



**Council**

**CNL(16)63**

***Atlantic Salmon Federation's Salmon Tracking Programs  
Investigating Low Marine Survival***

***(Presentation by Dave Meerburg)***



# **Atlantic Salmon Federation's Salmon Tracking Programs Investigating Low Marine Survival**



**David Meerburg  
June, 2016  
NASCO**



# Collaborations



- Countless volunteers
- *Adopt a Smolt and Kelt* Donors
- Field and Office Staff



# Overview of Low Marine Survival Presentation

- Smolt tracking
- Kelt tracking
- Predator-Prey Studies
  - Striped Bass
- Next Steps

# Tracking

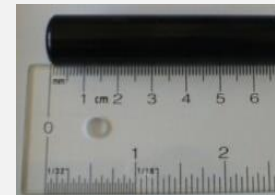
## Smolt Tracking (sonic tags):

- Started in 2003 Miramichi , 2004 Restigouche and 2006 Cascapedia
- **> 2500 smolt tagged**



## Kelt Tracking (sonic tags):

- Started in 2008 Miramichi and 2013 Restigouche
- **> 350 kelt tagged**



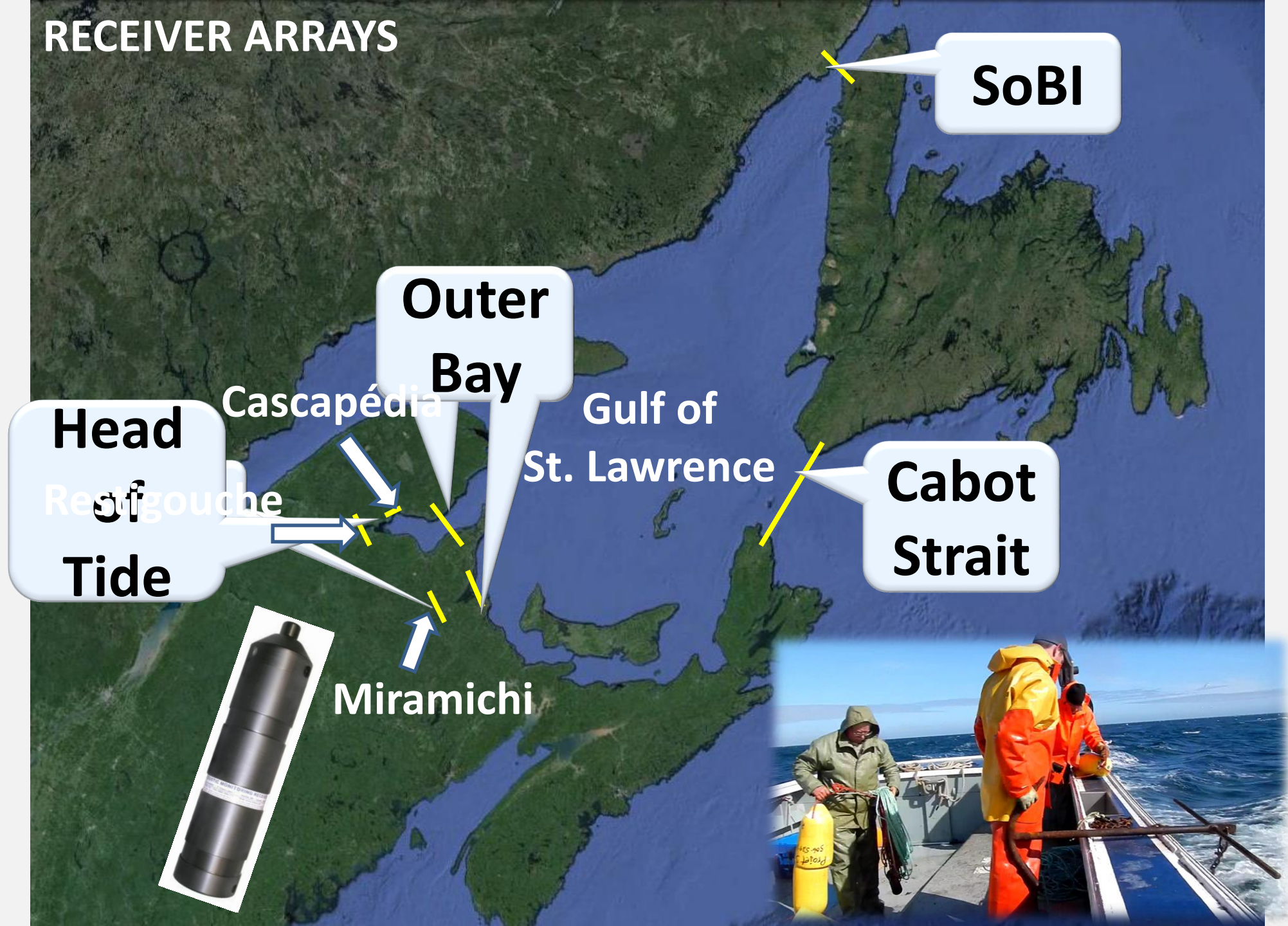
## Kelt Satellite Tags (PSATs)

