

## Comments on the Predation of Salmon by Seals in the Coastal Waters of Newfoundland and Labrador

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There are six species of seals present in Newfoundland and Labrador waters, i.e. harp, hooded, harbour, grey, ringed and bearded seals. Approximately 7,000 seal stomachs containing food have been examined. There is little information to evaluate the importance of seal predation on salmon in either coastal areas or offshore areas; only two incidences of salmon have been documented in the stomachs of harp seals and none for any other species (Anon. 2000; Hammill and Stenson 2000). Despite this lack of evidence in the diet of seals sampled by DFO, all seals (with the exception possibly of bearded seals) are known to opportunistically take salmon in Newfoundland and Labrador waters.

Presently there is growing concern that seals are responsible for the declining returns of salmon in many Newfoundland and Labrador Rivers (e.g. Cairns 2001). To address some of the key aspects of this issue a River Observation Program was implemented in 1999 on rivers with counting facilities to identify which rivers have seal/salmon interactions, to document the frequency of occurrence and nature of the interactions, and to evaluate potential mitigation actions where problems exist (the program is ongoing). Furthermore, in 1997 a questionnaire dealing with seal/salmon interactions along the coast of Labrador was presented to commercial fishermen.

Participants in the River Observation Program recorded the date, location, time, sighting effort and activities of all mammalian and avian predators observed in the vicinity of the counting facility. In addition to this detailed logbook information, DFO personnel who spend significant amounts of time on rivers were interviewed in order to synthesize their existing knowledge of salmonid predation.

The seal/salmon questionnaire dealt with a wide range of fishery-related issues including when and where seal and avian predation problems occurred. A total of 89 commercial fishermen participated; however, several of the questions allowed the respondents to list more than one answer. Thus, for some results  $n > 89$  responses. Although the commercial fishery was closed in 1998, much of the information collected is relevant to current seal/salmon interaction issues.

Based on interviews with DFO personnel, seals were observed more frequently, and thought to be more of a predation threat, in rivers along the NE Coast of Newfoundland and parts of the Avalon Peninsula compared to the West Coast. Harp seals were the most commonly identified problem species along the NE Coast while harbour seals were the most common along the southern Avalon Peninsula.

Logbook information was collected for periods of 1–3 years from 7 rivers that have counting facilities. The longest series of data is from Northeast Brook in southern Newfoundland and the English River in Labrador; Table 1 summarizes seal observations at each of these study areas. In Northeast Brook 87.5% (1999), 80.0% (2000) and 77.4% (2001) of seals were sighted during late August and September. In the English River Estuary 77.0%, 73.0% and 88.8% of the seal sightings were made prior to mid-July in 1999, 2000 and 2001 respectively.

**Table 1.** Seal Observations for Northeast Brook, Newfoundland and English River, Labrador. In both study areas the field seasons were approximately 70–90 days from early July to mid- or late September.

	Obs. Hours	Total Seals	Sighting Effort	% of Days with a sighting	Species (%)
N.E. Brook					
1999	30.0	16	0.48/hr	17.5	harbour
2000	30.0	21	0.63/hr	20.2	harbour
2001	30.0	25	0.74/hr	21.2	harbour
English R.					
1999	83.0	43	0.52/hr	23.3	26 ringed; 67 harp
2000	70.8	26	0.37/hr	16.3	19 ringed; 69 harp
2001	78.0	89	1.10/hr	20.0	8 ringed; 88 harp

Based on limited logbook data only 2 seals were seen in the Campbellton River in 2001. Sightings were made on 8.7% of the observation days and the effort was 0.18 seals/hr. There was no reported seal predation at the Bishops Falls Fishway, Northeast River or the mouth of the Rocky River or the nearby Colinet River during the smolt and adult runs. Paradise River supports a significant population of harbour seals and individuals are seen almost daily at known haul-out sites and at predictable foraging sites (these data are still being analyzed).

Of those fishermen responding to the seal/salmon questionnaire, 45.8% indicated that the most significant challenges they faced during the season were interactions with seals. Other concerns included the presence of ice (20.4%), the occurrence of dirty water (19.0%) and the presence of sea gulls (14.8%; n = 142 responses). Seals and sea gulls were considered to be the two most important predators by 57.5% and 38.1% of the fishermen respectively (n = 134 responses).

Overall the fishermen felt that grey (29.1%), harp (28.6%) and harbour seals (23.4%) were the most problematic (n = 175 responses). Other species such as ringed, hooded and bearded seals were less of a concern. However, there were geographic differences in how fishermen ranked the various species (Table 2). Those setting nets along more exposed coastlines (Black Tickle, Charlottetown and Mary's Harbour) tended to have problems with highly migratory seal species such as harp seals while nets set in protected bays (Makkovik, Rigolet and Cartwright) were frequented by more sedentary species like harbour and grey seals.

Results of the interviews and River Observation logbooks indicate that there is considerable geographic variability in the occurrence of seal/salmon interactions as well as in the species of seal predator involved. Although some observations pertain to harbour seals and grey seals, many refer to harp seals. Satellite tags placed on harp seals during the mid-1990s indicated that they were migrating into Newfoundland and Labrador waters earlier and staying later in the spring compared to the 1980s. Tagging data also indicated that a portion of the population frequented inshore areas where they were not normally observed in such high numbers (Stenson and Sjare 1997).

Logbooks and observations made by commercial salmon fishermen along the coast of Labrador are consistent with the information provided by the tagging study. Changes in the timing of harp seal migrations into and out of Newfoundland waters during the 1990s is likely a response to changing availability of capelin and other prey species influenced by the cold oceanographic conditions at the time (Drinkwater 1996).

In addition to geographic variability, the logbook information provides good evidence for annual and seasonal variability within and between rivers. Data for several rivers suggests that the occurrence of harp seals is 'pulsed' and related to the presence of schooling, high-energy fish such as capelin, juvenile herring or smelt. Observations of harp seals in the English, Gander, Exploits, Campbellton and Humber Rivers also provide support for this link. Data from Northeast Brook suggests that at least in some areas harbour seals also exhibit pulses of activity. In two of the three years, the late August – September period of higher seal abundance overlapped with a run of juvenile herring and the presence of mackerel. Thus, a better understanding of the location and timing of schooling bait fish runs, and the timing of salmon runs, may be valuable for predicting, assessing the impact and mitigating seal/salmon interactions (particularly in relation to harp seals).

**Table 2.** The species composition of seals considered problematic by commercial salmon fishermen along the coast of Labrador. B. Tickle = Black Tickle; Chartown = Charlottetown; Mary's H. = Mary's Harbour. Harp and hooded seals are highly migratory; grey, ringed and bearded seals are seasonally sedentary; and harbour seals are considered resident.

Species	Makkovik %	Rigolet %	Cartwright %	B. Tickle %	Chartown %	Mary's H. %
Harp/Hooded	17.7	22.7	17.1	50.0	38.2	48.0
Grey, Ringed Bearded	52.9	36.4	55.2	30.0	44.1	40.0
Harbour	29.4	40.9	27.7	20.0	17.6	12.0

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