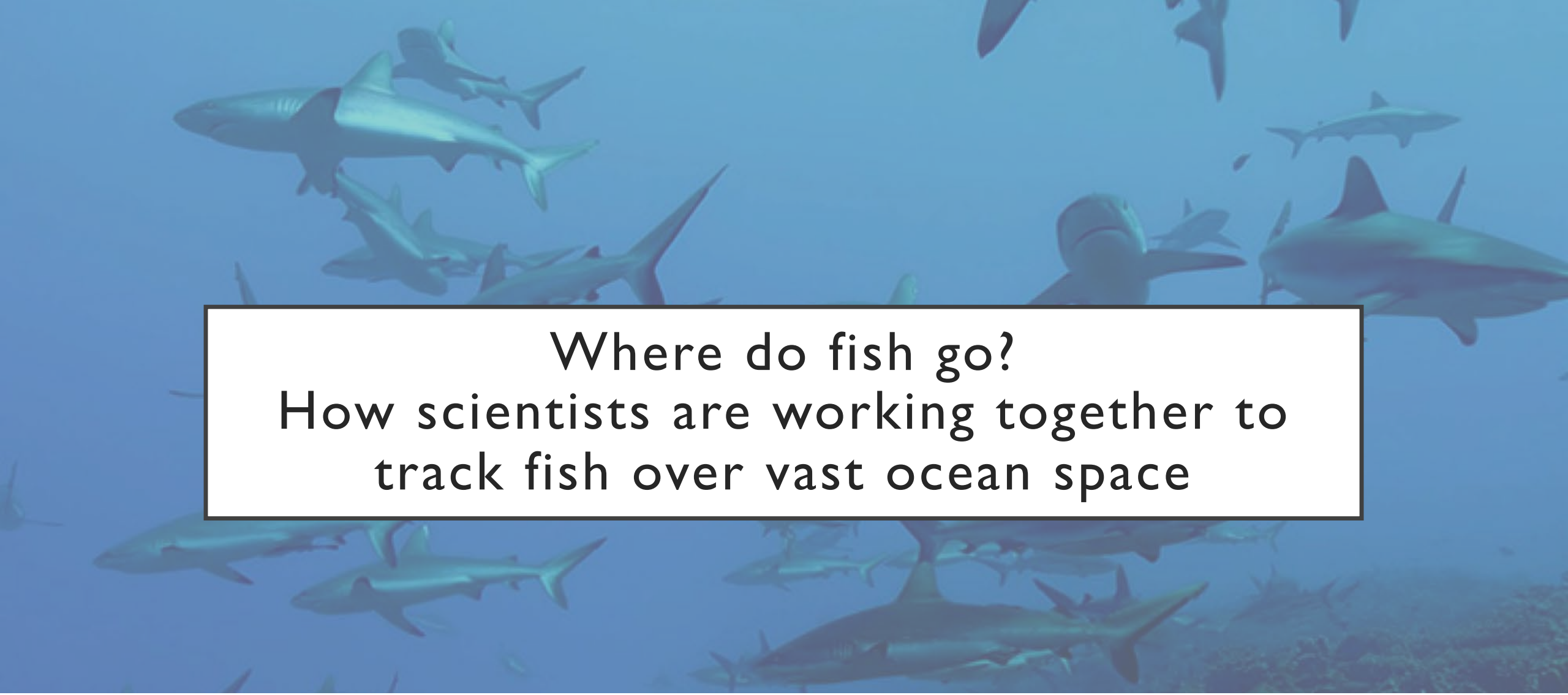


Where do fish go?
How scientists are working together to track fish over vast ocean space

SECOORA
Southeast Coastal Ocean Observing Regional Association

ATN ANIMAL TELEMETRY NETWORK

OCEAN TRACKING NETWORK

Joy Young, Ph.D.
SECOORA Webinar
24 March 2020

FACT Fish Move.

MOVEMENT IS VITAL FOR SURVIVAL.

Feed

Reproduce

Escape predators

Also…

Recolonization for population survival.

Spatial management

Species management

Why are scientists so interested in movement?

Human influence

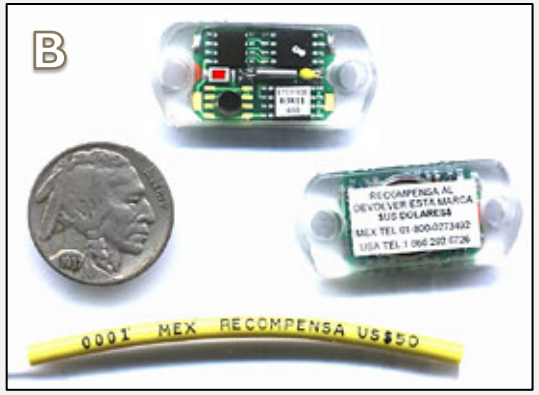
Predicting change

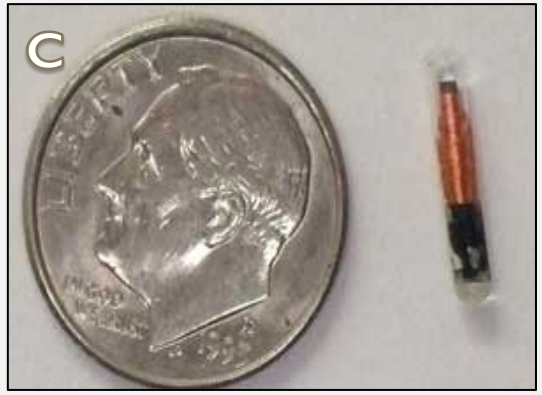
HOW DO WE TRACK MOVEMENT?