- Started in 2012 Miramichi
- **43 tagged**



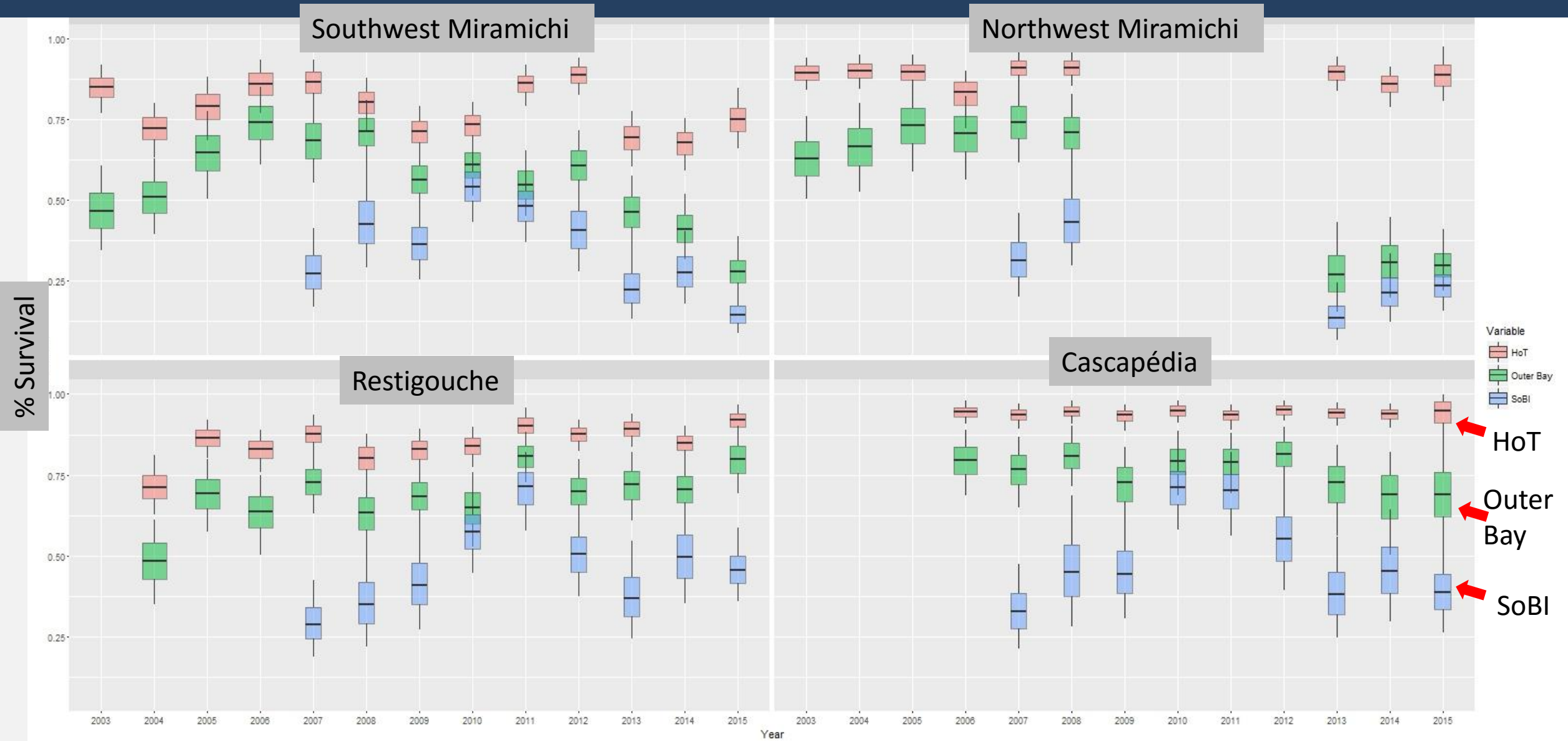


# RECEIVER ARRAYS



# Smolt Survival Estimates

## HoT to SoBI





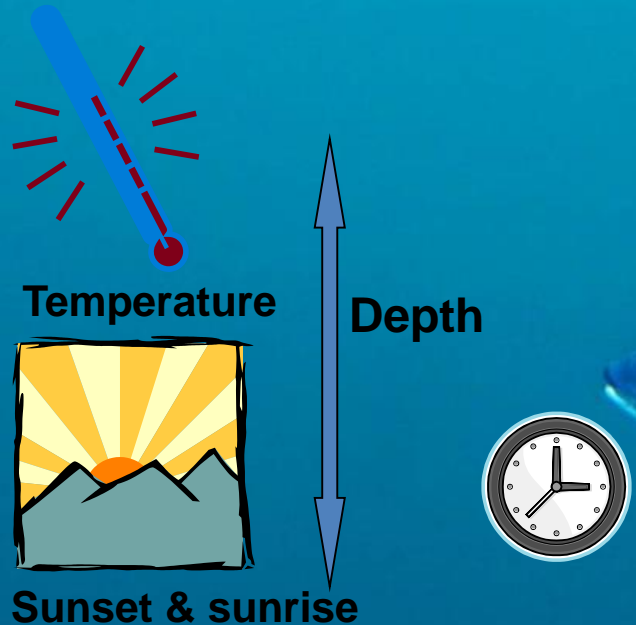
# Smolt Tracking

## What Have We Learned?

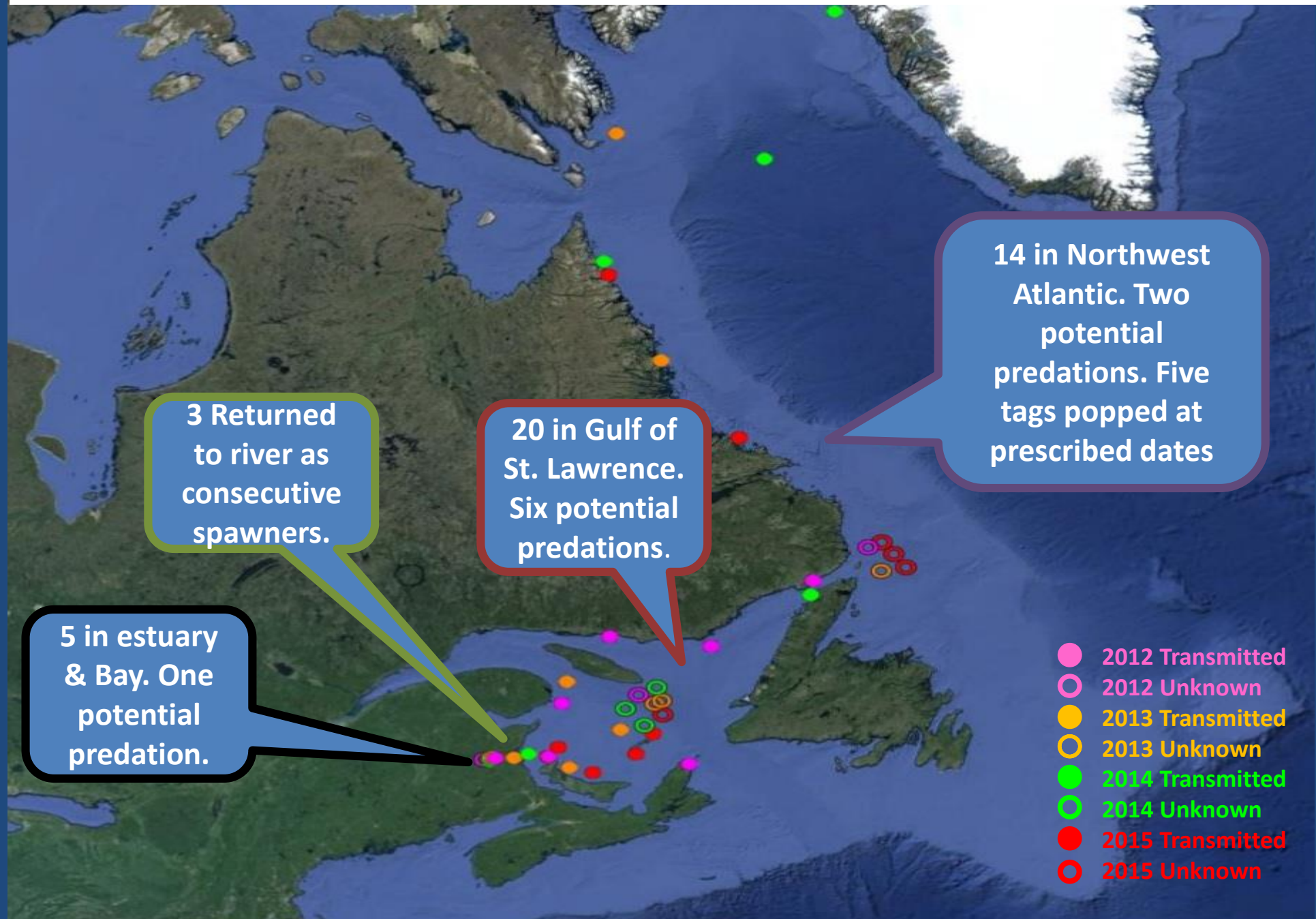
- Survival rates in the freshwater are high (80-95%).
- Survival rates through the bay:
  - Chaleur Bay: 68-76%.
  - Miramichi NW survival only 29% last 3 years.
  - Miramichi SW survival only 38% last 3 years.
- Survival through the Gulf of St. Lawrence *variable*.
- Smolt travel through Gulf in 30-40 days.
- Primary exit route through Gulf is SOBI.
- Gulf rivers smolt travel past SOBI over 2 week period.<sub>7</sub>

# Pop Up Tags

- **Finer scale location & movements of kelts.**
- **Where are the mortalities occurring?**
- **Identify the predators!**



# 2012-2015 Satellite Tag Ending Locations

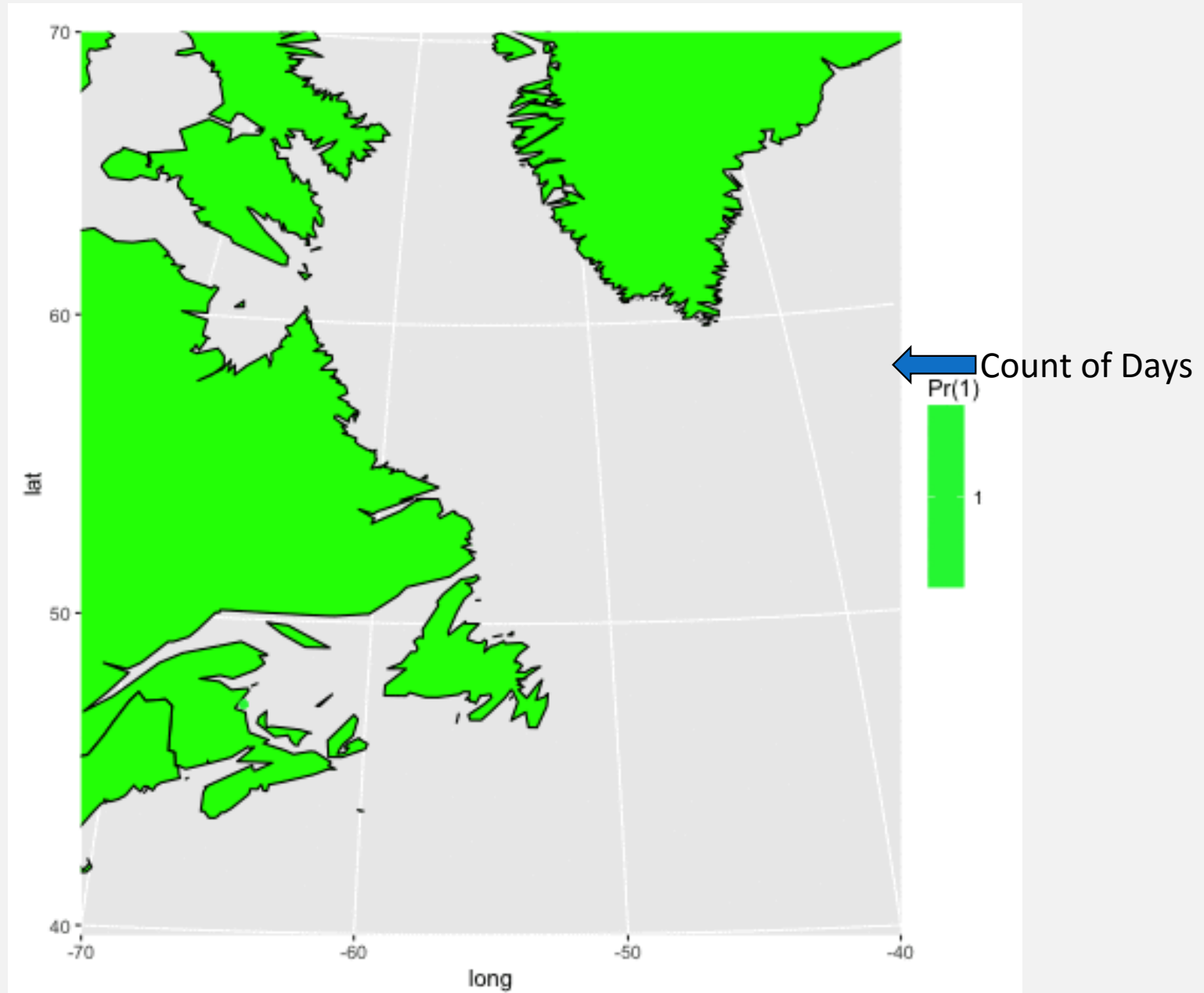


# PSATs

- 43 kelts have been tagged in the Miramichi river since 2012.
- Movement of 10 of these fish have been analyzed (7 past SOBI). Of these seven, 4 followed the Labrador coast toward Baffin Island while 3 moved off the continental shelf and had deep dives (600-800 m).
- Dive profiles were diurnal, suggestive of feeding behavior.

