OCEAN
TRACKING NETWORK

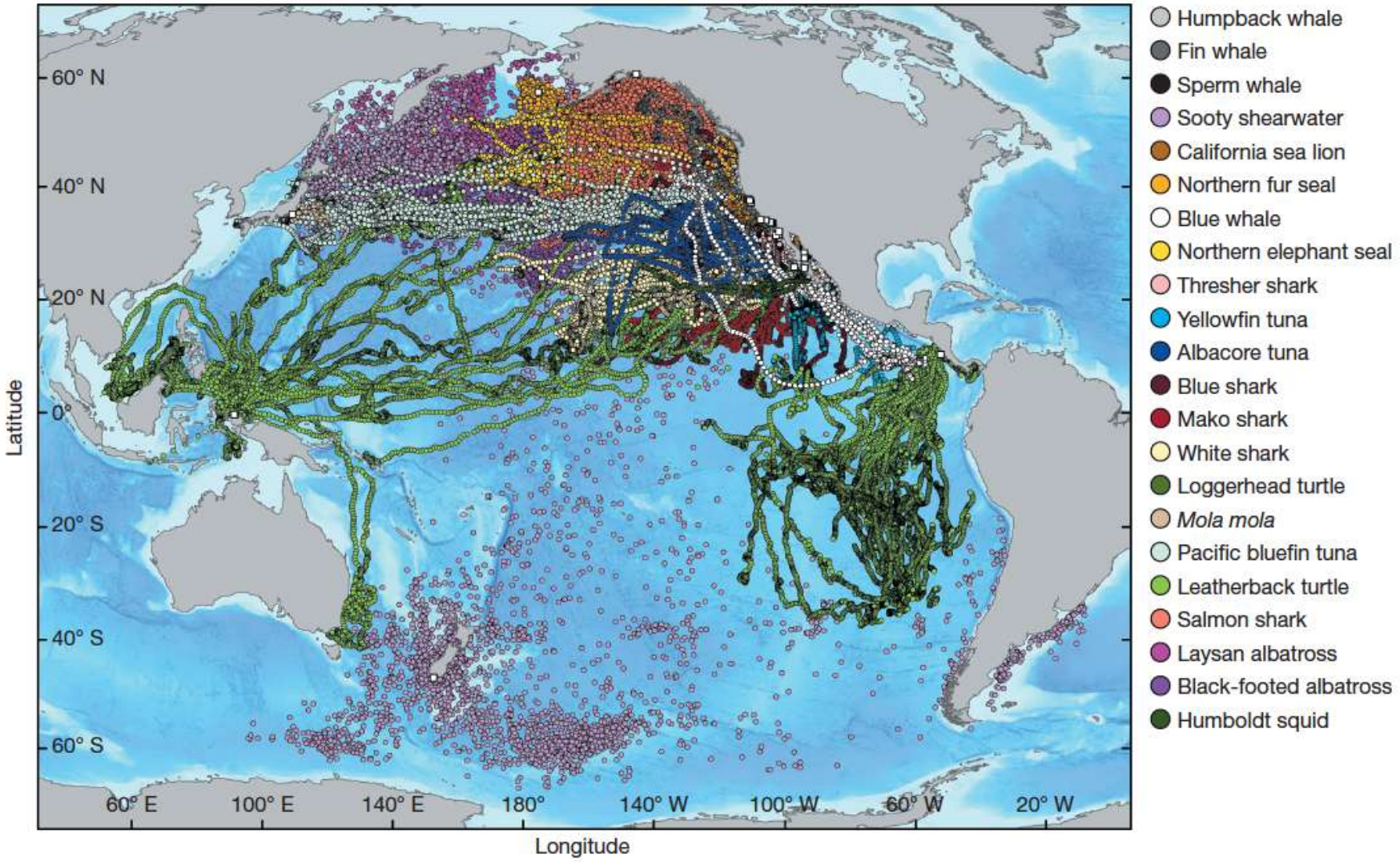
The use of electronic telemetry to follow salmon at sea

2 Oct 2015, Atlantic salmon Summit

Fred Whoriskey, Executive Director

Twitter @OceanTracking

TOPP: Animal population connectivity via movements



Hussey et al. (2015) Aquatic animal telemetry: a panoramic window into the underwater world. Science

