



ASF Research Programs 2009-2010

Ocean Tracking Research

Excessive mortality in the ocean is one of the most challenging problems facing wild Atlantic salmon populations. ASF has undertaken a sophisticated program of tracking using sonic transmitters that is unlocking the secrets of North American Atlantic salmon migration.

The research includes:

Tracking Smolt down Rivers and Across the Gulf of St. Lawrence

ASF has now multiple year experience of tracking smolts down rivers, including the Miramichi, Restigouche, Cascapedia and St-Jean (St. Lawrence North Shore), and Newfoundland's Western Arm Brook. In 2009, the Margaree River smolt of Nova Scotia's Cape Breton were added. Sophisticated receiver arrays have been set up in the rivers, and across the Baies des Chaleurs, and most importantly across the Strait of Belle Isle between Newfoundland and Labrador to monitor the smolts as they migrate to Greenland feeding grounds.

Tracking Kelt from the Rivers of the Gulf of St. Lawrence

Kelts in the Miramichi and St-Jean (St. Lawrence North Shore) are being tracked as they return to the ocean, and a large percentage are being found as far as the Strait of Belle Isle. The research is raising questions about whether older Atlantic salmon are travelling with younger salmon on migration routes.

Sea Migration of Kelts and Smolts from Magaguadavic in the Bay of Fundy

This research is being undertaken to determine if kelts (salmon that have spawned and spent the winter in fresh water and are making another migration) take on the role of teachers to smolts in Gulf of Maine populations of salmon; and to see if they are travelling together in the ocean.

Tracking Smolt for Acid Rain Research

A small batch of smolt from the acid-impacted West River Sheet Harbour in Nova Scotia has been tracked to document how the fish from this river are responding to remedial liming that ASF and the Nova Scotia Salmon Association (NSSA) have undertaken in that watershed.

Smolt and Kelt Tracking in Greenland and Labrador Waters

ASF, together with the Ocean Tracking Network based at Dalhousie University, and Fisheries and Oceans Canada, is working towards the deployment of a Slocum glider to detect post-smolts and kelts in feeding ground areas between Labrador and Greenland. While the technology is proven, severe weather conditions at sea required postponing deployment until 2010.

Assisting the Ocean Tracking Network in Developing a World-Class Network

ASF's many years of working with acoustic telemetry has provided an important key in the new technology boosting the Ocean Tracking Network based at Dalhousie University in Halifax that is changing the way we understand the movement and interaction of migration and physical parameters of the ocean. Among significant developments in 2010: a line of receivers across Cabot Strait

Other ASF Research Projects

Inventory of Exotic Species in New Brunswick

ASF is using the Magaguadavic River to develop a template for recording exotic species that may establish themselves in New Brunswick rivers. So far, the Magaguadavic has seen invasions of smallmouth bass, chain pickerel and largemouth bass. The project includes establishing a public awareness network for exotic species reporting.

Monitoring the Wild-Aquaculture Interactions on the Magaguadavic

Since 1992, ASF has monitored the Magaguadavic as a Canadian Index River for interactions between wild and aquaculture salmon. ASF monitors and studies the river for escapees from sea cages and freshwater hatcheries, including impacts of disease, and parasites.

The Magaguadavic River is also a template that may be applied to other rivers in determining salmon restoration and recovery strategies.

Alewives tracking in river and at sea related to the Magaguadavic River

ASF has been studying pre to post-spawning migratory patterns for the past two years of this species, in exploring the importance of these runs as part of the ecology of salmon rivers. Initial results were presented at a conference in Sweden in Sept. 2009.

ASF Studying Fish Passage at Hydro-electric dams

ASF is undertaking sonic telemetry of smolts and kelts, as well as alewives and eels, to determine the efficacy of fish passage and to improve safe passage of fish upstream and downstream.

ASF undertakes population assessments of SW New Brunswick salmon populations

Every day, year after year, ASF monitors the Magaguadavic fish ladder for complete counts of adults returning and, in spring, downstream passage for smolts. Each year ASF also identifies areas in need of restoration; electrofishing for juvenile assessments in other rivers of southwest New Brunswick.



ASF Tracking Atlantic Salmon – a Timeline

Excessive mortality during migration is one of the most significant problems currently facing wild Atlantic salmon. Fewer and fewer return from their ocean feeding grounds to their natal rivers to spawn.