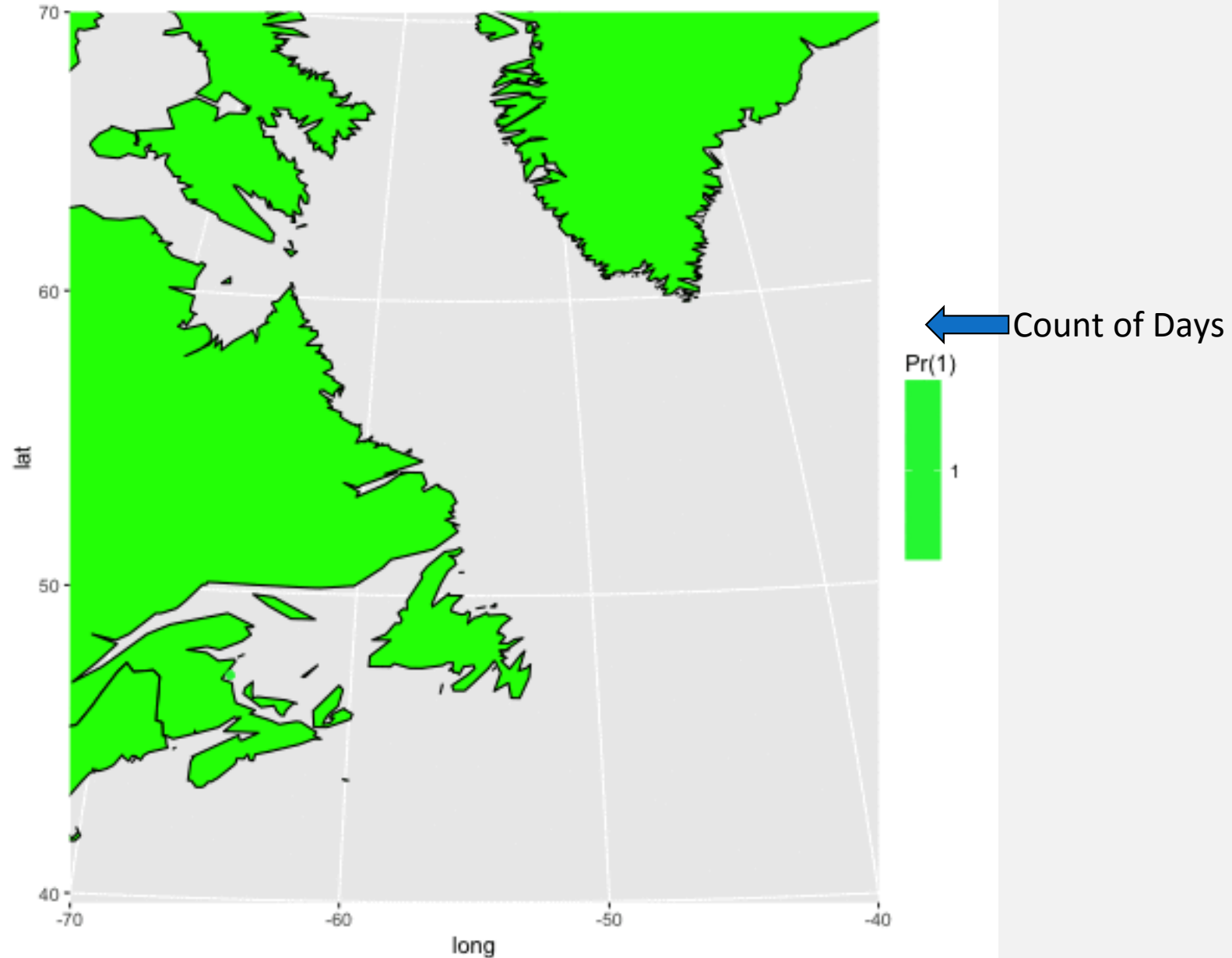


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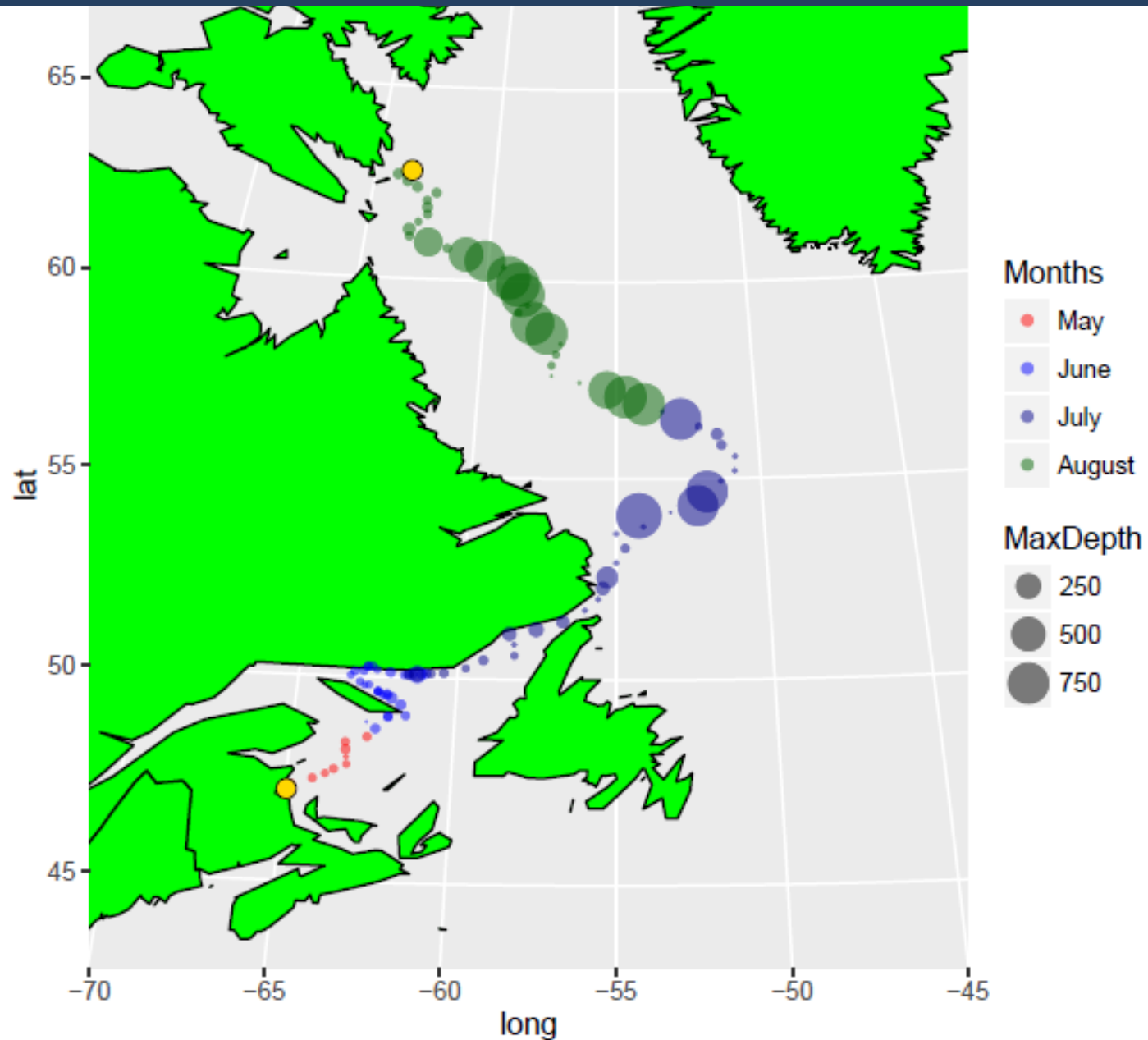




# PSAT 128017: 'Martha'



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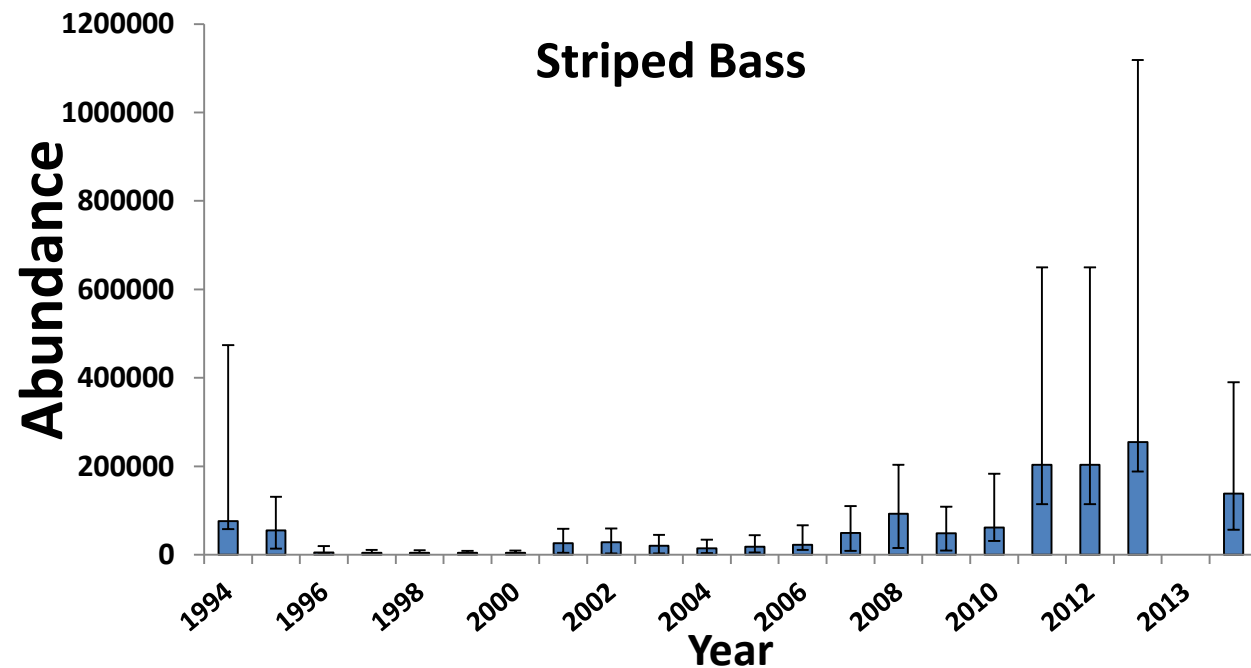
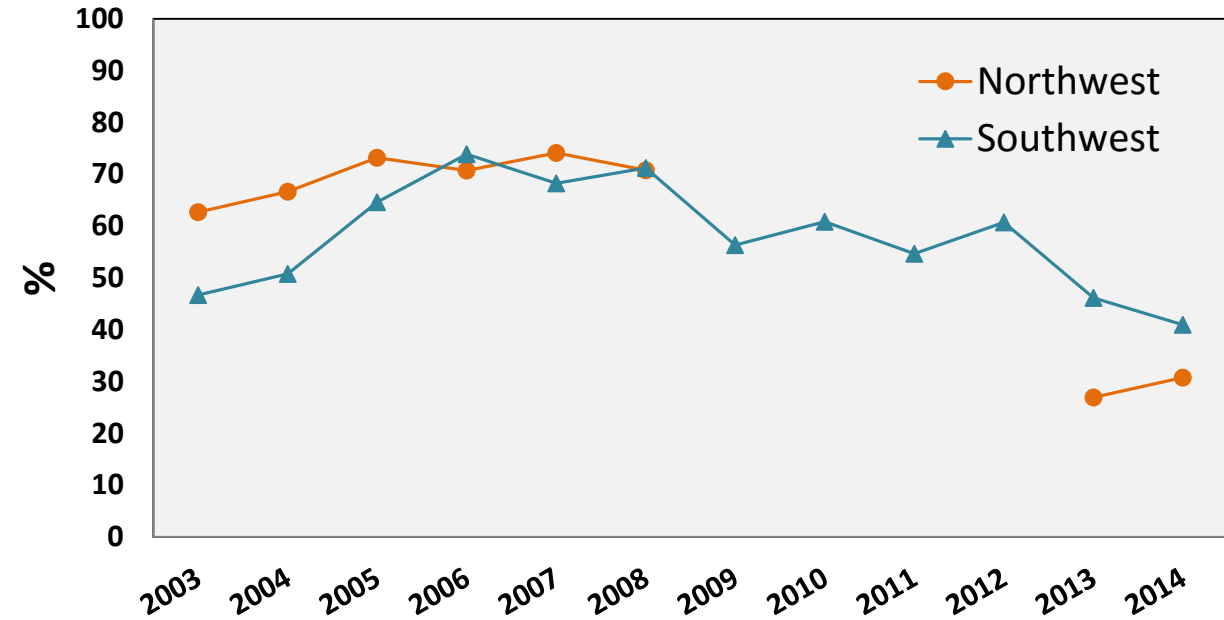
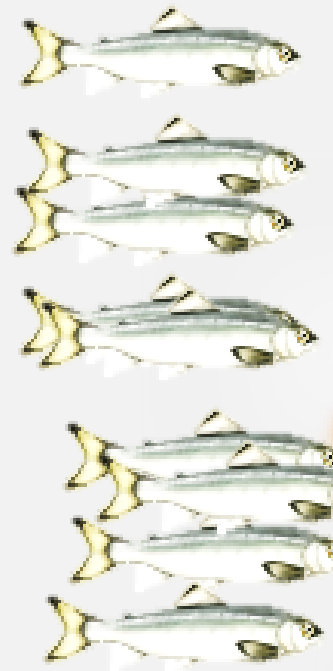
# **Kelt Tracking**

## **What Have We Learned?**

- **Survival rates through estuary/bay >90%.**
- **High mortality in Gulf of St. Lawrence (>50%).**
- **Ocean survival higher for Rest (27%) vs Mir (10%).**
- **Kelts and smolt cross SOBI over the same time period in early July (even though distances travelled and tagging time vary greatly)**
- **Kelts travel through Gulf in 50-60 days.**
- **Kelts spend about 30-40 days reconditioning within the Gulf.**
- **Kelts exit Gulf via SoBI & return via Cabot Strait.**
- **Kelts migrate within and off the continental shelf.**