Why track? Filling in ecological knowledge gaps

- Fisheries management (fishery independent mortality; fish distributions and habitats; monitoring)
- Design of Marine Protected Areas
- Impact Assessment for coastal/offshore developments
- Hatchery vs wild fish behavior
- Wild fish interactions with farmed fish
- Environmental conditions and the prediction of future animal distributions
- Results stand up in court cases
- Engagement of the public

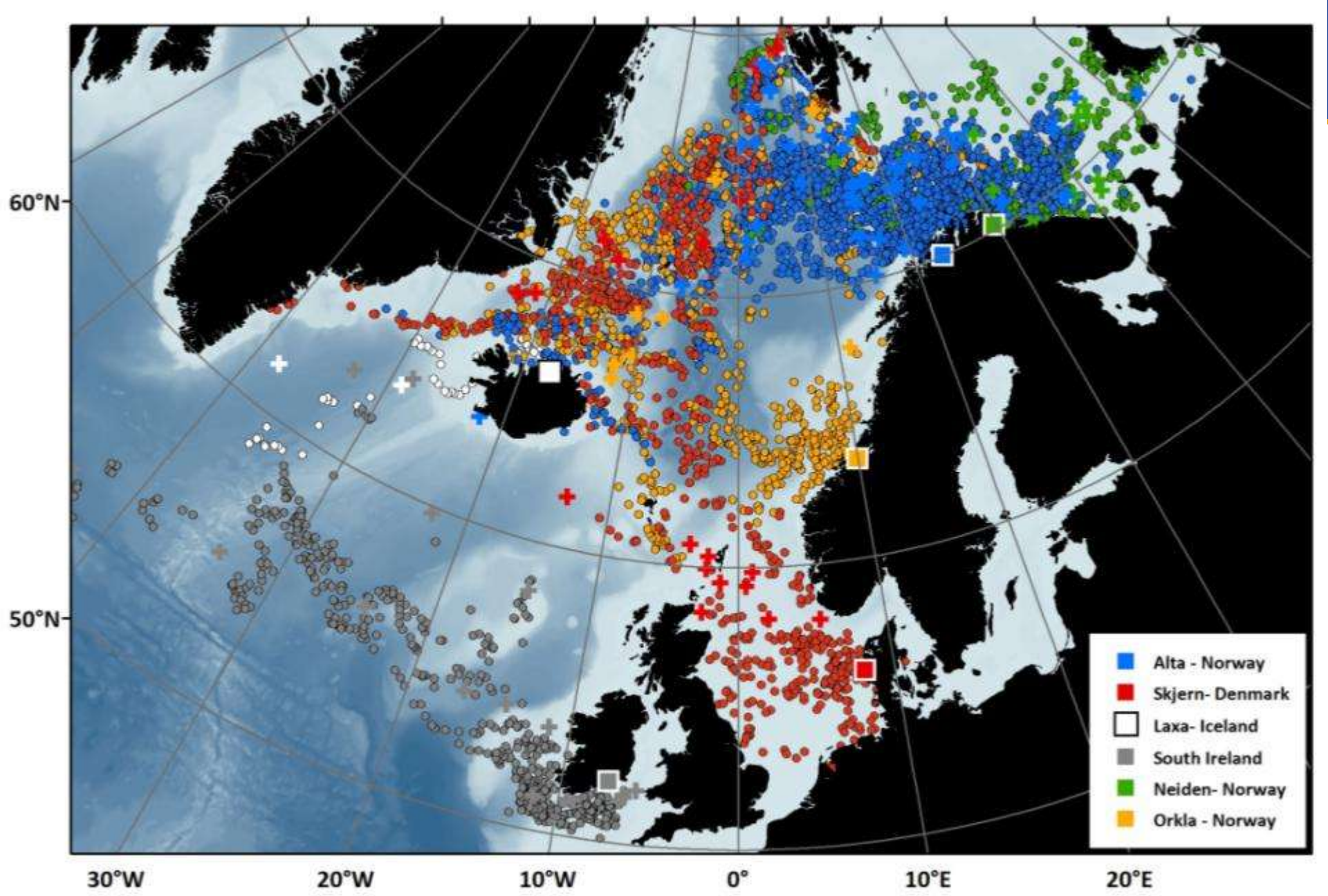
Electronic tag types

- Data loggers (Data storage tags)
- Acoustic tags
- Satellite tags
- No single perfect technology

