

**KELT TRACKING THROUGH THE
MIRAMICHI RIVER, ESTUARY AND GULF OF ST. LAWRENCE IN 2010**

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 on the temperature and depths kelts prefer to migrate through and how long individual kelts spend in the ocean before returning to spawn. This project will also give us the locations and possible sources of mortality for some of the kelts.

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 first 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 three day period, from April 26-28, 2010 on the Northwest and Southwest Miramichi. Twenty nine kelts were tagged on the Northwest Miramichi, at Red Bank, and twenty one 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 21 inches (2.8 lbs) and the largest being 40.6 inches (14.4 lbs). Two were female grilse, 14 were male grilse, 26 were female salmon and eight were male salmon.

Kelt survival out of the river was very high, 90% of the tagged kelts made it to the mouth of the river at Loggieville. The kelts that made it to Loggieville passed by the island between May 2- 14th, between four and eighteen days after they had been angled at Quarryville or Redbank. The kelts moved through Miramichi Bay between May 2 and May 21st, 2010. Twelve kelts went through the Neguac exit, 31 went through receivers in Portage Channel, the main river channel exiting Miramichi Bay and two kelts were not picked up by the receivers in Miramichi Bay. No fish exited near Huckleberry Gully near Bay du Vin, NB. Of the 45 kelts that made it through the outer array, seven kelts passed through the Strait of Belle Isle on their way to Greenland. The kelts that went through the Strait of Belle Isle are making their way to Greenland and are alternate spawners. These kelts will recondition in the ocean in 2010 and may return to spawn in 2011.

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 reconditioning the Gulf of Saint Lawrence or may have died at sea.

Nine kelts returned back to the Miramichi River, to spawn in 2010. The kelts that returned back to the Miramichi in 2010 are consecutive spawners, which recondition in the ocean for part of the summer and return in the summer or fall of 2010 to spawn again. This is the highest number of kelts returning that we have had in the three years this project has taken place. Most of the kelts that came back to the river moved through the bottom section of the river within two to three days of entering. All of the kelts that returned to the Miramichi River went up the respective branches where they were tagged this spring. Eight of the kelts that returned were female salmon and one was a male salmon. All of the kelts returned to the river between June 22 and July 14th, 2010.

Most of the returning kelts entered the river and traveled fairly quickly through the lower tidal section of the river. However there were three kelts that made some interesting movements prior to or while in the river. One kelt passed by a receiver at Chatham on July 12 and was captured at the DFO Millerton trap net on the Southwest Miramichi on July 13th, 2010. This kelt was noticed by DFO staff since it still had stitch marks on the belly where the tag had been inserted. Another kelt was also picked up in the Bay du Chaleur on a receiver for a smolt tracking study on July 12, 2010, moved into the Miramichi River the same day and made it's way to Millerton by July 14. Another kelt entered the river at Chatham on July 6th, went up the Northwest Miramichi on July 9th (last known hit was Cassilis) held for the summer on the Northwest then on September 26th moved downstream and up the Southwest Miramichi, past Millerton. This kelt was originally tagged on the Southwest Miramichi.

We will not know entirely how many kelts successfully returned until 2011 when the kelts that went to feed off the coast of Greenland return.

Table 1. Locations of kelts moving through the Northwest and Southwest Miramichi River and Miramichi Bay estuary.