# Striped Bass and Smolt Interactions

## Miramichi Estuary



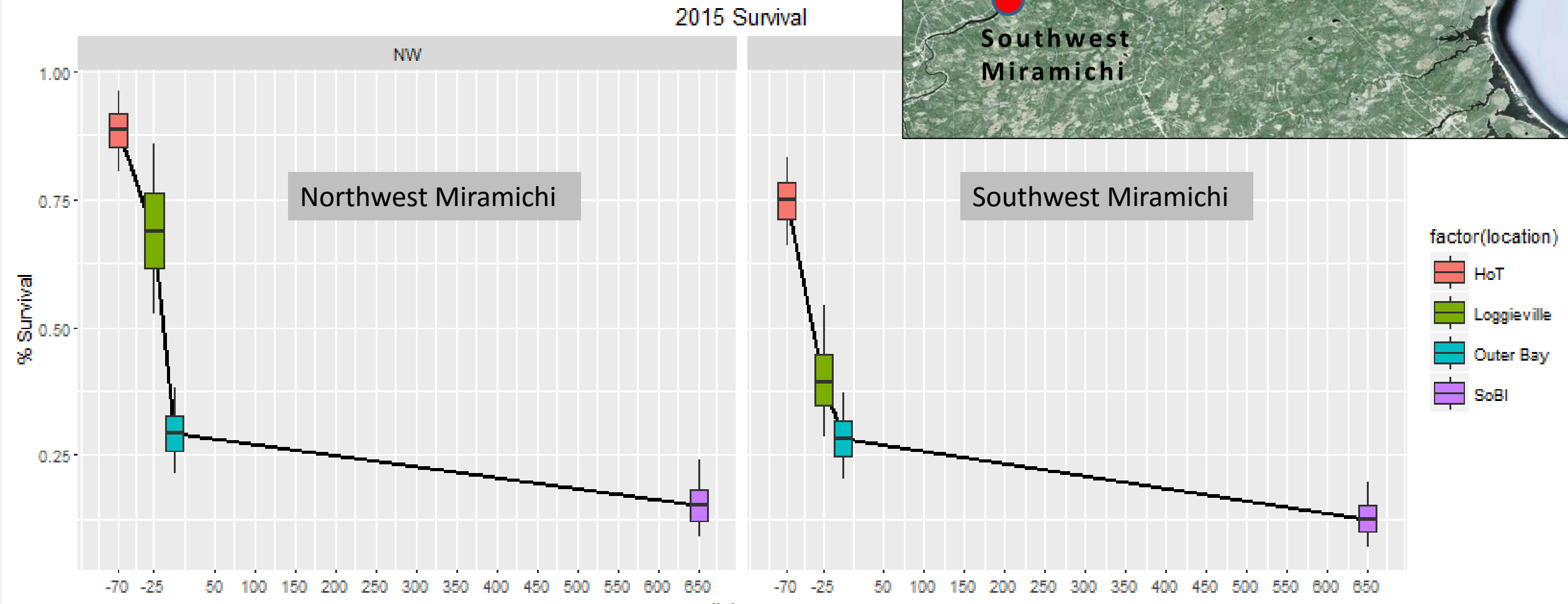
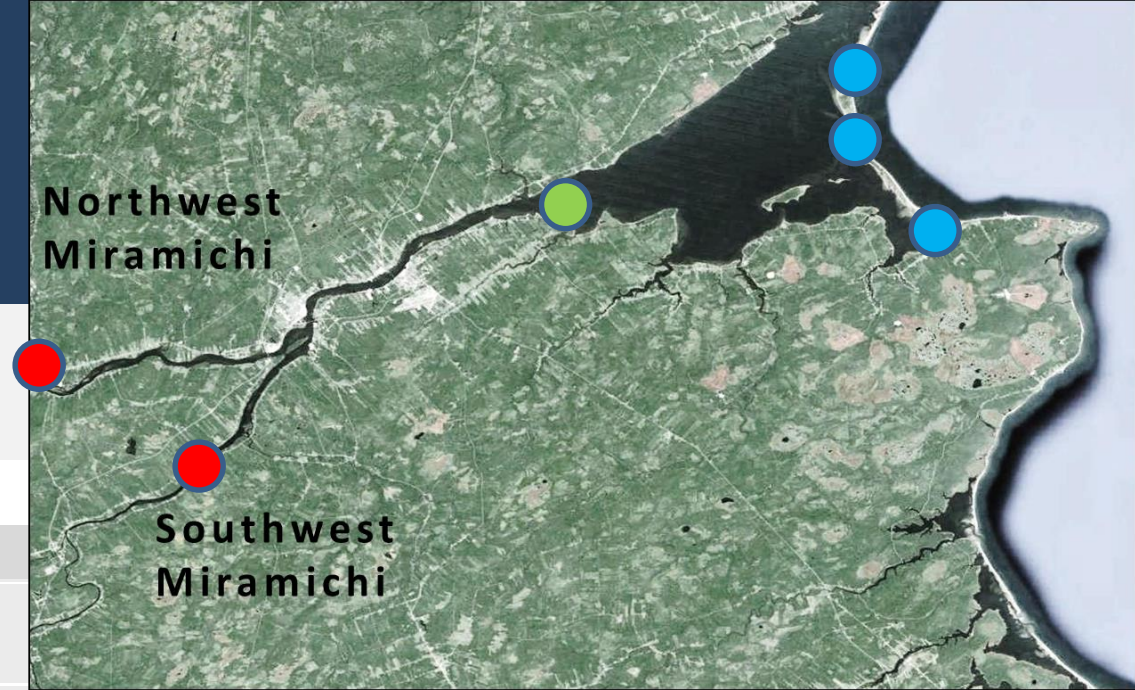
Atlantic Salmon Federation  
Fédération du Saumon Atlantique



Fisheries and Oceans Canada  
Pêches et Océans Canada



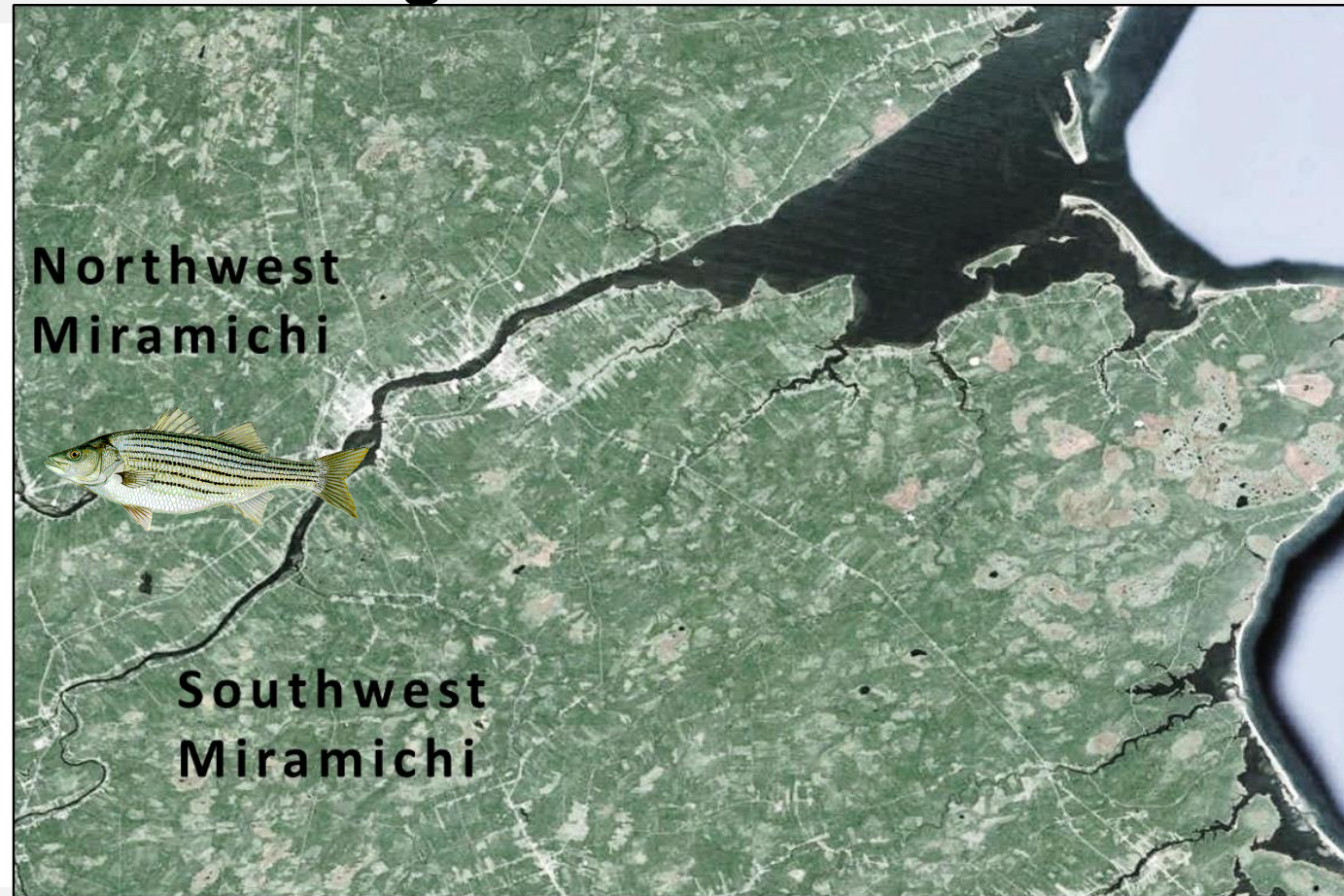
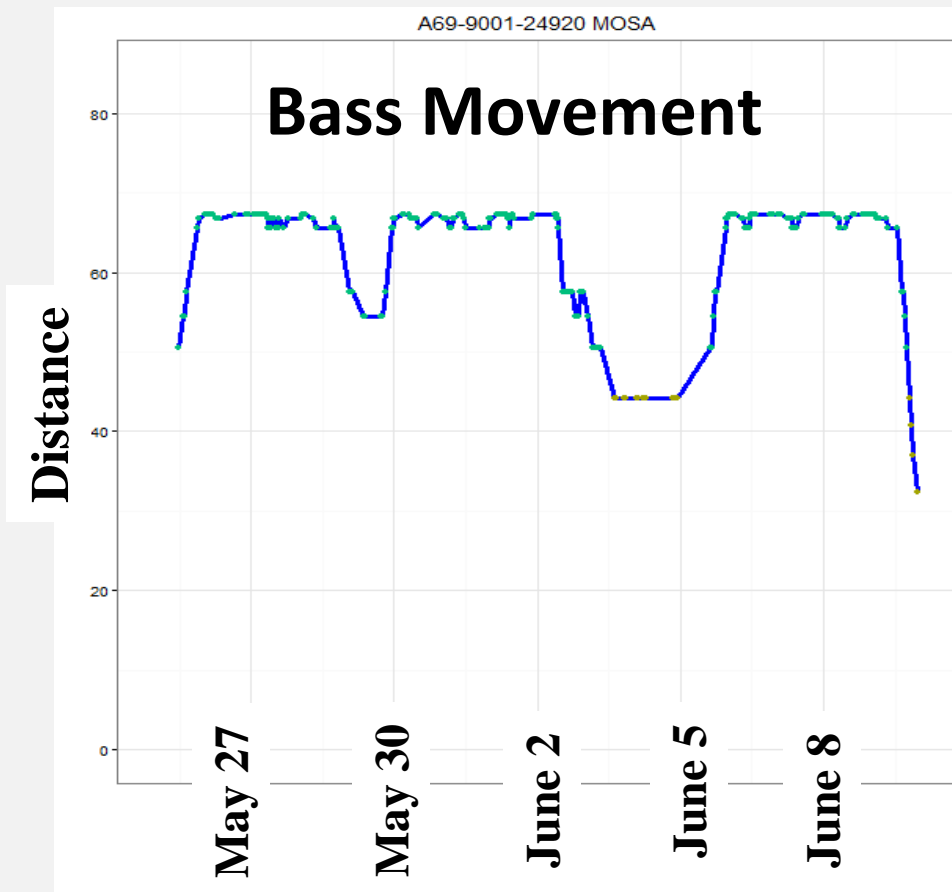
# Miramichi Smolt Survival 2015 Estimates





