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ROAM update

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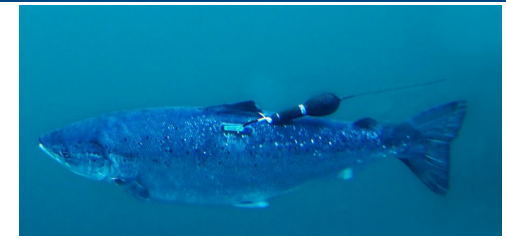
May 26, 2021

Electronic tagging technologies

- Have advanced our understanding of the marine ecology for many species, including Atlantic salmon
- Two primary/contemporary tools used for Atlantic salmon:
 - Ultrasonic acoustic tags (acoustic tags)
 - Since 1994
 - Tag emits a signal that receivers detect and record
 - Pop off Satellite tags (PSAT)
 - Since 2008
 - Geo-positioning from collected data (temperature, depth, light, magnetic fields, etc.)



A Few Pros and Cons



Acoustic

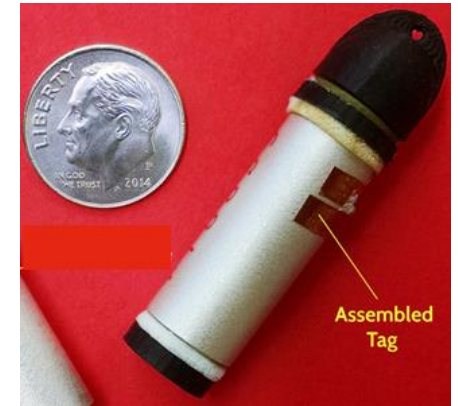
- Small tag size
 - Precise locations
 - Predation events
 - Impacts considered minimal
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- Limited tag life
 - Small receiver detection radius
 - Data from monitored areas
 - Monitoring large expansive areas is logistically and economically challenging

PSAT

- Long-term deployment
 - Continuous data collection
 - '*Daily precise*' locations
 - Predation events
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- Large tag size
 - Impacts on behaviour
 - Behaviour may be incompatible with data requirements
 - Sub-set of data informative
 - Imprecise location estimates

ROAM (RAFOS Ocean Acoustic Monitoring) tag

- Evolution of a common oceanographic monitoring tool
 - Modification and miniaturization
- Overview:
 - Moored sound sources deployed in the ocean
 - 10-year life span
 - A hydrophone is incorporated into the fish tag
 - Daily precise estimates of tag position via triangulation (± 1 km²)
 - Temperature and depth data also collected by tag
 - Archive (*smolt*) and pop-off satellite (*adults and sub-adults*) tags are being developed



Timeline

2017

- 1st presented to IASRB

2018

- Workshop (June 7-8, 27 participants)
 - Bronger and Sheehan (2019)
<http://www.nefsc.noaa.gov/publications/>
 - Approach holds promise
 - Significant challenges/unknowns remain
 - Questions on permitting
 - Fields trials a significant next step
- Update provided to IASRB
 - Continued support and interest
 - IASRB funds earmarked £4,000 for 2nd workshop
 - Interest expressed to seek domestic funding

2019

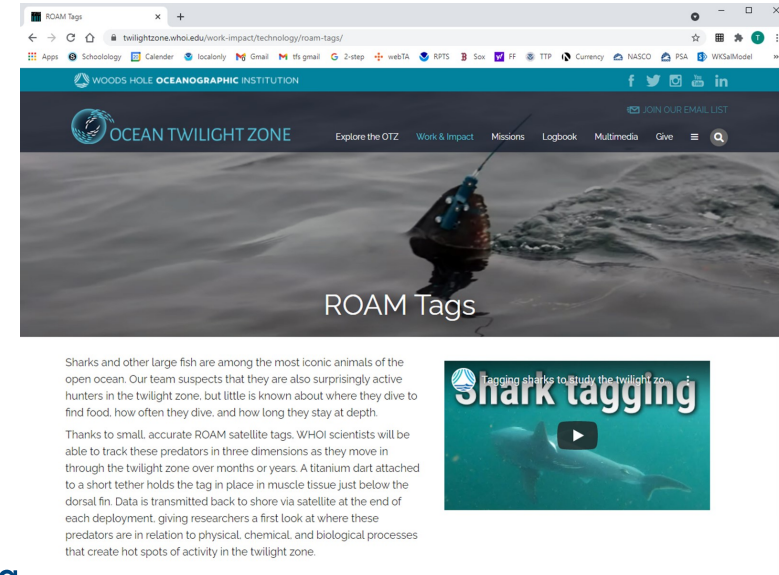
- 1st ROAM 'salmon' sound source fabricated
- Tags
 - Delays in pressure sensor delivery/proto-tag fabrication
 - 2nd and 3rd generation tags planned/pursued
 - PSAT housing, increase sensor capabilities, dual frequency
- Field trials
 - Delayed to incorporate commercial proto-types
 - Fall 2019 - cancelled due to logical issues
 - New target – summer 2020
- Permitting (U.S.)
 - No mammal concerns, permit obtained