Capabilities of different tags

	Data Logger	Acoustic	Satellite
Fish size	> 15 cm	> 5 cm	>50 cm
Fresh and salt water?	Yes	Yes	No
Tag life	Memory limited	Up to 10 Y	1 Y
Sensors	Yes	Yes	Yes
Real time data	No	Some types	Some types
System components	Tag	Tag, recevier	Tag, satellite
Approx. tag cost	$10-400	$400	$5,000
Attachment (location)	External	Internal	External
Tag retreival	Required	No	Satellites

DTU Aqua
National Institute of Aquatic Resources


60°N
50°N
30°W
20°W
10°W
0°
10°E
20°E
Alta - Norway
Skjern- Denmark
Laxa- Iceland
South Ireland
Neiden- Norway
Orkla - Norway

Campbellton River, DSTs

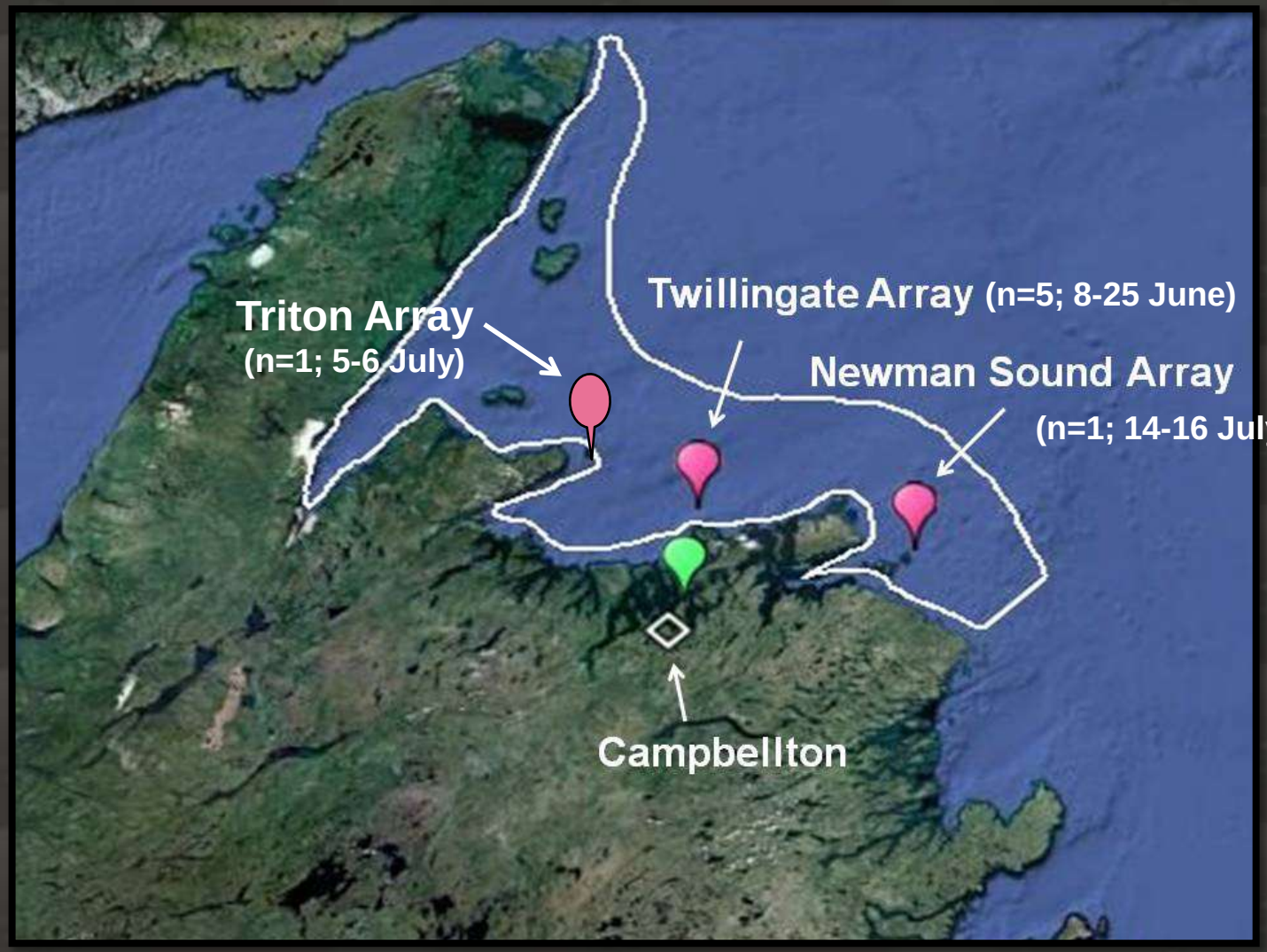
Ian Fleming et al., Memorial University

2007, 2012 Kelts; 2014 smolts

(1) Kelts: 69 , 54 days at sea

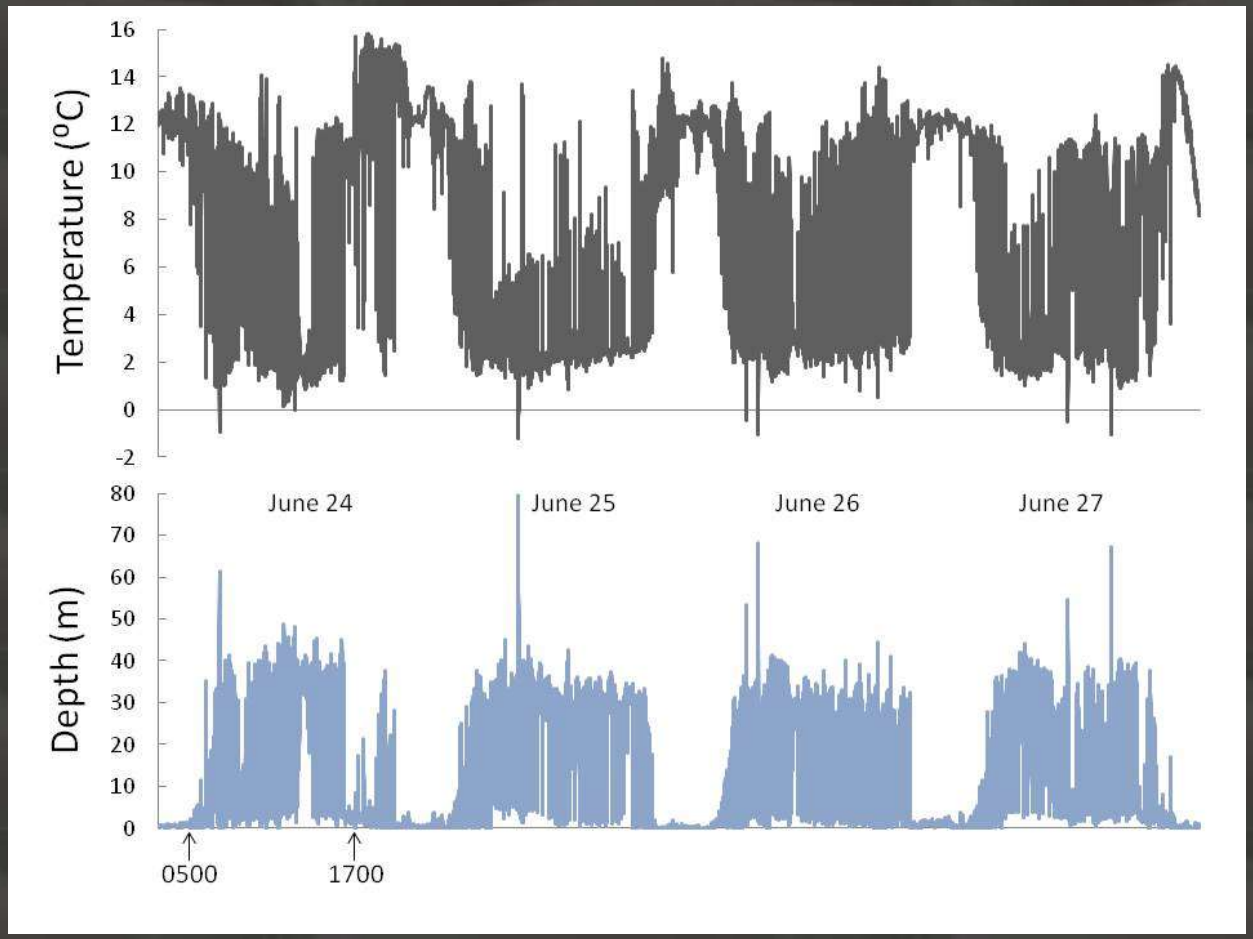
(2) Survival: 50%, 24%

Migration Patterns



- Bayesian model to calculate tracks from geolocation data and acoustic detections (future)