# Striped Bass and Smolt Interactions

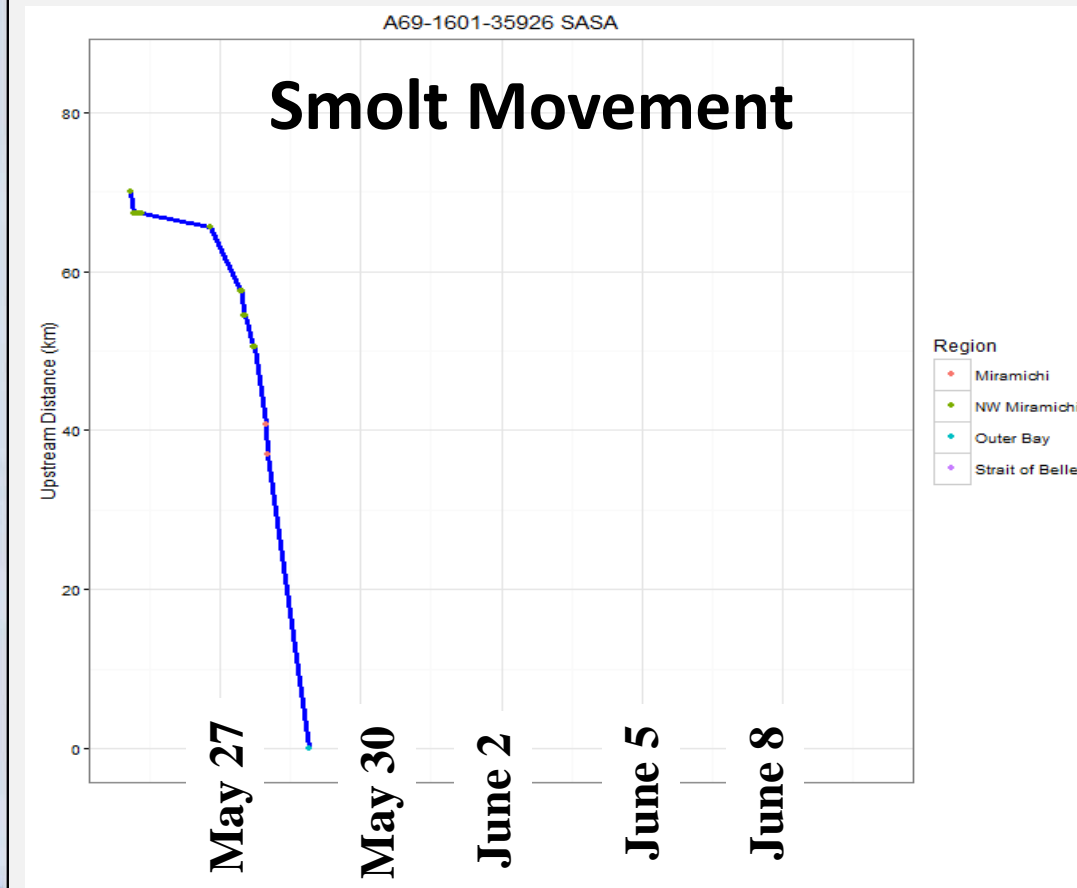
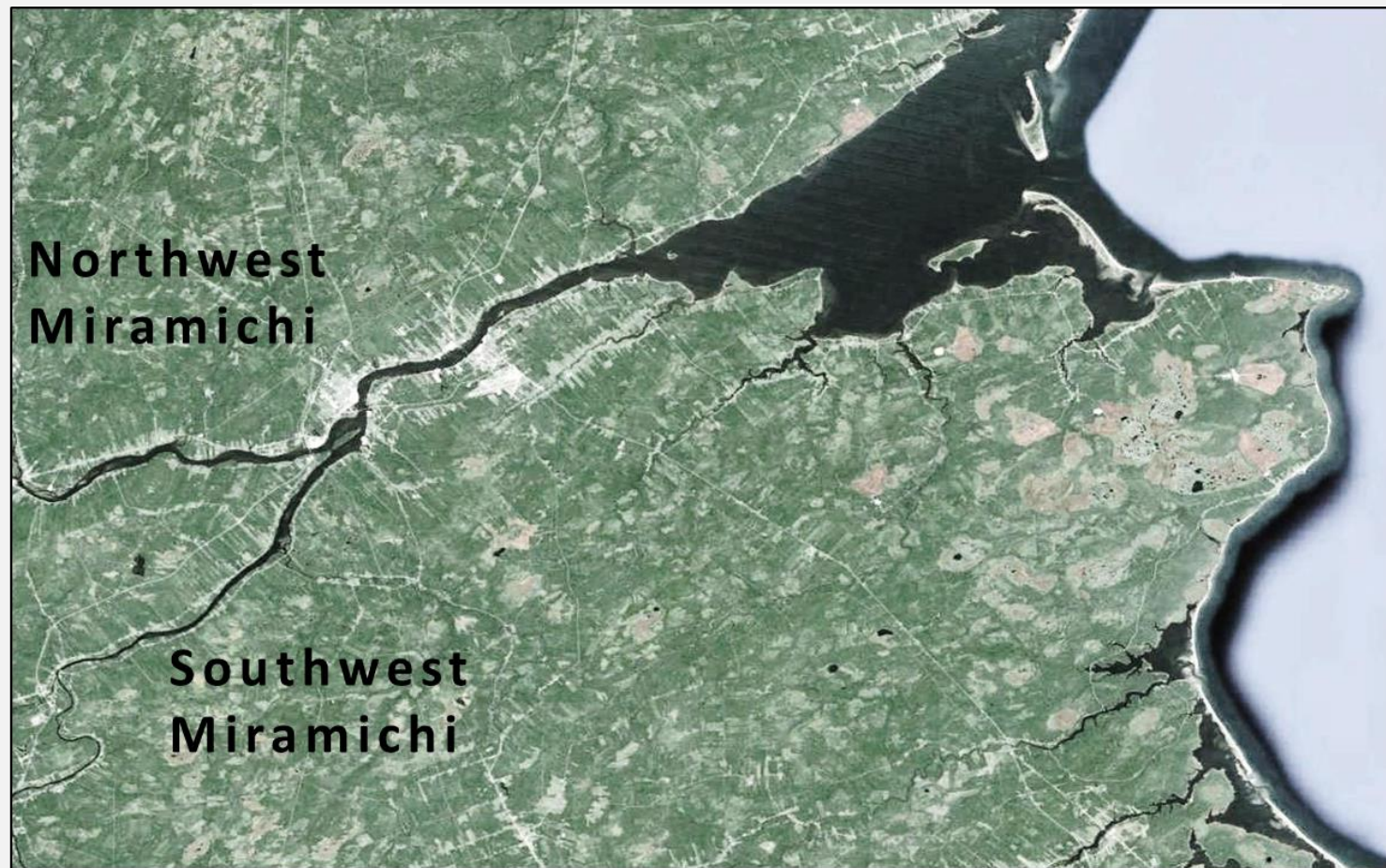
Acoustic receivers provide us with moderate resolution detection data for both smolt and striped bass throughout the Miramichi.





# Striped Bass and Smolt Interactions

Acoustic receivers provide us with moderate resolution detection data for both smolt and striped bass throughout the Miramichi.



# Striped Bass and Smolt Interactions

- This smolt, tagged in the Southwest, is one of several fish that models quantitatively select as a predation event.

## 2015 Predation Events

- NW smolt: 10%
- SW smolt: 2%



# Tracking Program: Next Steps

- **Need a better estimate of survival through Gulf**
- **Focus on areas of high mortality.**
  - ***Smolts***: Estuaries & Bays (predator-prey)
  - ***Smolts & Kelts***: Gulf, Labrador Sea, Davis Strait
- **Focus on critical habitat/migrations zones.**
  - Continue to map kelt and smolt routes
  - Identify 'traffic' in those areas
    - predator, prey, environmental parameters

# How to we get there (Tagging)?

## **Tag more salmon & track for greater distances.**

- Tag more smolt (account for inter-stage mortality)
- More PSAT tags on kelt (Restigouche, Miramichi)
- Track maiden fish from Greenland back to home rivers (PSATs and Sonic)\*\* -gain knowledge on routes & timing, survival (relevant to ICES models), predators