Date Tagged	Location Tagged	Sex	Size	River Mouth Receiver	Receiver in Miramichi Bay
April 28, 2010	Southwest	female	salmon	French Fort Cove	Dead
April 28, 2010	Southwest	female	salmon	French Fort Cove	Dead
April 28, 2010	Southwest	male	grilse	French Fort Cove	Dead
April 28, 2010	Southwest	female	salmon	French Fort Cove	Dead
April 26, 2010	Northwest	male	salmon	Loggieville	Dead
April 27, 2010	Northwest	male	grilse	Loggieville	Neguac
April 28, 2010	Southwest	male	salmon	Loggieville	Neguac
April 28, 2010	Southwest	male	grilse	Loggieville	Neguac
April 28, 2010	Southwest	male	grilse	No Hit	Neguac
April 28, 2010	Southwest	male	grilse	French Fort Cove	Neguac
April 26, 2010	Northwest	female	salmon	Loggieville	Neguac
April 26, 2010	Northwest	female	grilse	Loggieville	Neguac
April 26, 2010	Northwest	male	grilse	Loggieville	Neguac
April 26, 2010	Northwest	male	grilse	Loggieville	Neguac
April 27, 2010	Northwest	female	salmon	French Fort Cove	Neguac
April 27, 2010	Northwest	male	grilse	French Fort Cove	Neguac
April 27, 2010	Northwest	female	salmon	Loggieville	Portage Channel
April 27, 2010	Northwest	female	salmon	Loggieville	Portage Channel
April 27, 2010	Northwest	female	salmon	Loggieville	Portage Channel
April 28, 2010	Southwest	male	grilse	Loggieville	Portage Channel
April 28, 2010	Southwest	female	salmon	French Fort Cove	Portage Channel
April 28, 2010	Southwest	female	grilse	Loggieville	Portage Channel
April 28, 2010	Southwest	female	salmon	Loggieville	Portage Channel
April 28, 2010	Southwest	male	salmon	Loggieville	Portage Channel
April 28, 2010	Southwest	male	grilse	Loggieville	Portage Channel
April 26, 2010	Northwest	male	salmon	Loggieville	Portage Channel
April 26, 2010	Northwest	male	grilse	Loggieville	Portage Channel
April 26, 2010	Northwest	female	salmon	Loggieville	Portage Channel
April 26, 2010	Northwest	female	salmon	Loggieville	Portage Channel
April 27, 2010	Northwest	male	salmon	Loggieville	Portage Channel
April 27, 2010	Northwest	female	salmon	Loggieville	Portage Channel
April 27, 2010	Northwest	male	salmon	Loggieville	Portage Channel
April 27, 2010	Northwest	female	salmon	Loggieville	Portage Channel
April 27, 2010	Northwest	male	grilse	Loggieville	Portage Channel

Table 2. Locations of kelts moving into the Gulf of Saint Lawrence, Strait of Belle Isle or returning to the Miramichi River in 2010.

Date Tagged	Location Tagged	Sex	Size	River Mouth Receiver	Receiver in Miramichi Bay	Location in Gulf	Date of receiver hit
April 27, 2010	Northwest	male	salmon	French Fort Cove	Portage Channel	returned 2010	2-Jul
April 26, 2010	Northwest	female	salmon	Loggieville	Portage Channel	returned 2010	2-Jul
April 26, 2010	Northwest	female	salmon	Loggieville	Portage Channel	returned 2010	29-Jun
April 27, 2010	Northwest	female	salmon	Loggieville	Portage Channel	returned 2010	22-Jun
April 28, 2010	Southwest	female	salmon	Loggieville	Neguac	returned 2010	29-Jun
April 28, 2010	Southwest	female	salmon	Loggieville	Portage Channel	returned 2010	13-Jul
April 28, 2010	Southwest	female	salmon	Loggieville	Portage Channel	returned 2010	13-Jul
April 28, 2010	Southwest	female	salmon	French Fort Cove	Portage Channel	returned 2010	14-Jul
April 28, 2010	Southwest	female	salmon	Loggieville	Portage Channel	returned 2010	8-Jul
April 28, 2010	Southwest	male	grilse	Loggieville	no hit	Strait of Belle Isle	2-Jul
April 28, 2010	Southwest	female	salmon	French Fort Cove	Portage Channel	Strait of Belle Isle	11-Jul
April 26, 2010	Northwest	male	grilse	Loggieville	Portage Channel	Strait of Belle Isle	28-Jun
April 26, 2010	Northwest	male	grilse	Loggieville	Portage Channel	Strait of Belle Isle	1-Jul
April 26, 2010	Northwest	female	salmon	Eel Ground	Portage Channel	Strait of Belle Isle	29-Jun
April 26, 2010	Northwest	female	salmon	French Fort Cove	no hit	Strait of Belle Isle	30-Jul
April 27, 2010	Northwest	female	salmon	Loggieville	Portage Channel	Strait of Belle Isle	27-Jun



a)



b)