2020

- Field trial piggy-back on July survey
 - Sound source deployment, range testing with ship and performance evaluation with glider
- Corona
- Field trial canceled

2021

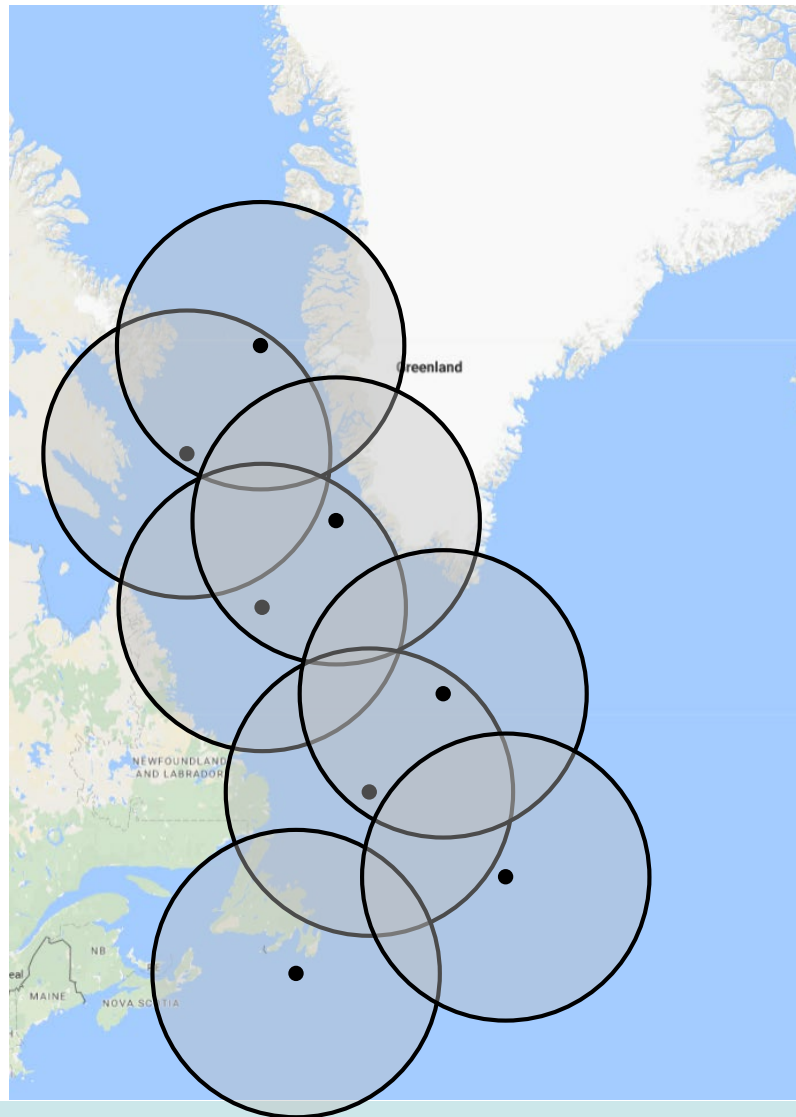
- Primary Investigators still keen to pursue
 - ROAM is integral to the *Ocean Twilight Zone* project (<https://twilightzone.whoi.edu/>)
- Advances with tag development/production
 - Vemco and Wildlife Computers still pursuing
 - Necessary components in hand
 - Multi-frequency ROAM tag being developed
 - Will increase the versatility (e.g. variable range, fw/sw)
- Marine surveys resumed, but at reduced staff making piggy-backing difficult
 - Pursuing an opportunity for July 2021
 - Collaborators working to secure commitments, ship time and glider support
- Great Lakes project being considered



RAFOS Ocean Acoustic Monitoring (ROAM)

- Offers the potential to accurately track further out to sea throughout the marine stage than previously able
 - New use for an old technology
 - Different tag types allow for different research approaches
 - Overall cheaper cost
 - Field testing is needed
- Prime for within and cross-basin multi-species collaborations

Greenland Sub-adult PSAT Tracking



Basin wide/global potential (~2-4 million USD)