# How to we get there (Tracking)<sup>22</sup>?

## Expand receiver coverage

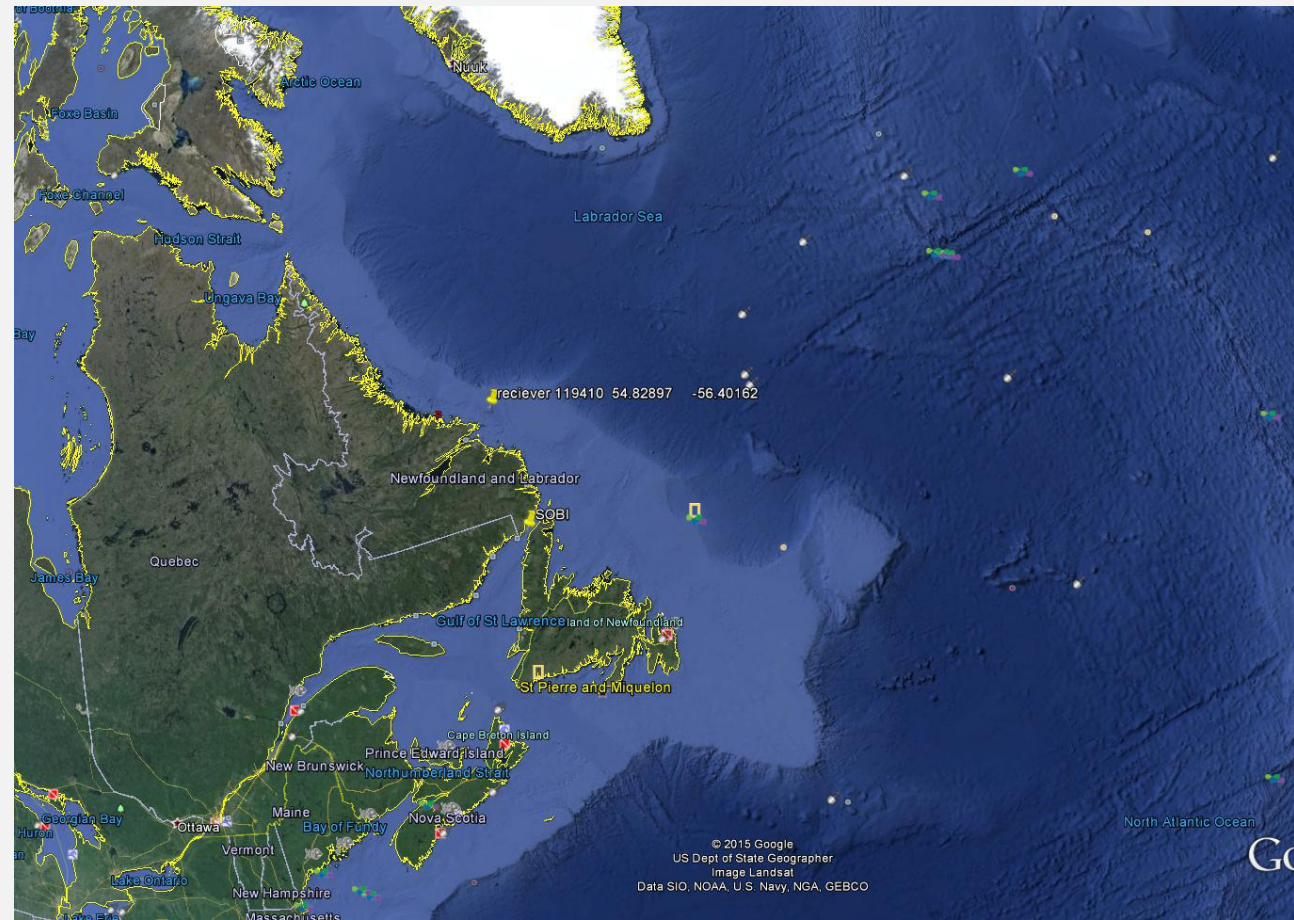
- More units in Gulf
- Labrador Sea

## Deployment Strategies

- Drifters
- Bionprobes



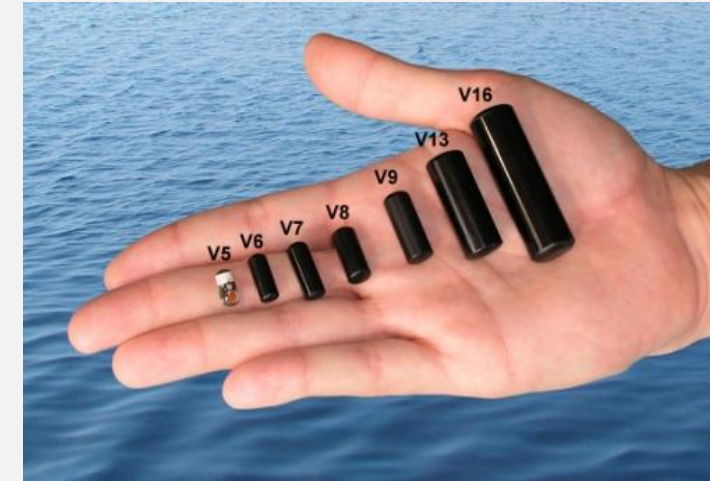
*Improve telemetry technology*



QUESTIONS?

# 2016 Tagging Plans

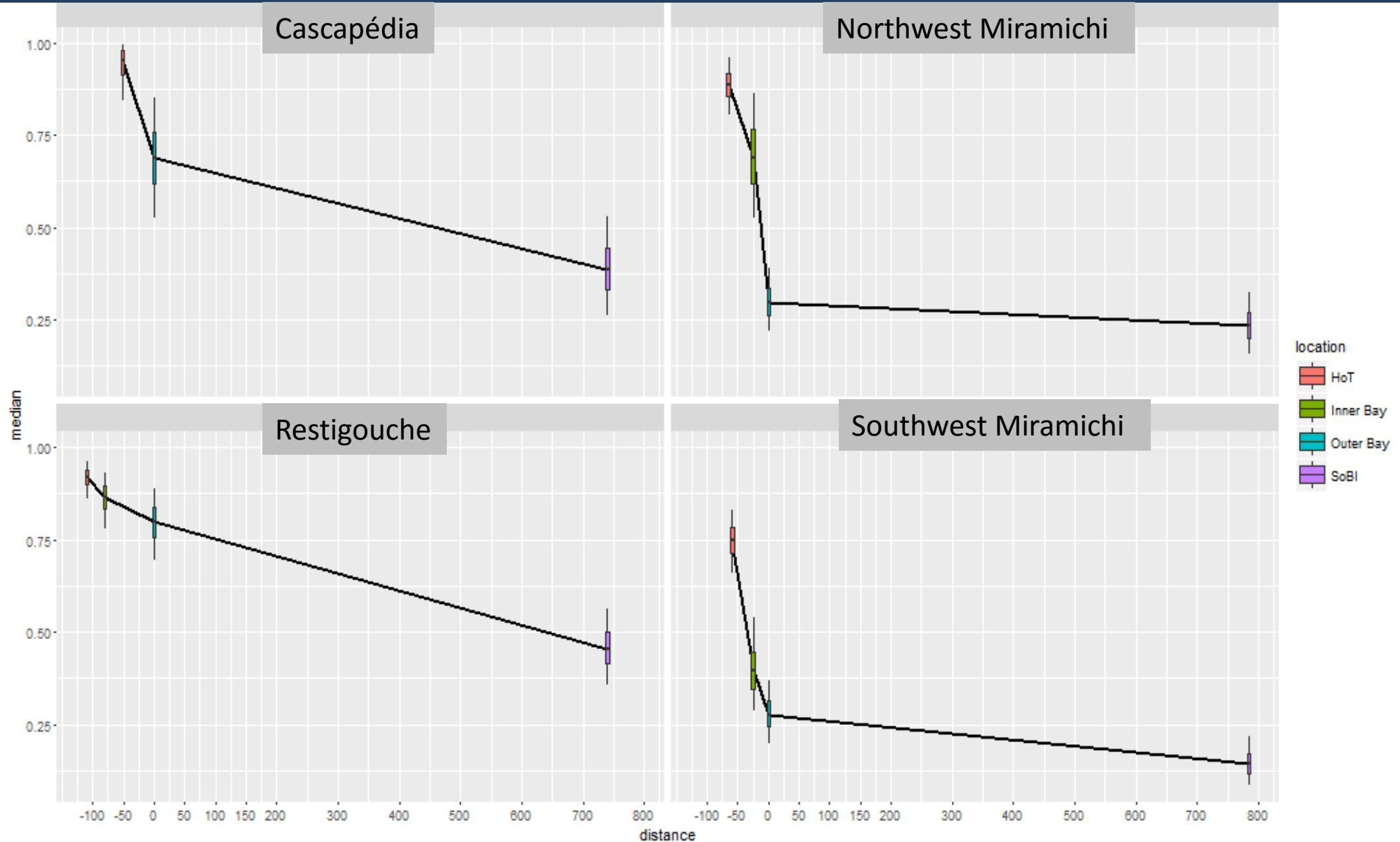
Smolts (V8)	2009	2010	2011	2012	2013	2014	2015	2016
Restigouche	81	80	99	105	80	80	80	80
Miramichi	80	80	80	80	105	130	160	240
Cascapedia	54	40	45	64	39	40	40	40
<i>Matapedia</i>								60
<b>Total</b>	215	200	224	249	224	250	280	420

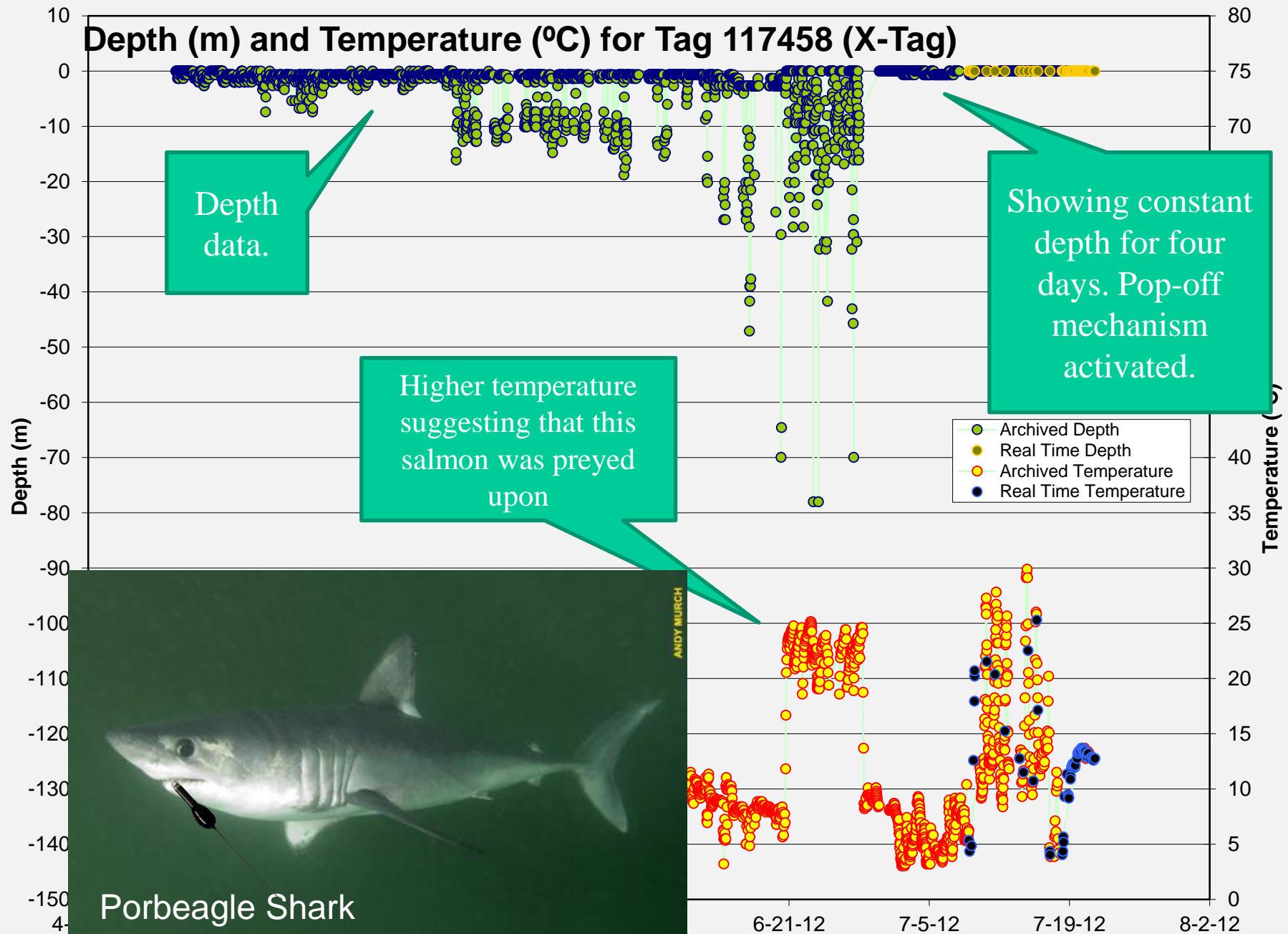


Kelts (V16)	2009	2010	2011	2012	2013	2014	2015	2016
Restigouche (sonic)					25	17	25	25
Miramichi (sonic)	50	50	50	35	16	21	13	25
Miramichi (Pop-up Tags)				10	11	11	11	0
<b>Restigouche (Pop-up Tags)</b>				0	0	0	0	10