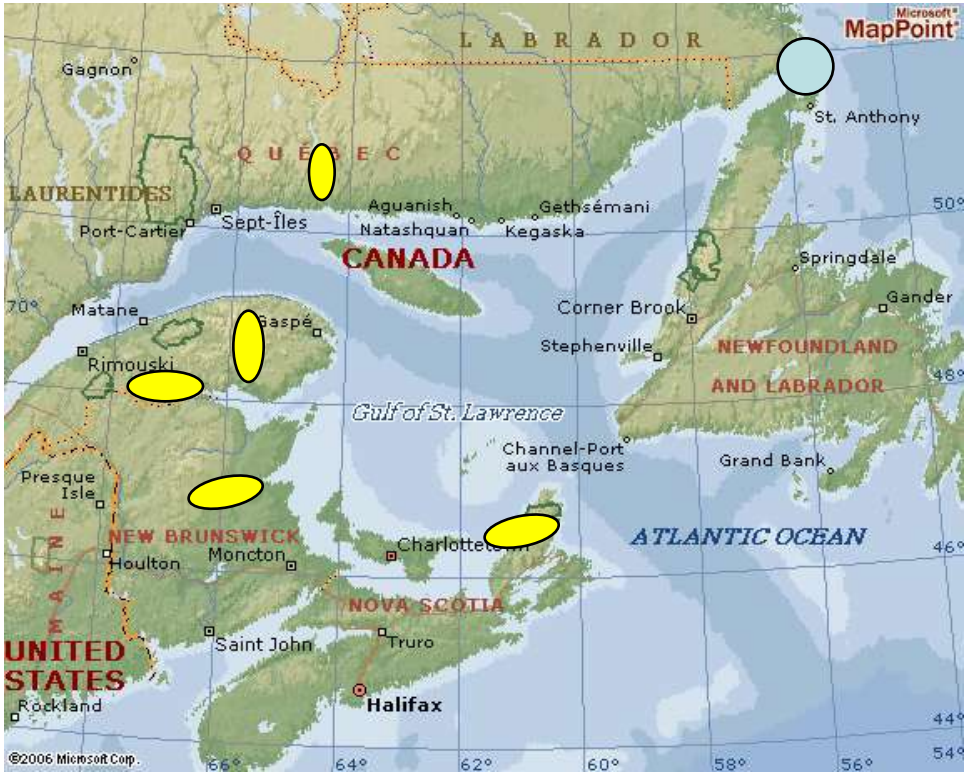
Diving Behaviour



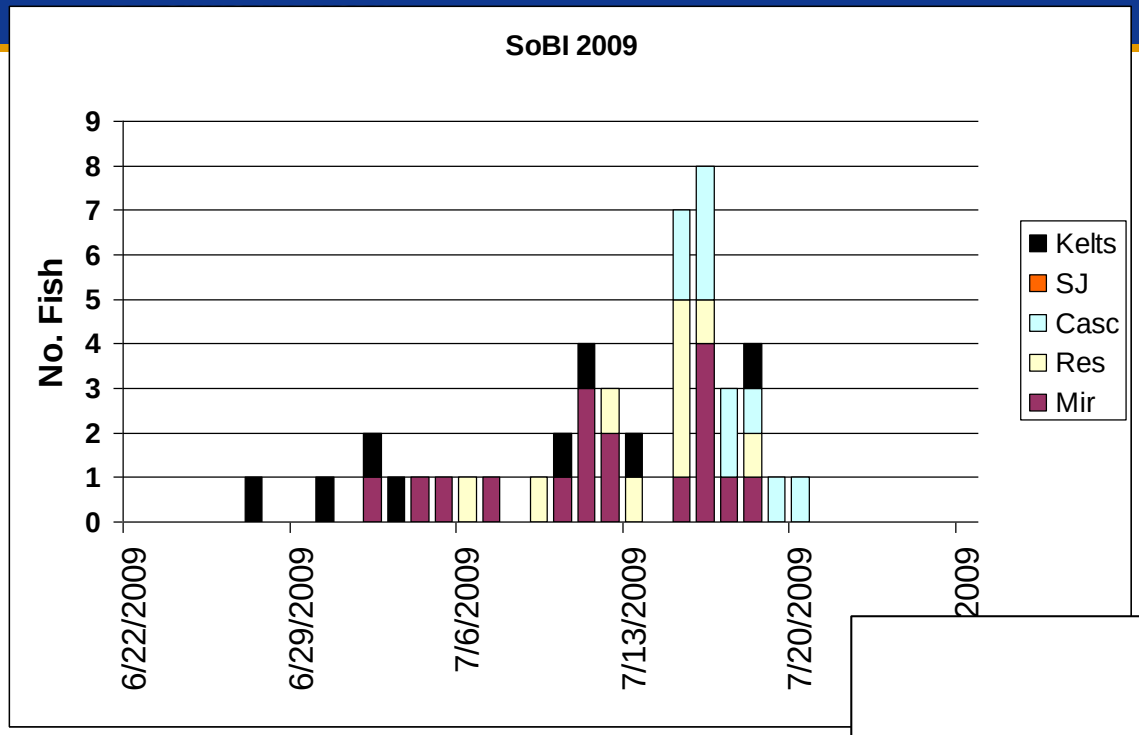
- Diurnal pattern may be indicative of a reliance on vision for feeding at depth
- Dives of short duration (<10 min)

