	2SW	Scotia-Fundy	0.96	0.24 to 1.58	2					
		Gulf	1.60	0.80 to 2.20	1					
		Québec	0.70	0.19 to 1.39	2					
Hatchery	1SW	Scotia-Fundy	0.37	0.24 to 0.56	1					
	2SW	Scotia-Fundy	0.11	0.06 to 0.15	1					

• Return rates of wild stocks exceed those of hatchery stocks.