# 2015 Smolt Survival Estimates 2015







# Strait of Belle Isle Arrays

Labrador

New array deployed in 2015

Sentinel Tags

21.25km

3.85km

19km

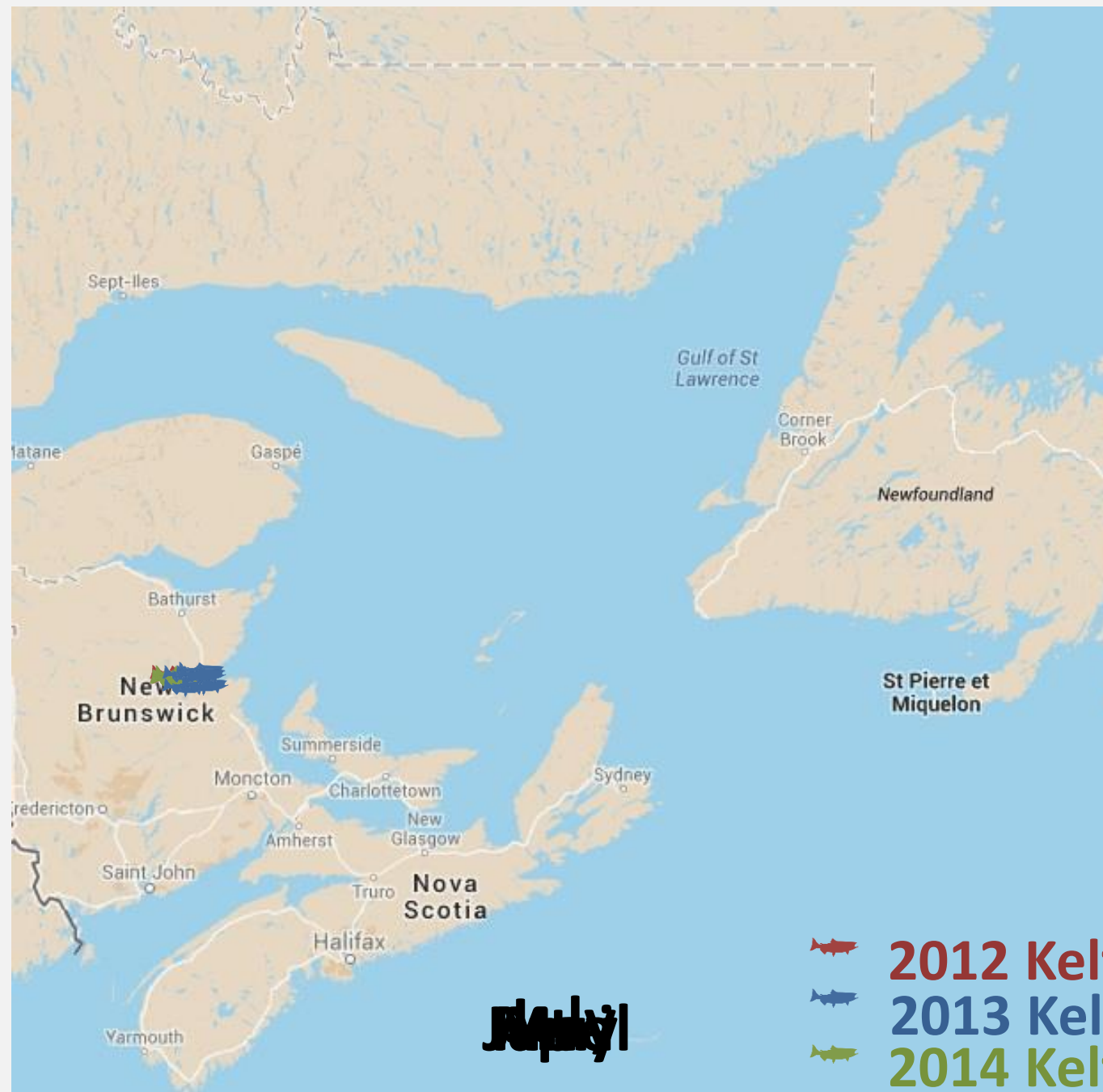
Newfoundland

RECEIVER ARRAYS

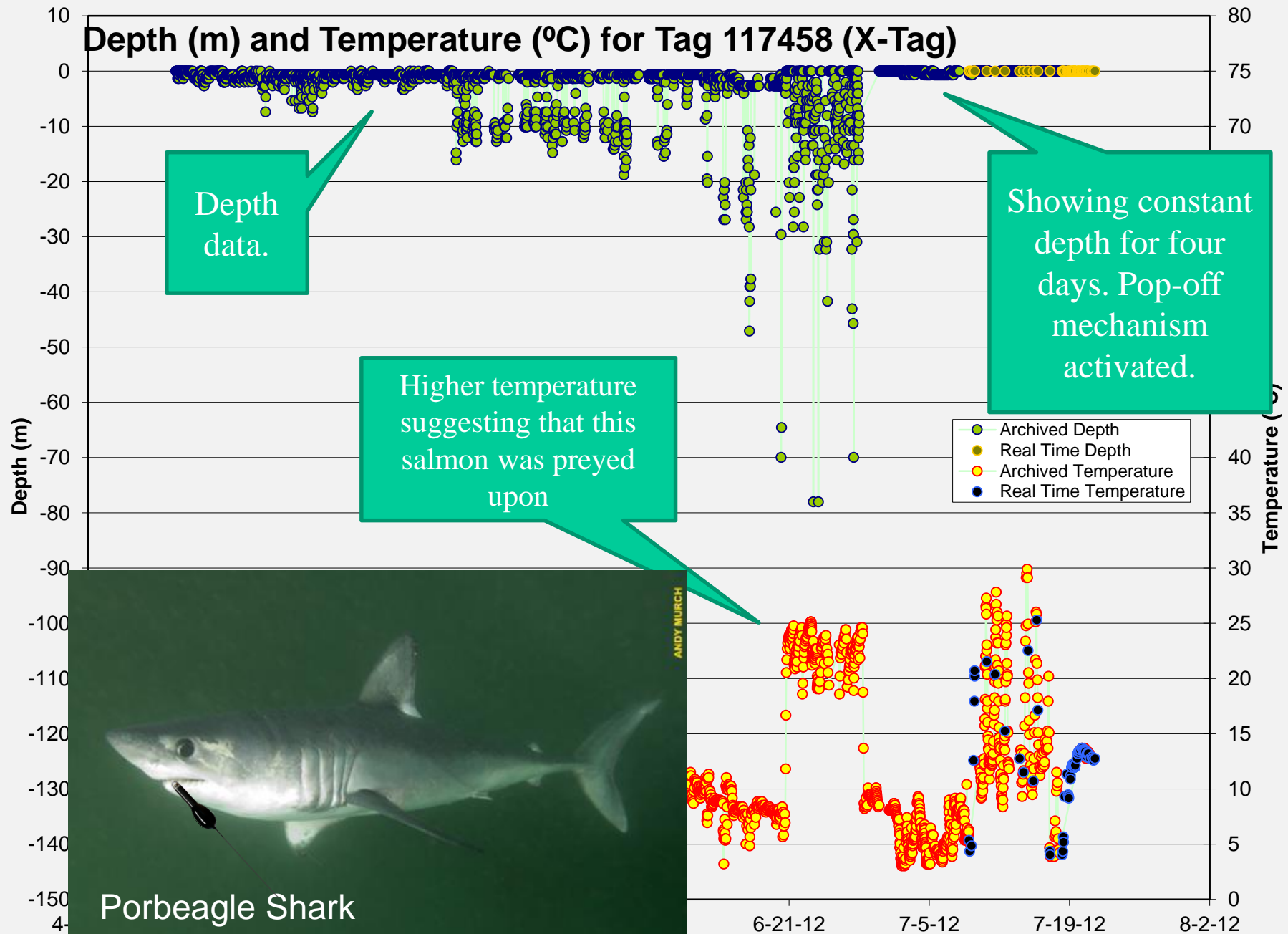
SoBI

# Collaborations: LOW MARINE SURVIVAL

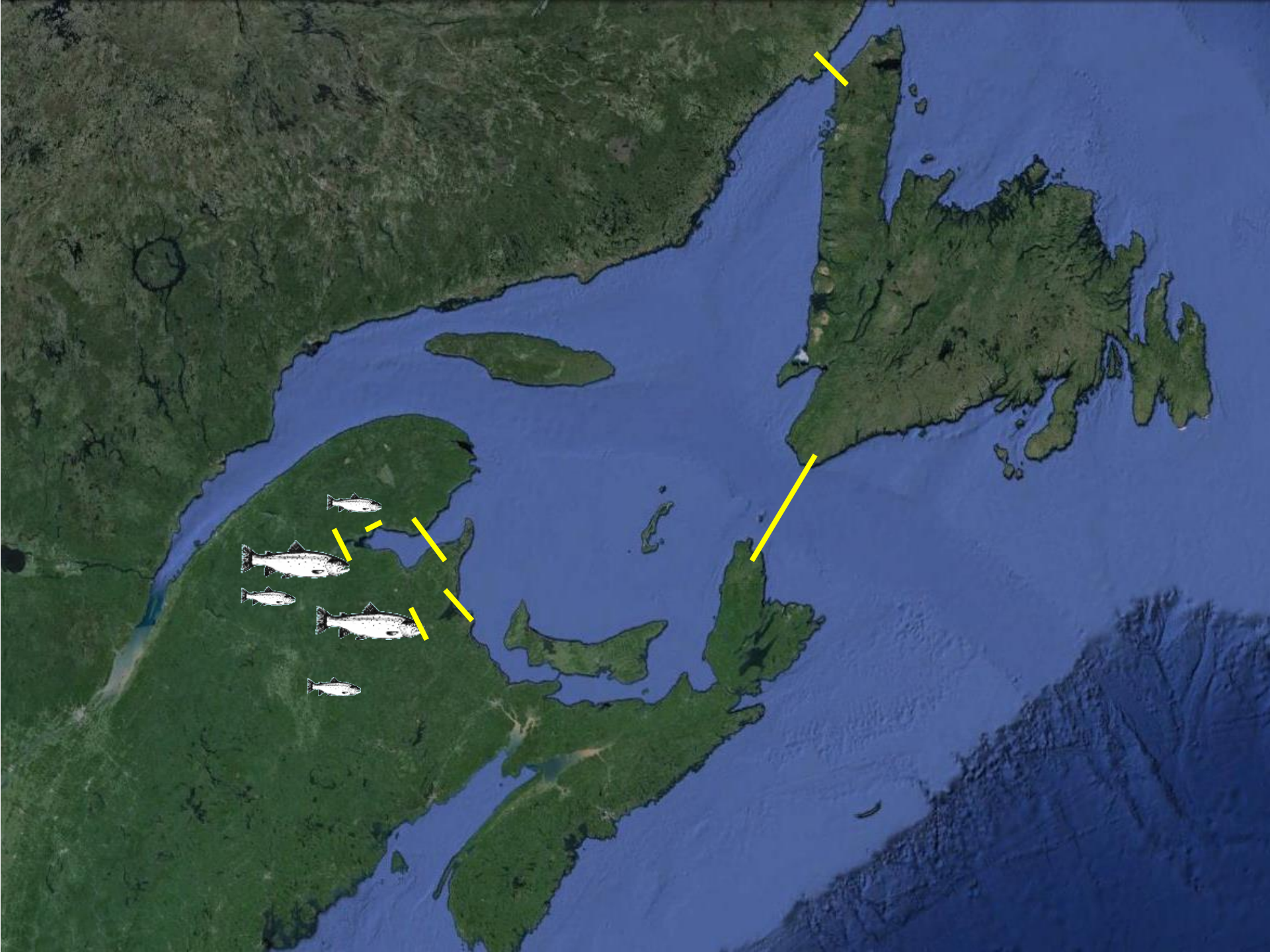
PROJECT	STATUS	PARTNERS
GoSL Smolt Tracking	ongoing	several
Kelt Tracking	ongoing	several
Greenland Pre-adult-Adult Salmon Tracking	planning	Greenland Institute of Natural Resources, several others
Tag Retention Study	ongoing	several
Striped Bass-Smolt	ongoing	several
Cormorant-Smolt	complete 2016	several
Climate Change: scale analysis	planning	ASF, NOAA, DFO, GMRI
Drifters in GoSL	planning	ASF, DFO
PEI Smolt Tracking	new 2016	<b>Souris and Area Branch of the PEI Wildlife Federation</b> , OTN, Abegweit First Nation, Canadian Rivers Institute,
River Dee Smolt Tracking	new 2016	<b>River Dee Trust</b> , AST
Scale Aging	ongoing	<b>ICES</b> and many international partners
Wild fish health monitoring	planning	TBD