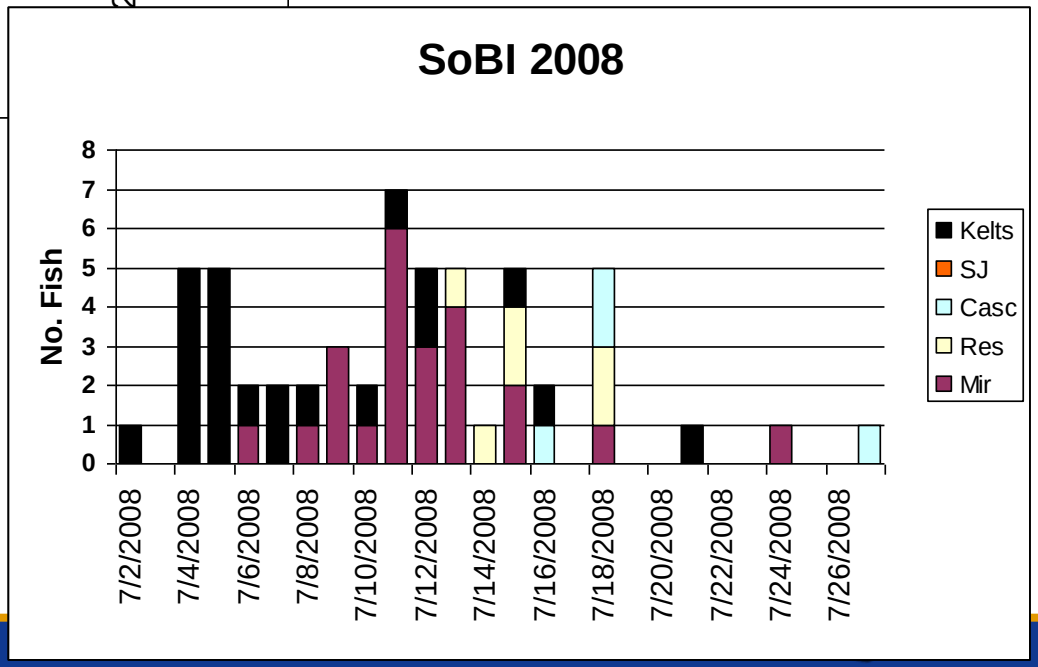
Atlantic Salmon Federation, Sonic telemetry

- Wire key choke points on migration routes
  - Head of tide zones
  - Estuary exits
  - Gulf (Straits, continental shelves)
- Long time series- natural experiments
- Smolts, kelts