Figure 1. a) Biologist Jenny Reid implants a kelt with an acoustic tag for tracking its movements through the Miramichi River and Gulf of Saint Lawrence. b) President Mark Hambrook releases a kelt that has undergone surgery.

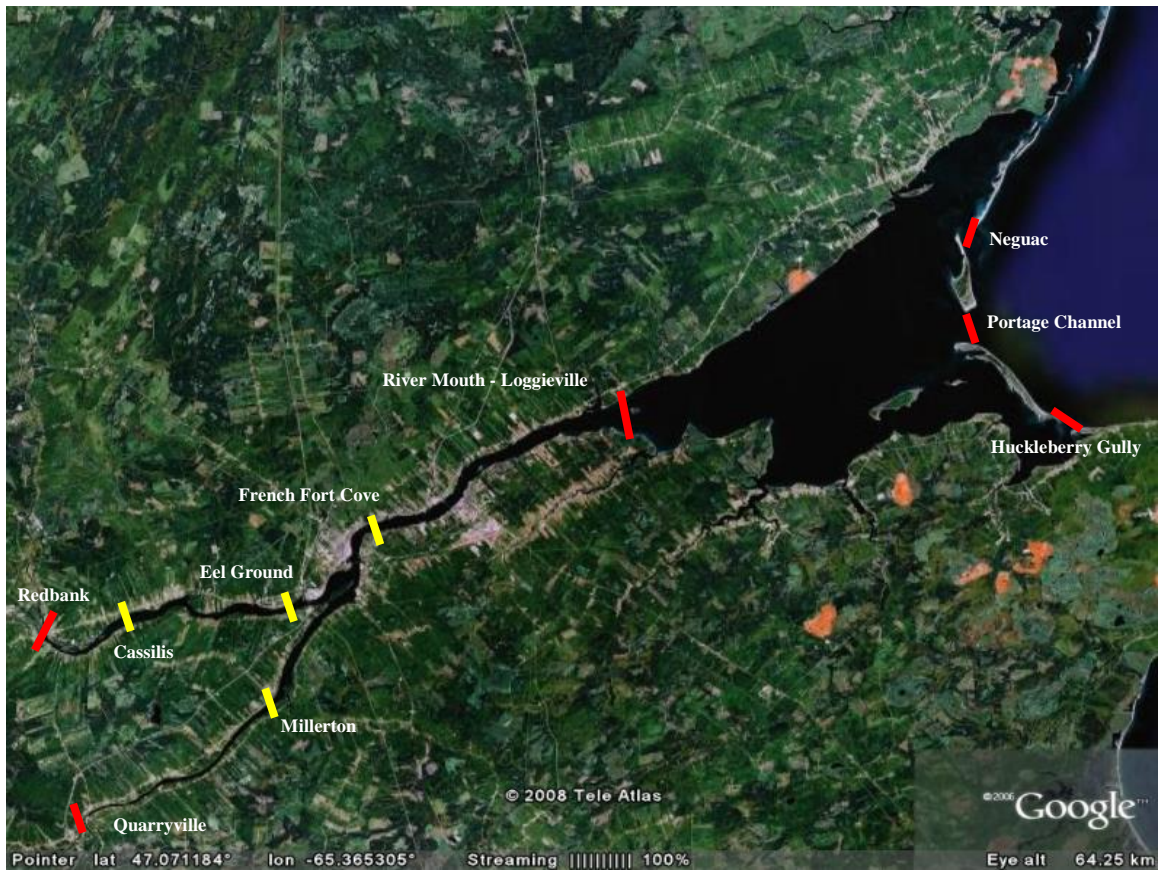


Figure 2. Location of receivers in Miramichi River and Miramichi Bay. Red lines are receivers located at head of tide, river mouth and exits of barrier islands, yellow lines are additional receivers which may have extra information about a kelt's movements.

