Kelt Tracking Through the Miramichi River and Estuary in 2011
Final Report

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Introduction

Kelts are salmon that have spawned the previous fall and are migrating out of the river towards the ocean in spring to feed and recondition. Kelt survival on the Miramichi River is currently estimated between 15-20%, based on the life history characteristics of the fish captured in the DFO index trap nets. Fish that return to spawn in subsequent years are termed repeat spawners and they make up an increasing amount of the spawning run each year. Since they are older, these fish tend to be larger and produce larger eggs and more eggs than maiden fish (grilse and 2 sea-winter maiden salmon). It is estimated that they produce between 25-40% of the eggs laid each year in the river. Repeat spawning salmon can either come back the subsequent year they left the river or the same year they left the river. Kelts that leave the river in spring and come back that same year are termed consecutive spawners. Kelts that leave the river in spring and come back the next year to spawn are termed alternate spawners. Approximately half of the repeat spawning salmon come back as alternate spawners and half as consecutive spawners, depending on the year. There is a large loss of Atlantic salmon at sea and this project will give insight into where the losses of some of these adults may be occurring.

The purpose of this project is to determine the migrations paths and timing of kelts movements through the Miramichi River, estuary and Gulf of Saint Lawrence. It will give us information how long individual kelts spend in the ocean before returning to spawn as well as the locations and possible sources of mortality for some of the kelts as they migrate through the ocean.

Methods

Vemco VR2 receivers were deployed at the head of tide, Cassilis and Millerton, NB, at Loggieville at the river mouth and between the barrier islands in Miramichi Bay near Neguac, Portage Channel and Huckleberry Gully. Receivers were also deployed in the Strait of Belle Isle between Newfoundland and Labrador and in the Cabot Strait between Newfoundland and Cape Breton. This is the second year that Cabot Strait had receivers in it which were put in place through the Ocean Tracking Network.

The spring salmon, or kelts were captured by angling on the Miramichi River below the head of tide. Fish were anesthsitized using MS-222 in an oxygenated holding box. The fish was held upside down by another holding box with a wet sponge over the fishes' head to keep the gills moist. A transmitter was surgically inserted into the abdominal cavity by making a small incision in the abdominal wall and sliding the transmitter into the cavity. The incision was then closed with 2-3 sutures depending on the size of the incision. The surgery took between 1-3 minutes. After surgery the fish was placed in a wooden holding box with river water flowing through it to recover. Each transmitter (tag) gave each fish an individual code, which was be used to identify it when it passed by receivers located at the head of tide, at the mouth of the river, at the barrier islands at Miramichi Bay or through the Strait of Belle Isle. After the fish had fully recovered the fish was released back into the river.

Receivers recorded the tag number, date and time of kelts each time the fish and tag passed the receiver.

Results

Overall 50 kelts were angled and tagged over a two day period, on May 3rd and 4th, 2011 on the Northwest and Southwest Miramichi. Twenty seven kelts were tagged on the Northwest Miramichi, at Red Bank, and twenty three kelts were tagged on the Southwest Miramichi at Quarryville. The surgery typically took around two minutes and all fish recovered fully. A range of fish sizes were tagged, with the smallest being 22.8 inches and the largest being 38.8 inches. Two were female grilse, nine were male grilse, 27 were female salmon and 12 were male salmon.

Kelt survival out of the river was very high, 94% of the tagged kelts made it to the mouth of the river and through inner Miramichi Bay at the barrier islands. The kelts moved through Miramichi Bay between May 7 and June 2, 2011 (Figure 1). Two kelts went through the Neguac exit, 43 went through receivers in Portage Channel, the main river channel exiting Miramichi Bay and two were not picked up by the receivers in the Miramichi Bay were picked up on later receivers. No fish exited near Huckleberry Gully near Bay du Vin, NB. Three of the fish died between the head of tide at Quarryville and Middle Island, near Miramichi.

Of the 47 kelts that made it through the outer array, 15 kelts passed through the Strait of Belle Isle and two kelts passed through Cabot Strait on their way to Greenland. The kelts that passed through the Strait of Belle Isle were picked up on the receivers between June 25-July 23rd and the kelts that went through the Cabot Strait were picked up on the receivers on June 16 and July 18th. The kelts that went through the Strait of Belle Isle and Cabot Strait are making their way to Greenland and are alternate spawners. These fish left the river to recondition in the ocean in 2011 and will return to spawn in 2012 if they survive. Five kelts returned back to the Miramichi River, to spawn in 2011. The kelts that returned back to the Miramichi in 2011 are consecutive spawners, which recondition in the ocean for part of the summer and return in the summer or fall of 2011 to spawn again. The kelts that exited the estuary but were not picked up by the receivers at the Strait of Belle Isle may have exited through the part of Cabot Strait not covered by receivers, may be in reconditioning the Gulf of Saint Lawrence or may have died at sea.