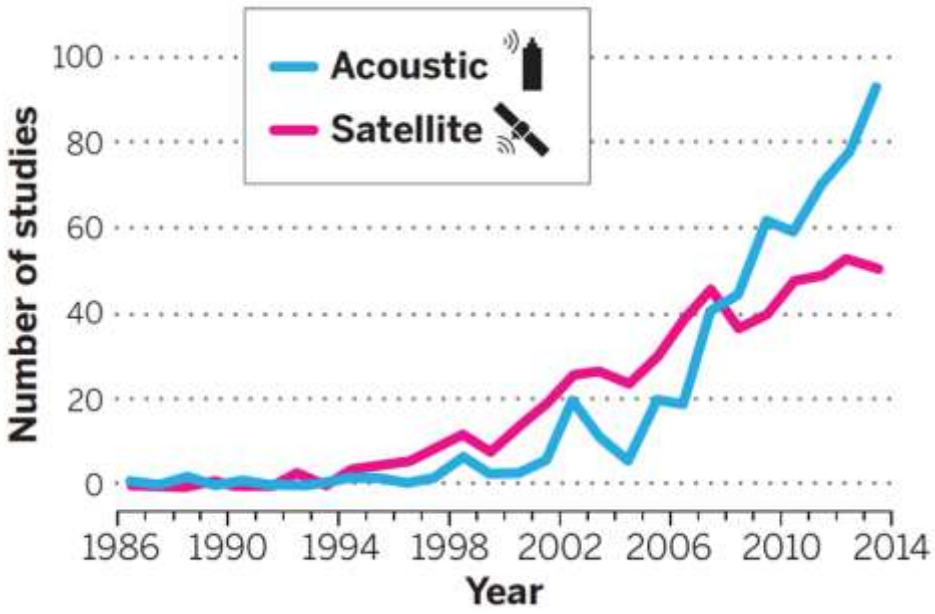
Strait of Belle Isle arrivals

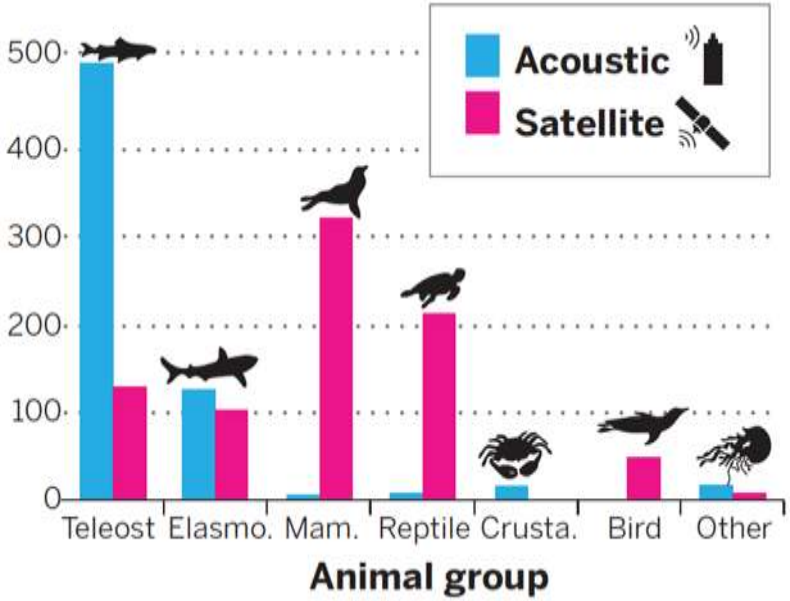


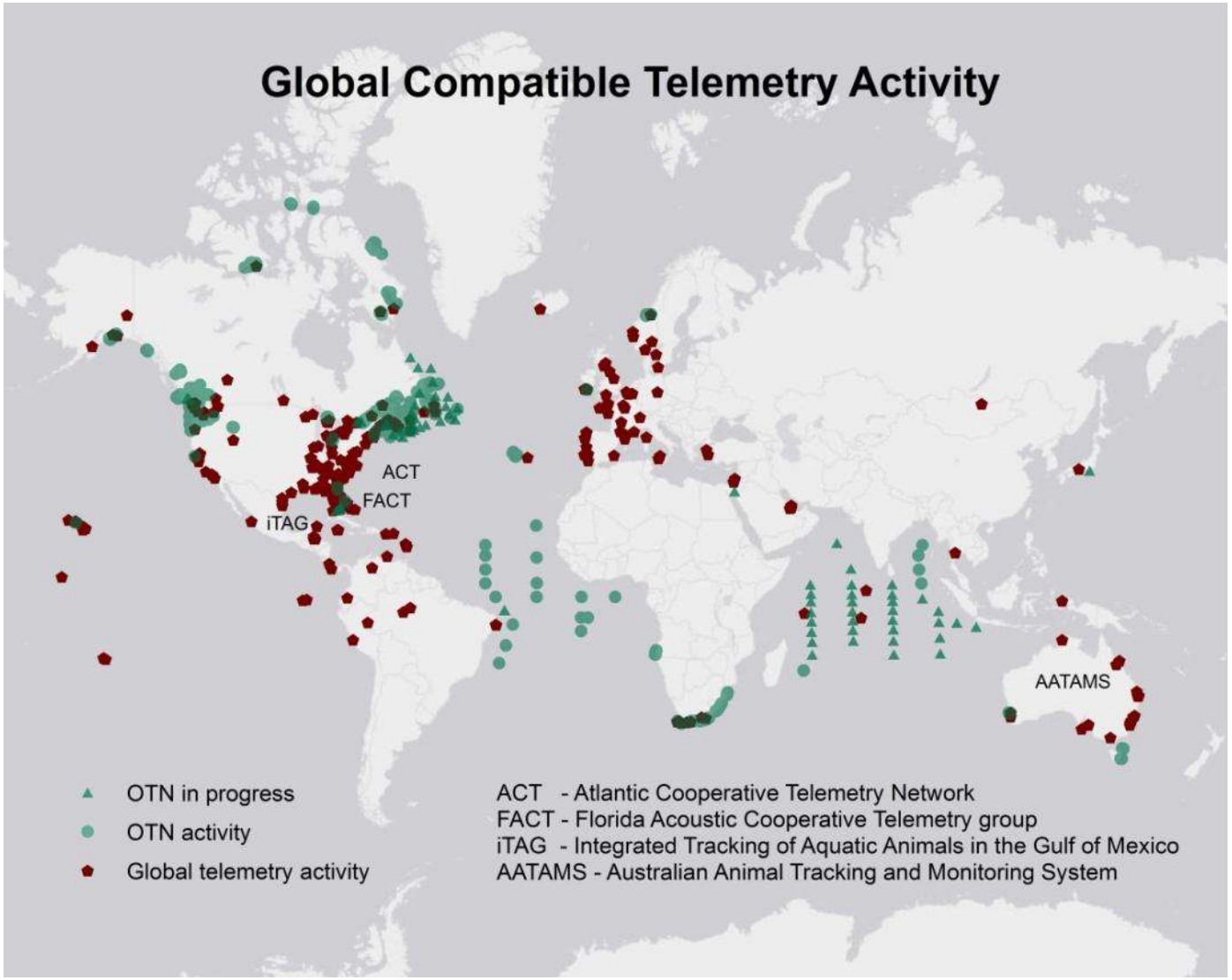


Future trends

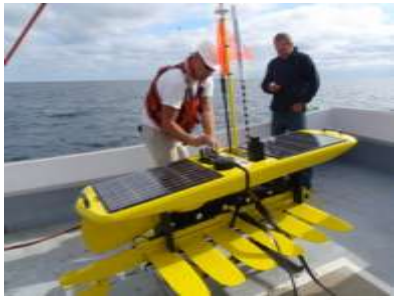
- Melding tracking work to other technologies (genomics, physiology sensors, etc.)
- Trend to acoustic telemetry

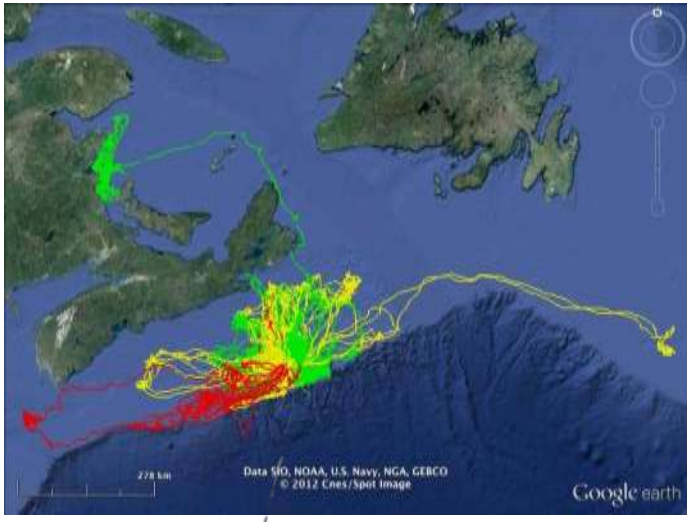





Global Compatible Telemetry Activity
ACT
FACT
iTAG
AATAMS
OTN in progress
OTN activity
Global telemetry activity
ACT - Atlantic Cooperative Telemetry Network
FACT - Florida Acoustic Cooperative Telemetry group
iTAG - Integrated Tracking of Aquatic Animals in the Gulf of Mexico
AATAMS - Australian Animal Tracking and Monitoring System

St Lawrence/Scotian Shelf/GoM OTN Network





Data systems

Conclusions

- Powerful technologies
- AtlantOS Horizon 2020 European Aquatic Animal Telemetry Network
- Fusing with other technology to provide new insights (genomics, physiology, epidemiology)
- Disruptive, but exciting

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Inspiring Minds

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