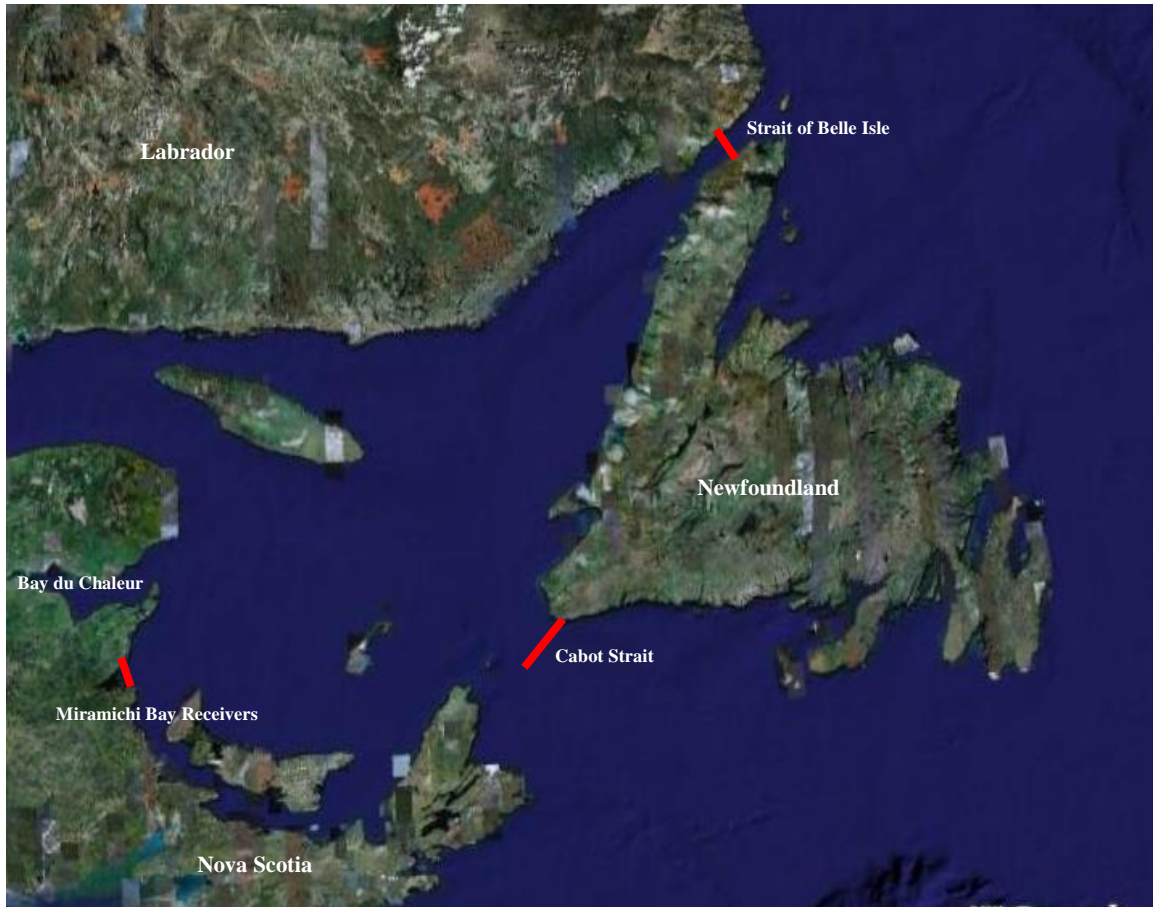


Figure 3. Location of receivers in the Gulf of Saint Lawrence. Red lines are receivers arrays.

Acknowledgements

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