All of the kelts that returned to the Miramichi River returned to the branch (Northwest or Southwest) that they were tagged in. Two of the kelts that were tagged in the Miramichi River were picked up on the Ocean Tracking Network Cabot Strait receiver line. The female salmon was picked up on June 16th and the male grilse was picked up on July 18th.

Conclusion

Our results over the past four years have shown that the kelts have high survival out of the Miramichi River and Bay; however the survival is variable to the Strait of Belle Isle indicating there may be environmental issues or issues finding adequate prey after entering the marine environment. The kelts that pass through the Strait of Belle Isle and Cabot Strait seem to travel towards Greenland, however salmon that exit the river and return the same year to spawn, do not cross the Strait of Belle Isle or Cabot Strait, which indicates that they likely feed and regain their body mass in the Gulf of St. Lawrence.

The majority of the kelts that return the same year are female, and the majority are large salmon. Interestingly, most of the tracked salmon that returned to the river, left the river in May and returned in July, after only feeding in the ocean for a couple of months. In addition to our tracking efforts, a few of our salmon kelts have been picked up on other research receivers off the coast of Labrador, Newfoundland, Cape Breton and south eastern New Brunswick.

This project has indicated that the majority of healthy adult salmon kelt losses are occurring at sea and that there is high survival of kelts from the head of tide at Quarryville and Red Bank through inner Miramichi Bay.

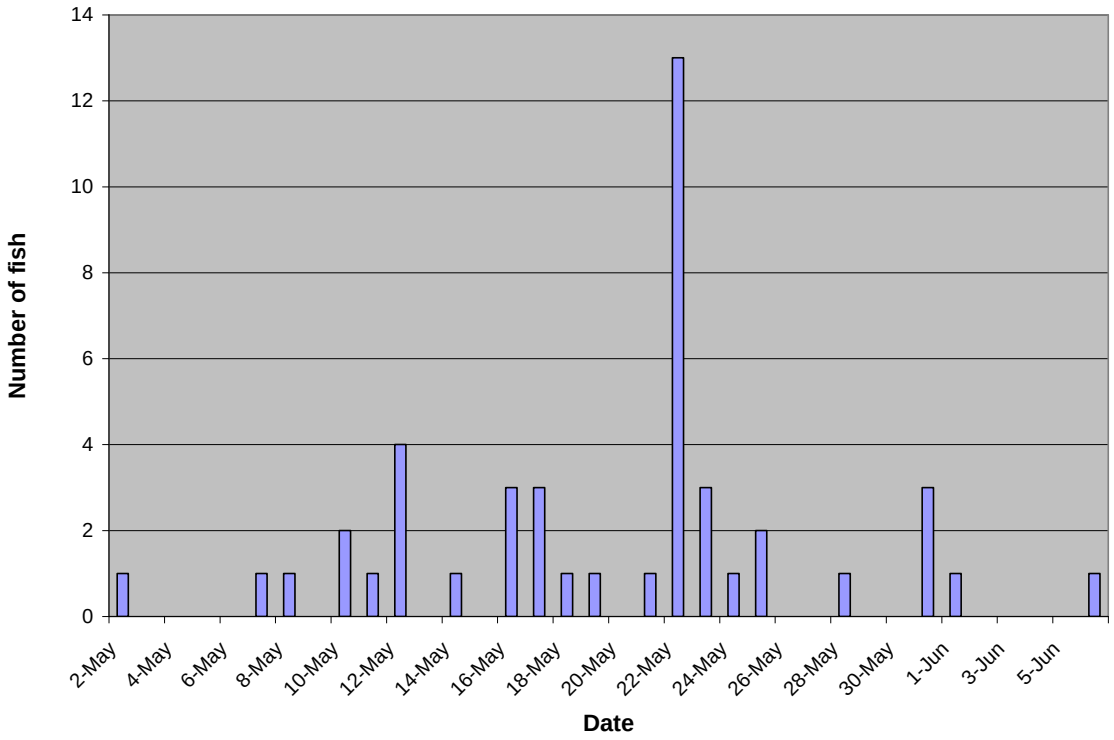

Figure 1. Timing of kelt movements through the receivers at the barrier islands in inner Miramichi Bay.

Table 1. Number of kelts surviving to the different receiver arrays by year. * denotes that an unknown number of alternate spawning salmon will returning in 2012.

Location	**2008**	**2009**	**2010**	**2011**
Head of tide	50	50	50	50
River mouth	48	46	45	47
Miramichi Bay	48	46	45	47
Strait of Belle Isle	22	9	7	15
Returned to river as consecutive	3	4	9	5
Returned to river as alternate	4	0	5	*