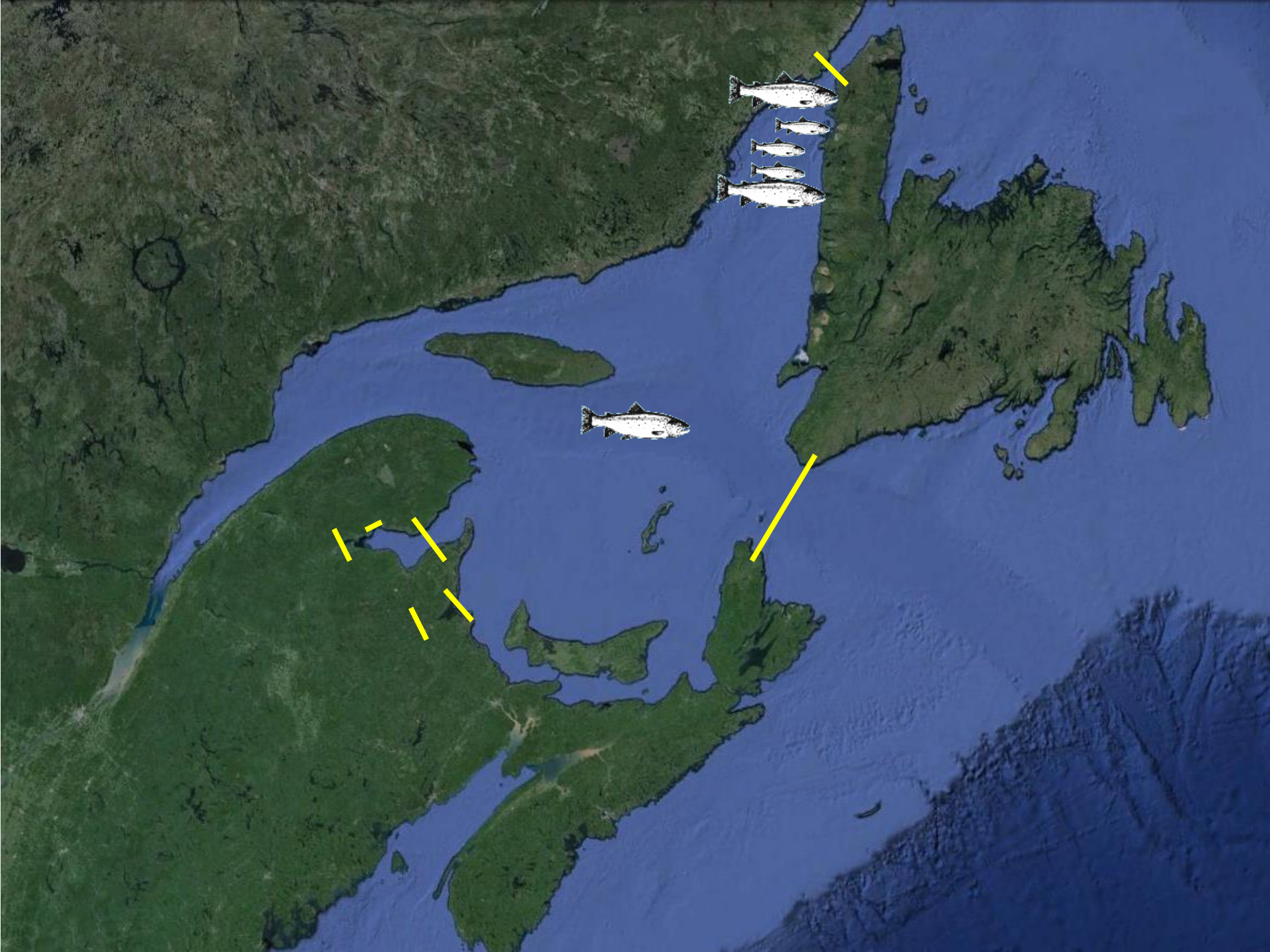




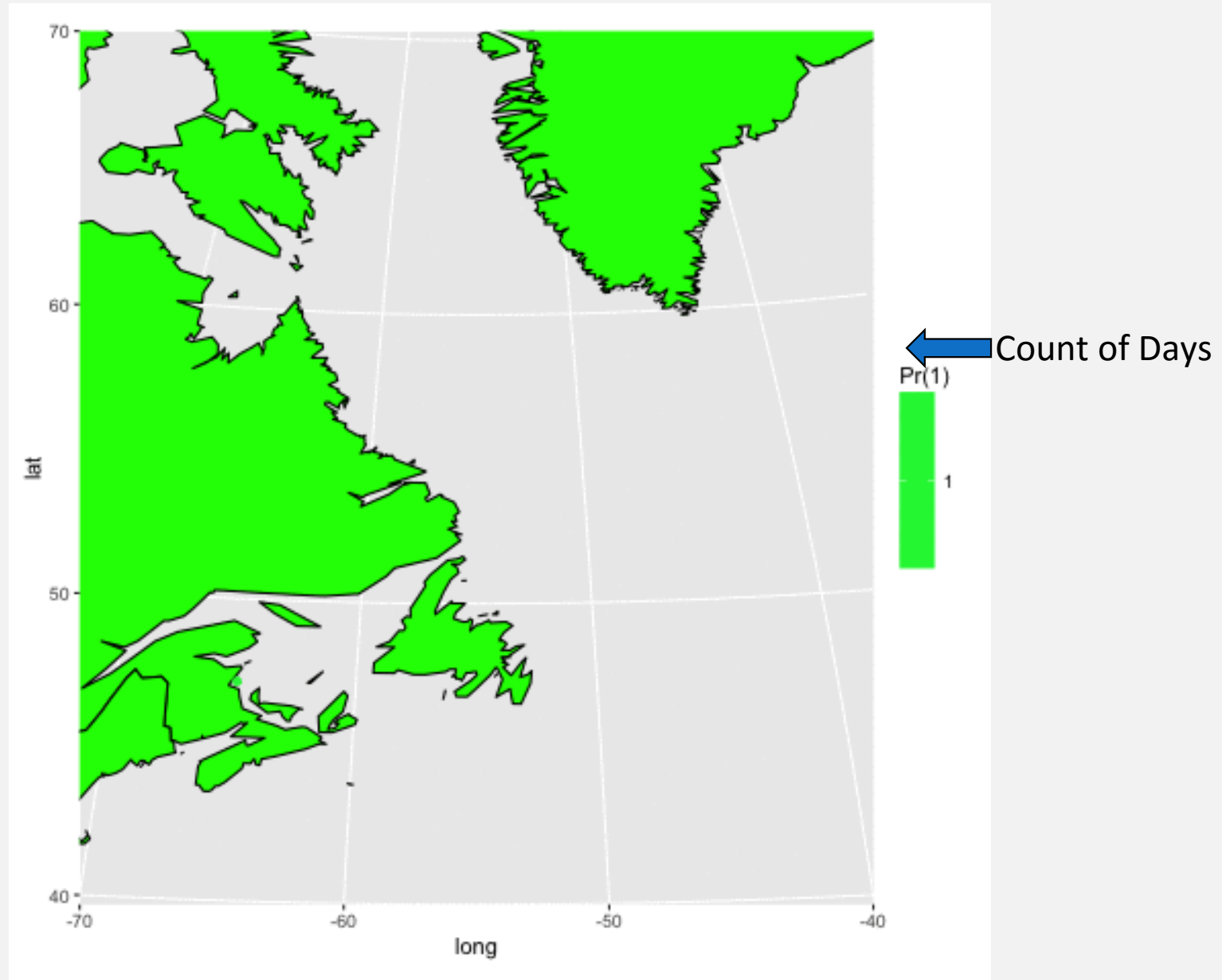






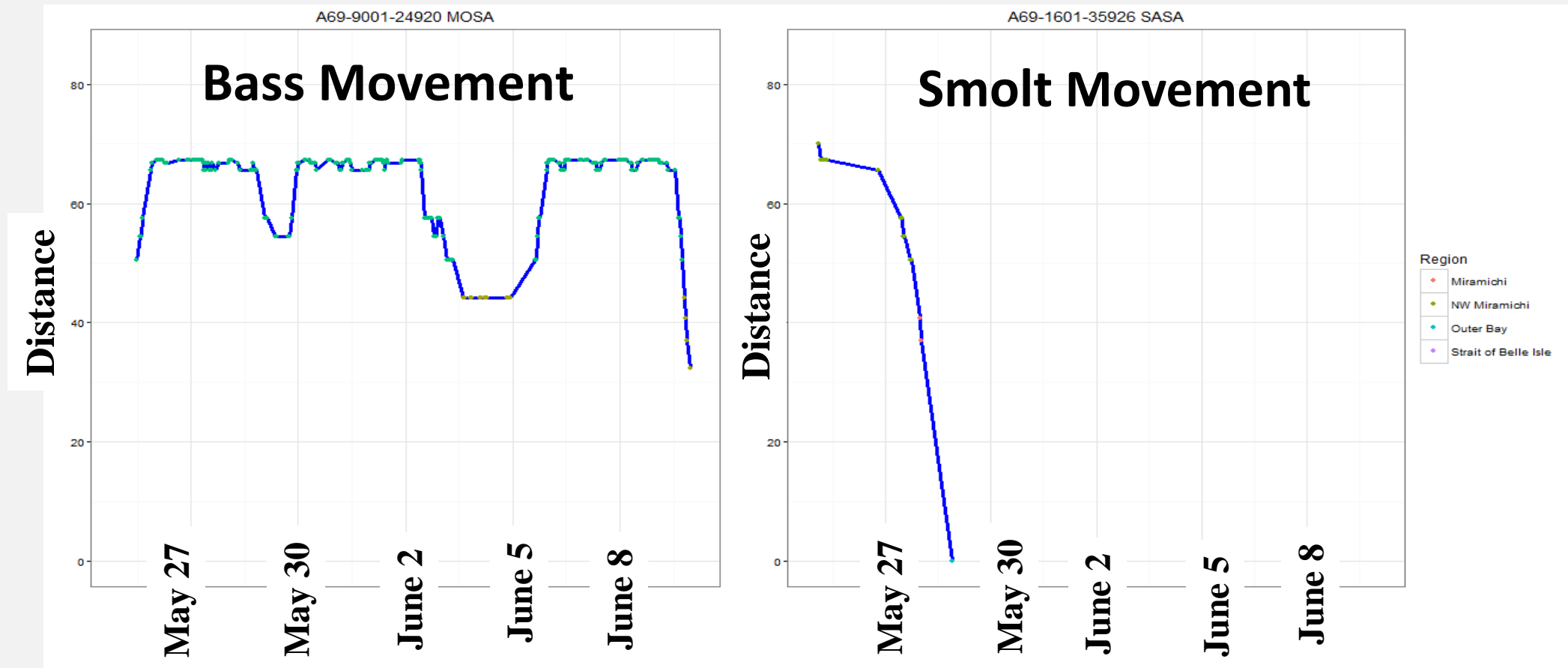


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