ASF, working with private enterprise, VEMCO, DFO, and other partners, pioneered technology to track migrating salmon using sonic transmitters.

ASF's goals are to:

- Determine smolt and adult salmon migration patterns
- Identify critical habitats and feeding areas
- Determine impacts of birds, seals and other predators
- Estimate losses of smolt in fresh water and estuaries
- Correlate fish movements with environmental variables, notably water currents and temperatures
- Determine when and where mortality occurs

Background

1994 - 1998

Developed technology to track post-smolt migration routes and distribution at sea

Became first to implant post-smolts with sonic transmitters

Utilized receiver units to track post-smolts from rivers in SW New Brunswick into the Bay of Fundy (BoF)

1999 - Implanted uniquely-coded transmitters into smolts and tracked them from Big Salmon River into the BoF
Monitored smolt survival and movements for up to 3 months over a 50km stretch of the Bay

2000 - Developed and tested a new live-catch crawl, based on a Norwegian design, in the Bay

Captured and screened post-smolts for diseases and parasites (none were found)

2001 - Deployed 200 tracking receivers around the BoF
Followed wild salmon smolts for several months at sea. Captured 127 post-smolts in second trawling season; some had been previously marked by river researchers
Examined (for the first time in 30 years) BoF smolts for general health, growth, etc.

2002 - Tracked autumn Miramichi River pre-smolts through winter, using sonic telemetry

Determined distances these little-understood fish moved from their home rivers

Used sonic telemetry to identify their over-winter habitat during their last year in the river

2003 - Tracked Miramichi smolts downstream to saltwater; the first time this had been done. Found 91% successfully survived from the headwaters to the head of tide, but only 43% made it through the estuary and out to sea

2004 - Tracked smolt in the Miramichi and Restigouche
Confirmed, Miramichi smolts had a high survival rate in freshwater and suffered a major loss in the estuary; slightly more than half the fish exiting the estuary to the sea

2005 & 2006 - Expanded research into Quebec's North Shore; the St-Jean (Cote-Nord), York, Cascapedia; and the Gulf of Maine

Tested for north to south variations in smolt survival

Deployed receivers in lines across the entire Bay of Chaleur to explore the Bay's post-smolts potential use of the Restigouche as a nursery area

Discovered:

- 22% of Restigouche River smolts tagged in the headwaters died before reaching the head of tide; 40% died in the estuary (Baie des Chaleurs); 38% reached the sea
- 90% of Miramichi smolts survived to the estuary; 64% reached the sea

2007 - Tracked salmon from New Brunswick and Quebec rivers to the Strait of Belle Isle (SoBI) (approximately half way to Greenland) for the first time

Continued tracking in the Miramichi, Restigouche, Grand Cascapedia

2008 & 2009 - Tracked smolt from Rivière St-Jean (Côte Nord), Miramichi, Restigouche, Grand Cascapedia and Western Arm Brook in Northern Newfoundland. (Western Arm Brook fish are of particular interest because they mature usually as grilse, salmon that return after just one year at sea.)

Compared movements of smolt that mature as grilse to those of Greenland migratory populations which first mature after two years at sea

Tracked smolt from the acid-rain impacted West River Sheet Harbour, NS, as part of a larger effort, to document how fish in the river are responding to ASF and the Nova Scotia Salmon Association's actions to reduce the level of acidity in the watershed

Confirmed remarkable synchrony of the smolt migration (smolt passed through the SoBI during a very narrow window during July and smolt from the Miramichi, Cascapedia and Restigouche Rivers moved through together)

Found a positive correlation between the size of a smolt class leaving a river in a given year and the fraction of smolt that survive to exit the river estuary, meaning the more fish making the migration, the more likely they are to survive to the sea

Noted a difference in movements with fish likely to mature as grilse lingering in the SoBI, while the 2 SW salmon passed through

Upcoming in 2010 - Tracking work will continue on an expanded basis. Through the Ocean Tracking Network, a line of receivers is to be deployed across the Cabot Strait, between Newfoundland and Nova Scotia, thus wiring both exits of the Gulf of St. Lawrence. ASF remains a leader in developing the tracking program, in concert with its partners in the private sector and government.