A) Streamer/ Conventional / Visual tags

B) Data Storage or archival tags

C) Coded tags





D) Radio tags

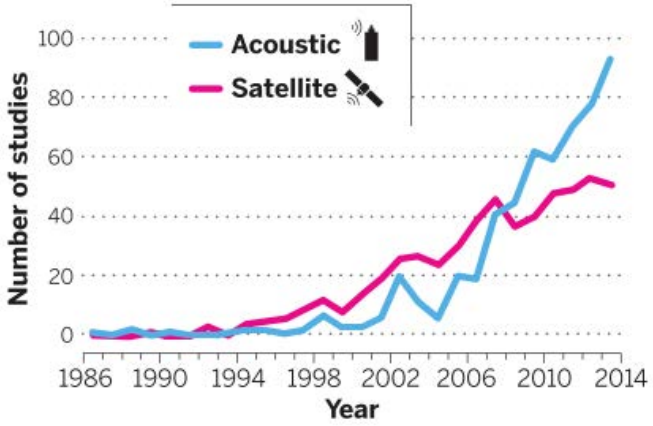
E) Satellite tags

F) Acoustic transmitters

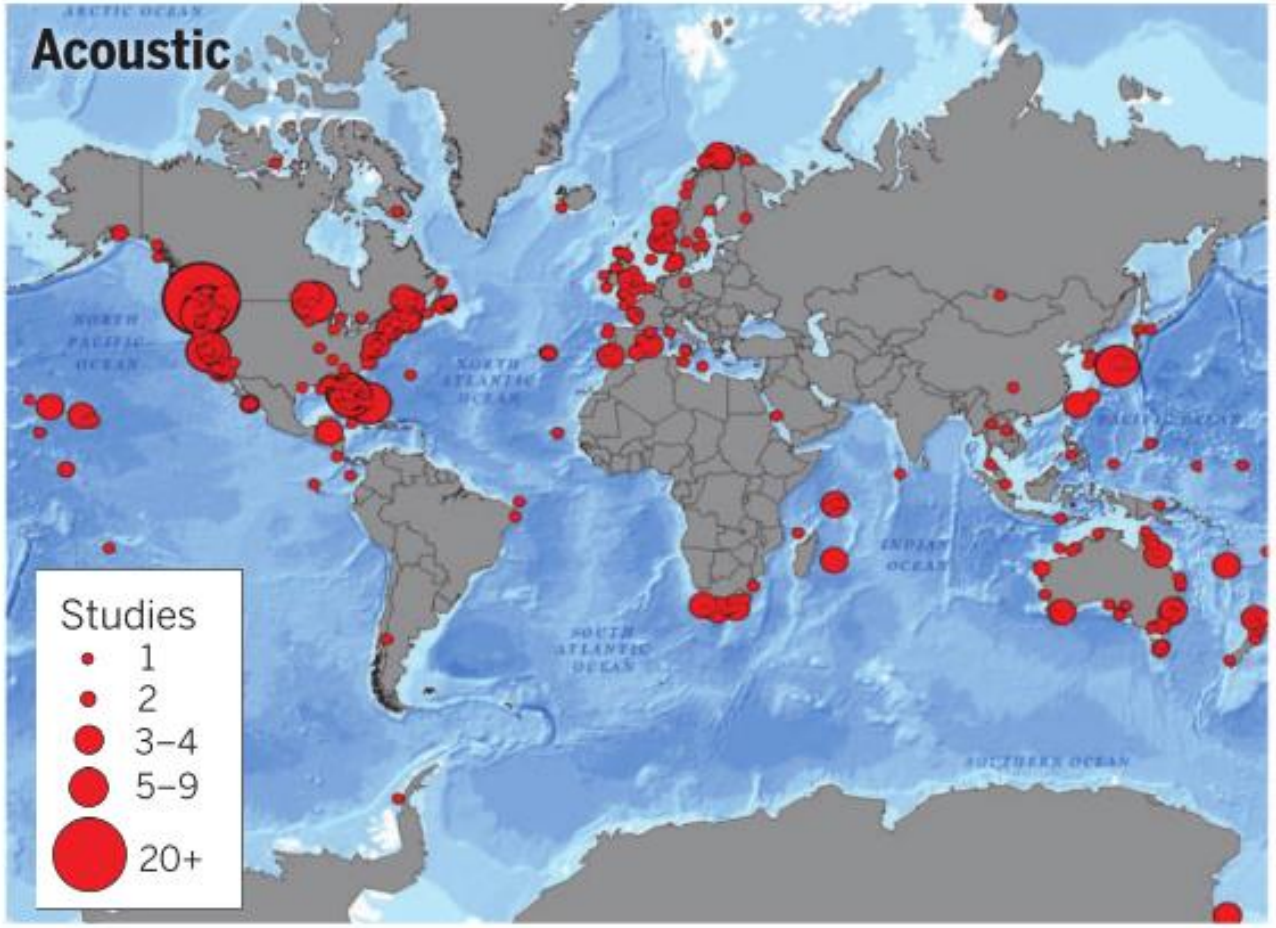
PASSIVE ACOUSTIC TELEMETRY SURPASSES SATELLITE TELEMETRY

SCIENCE sciencemag.org

12 JUNE 2015 • VOL 348 ISSUE 6240 1221

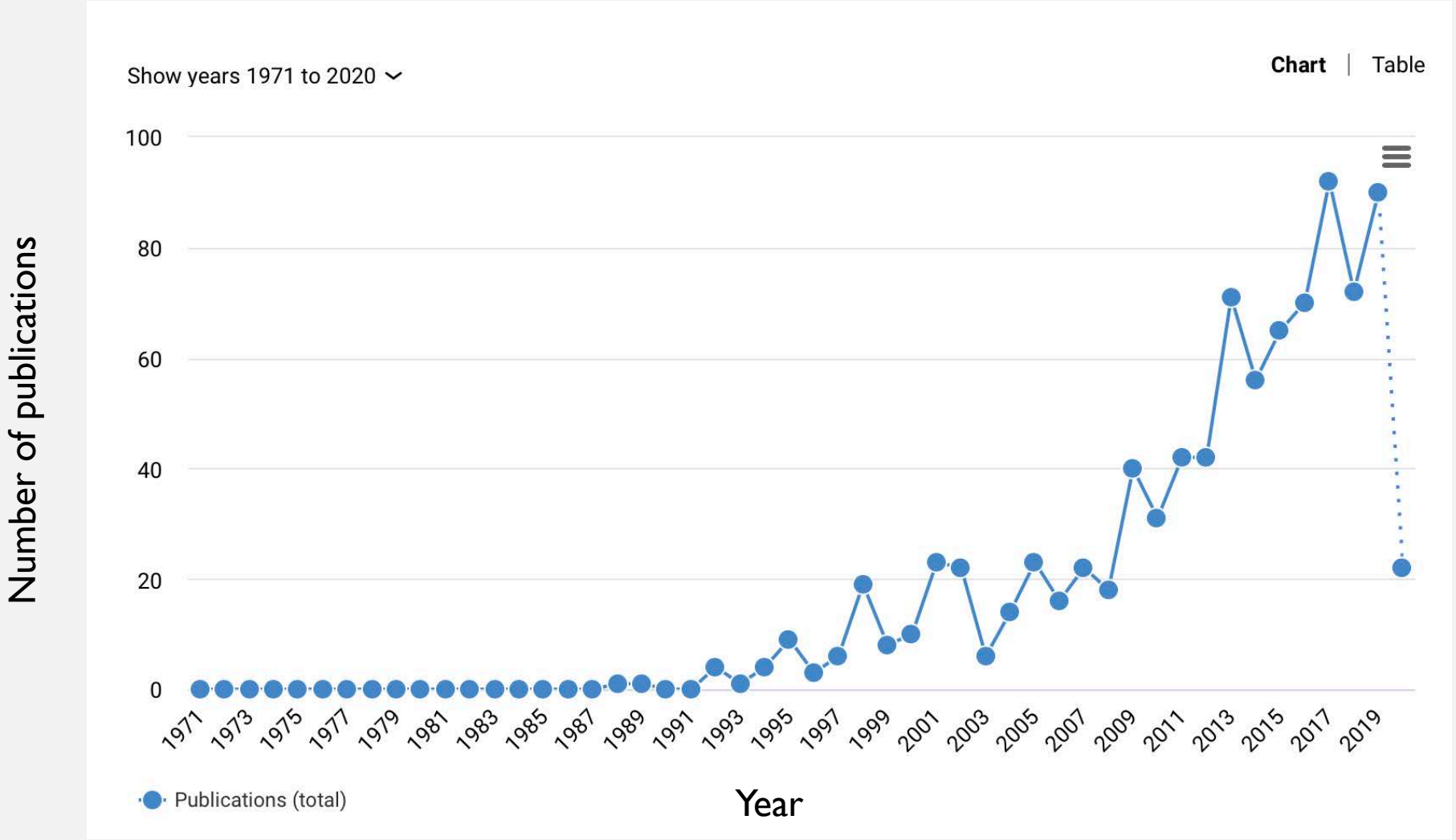


Global distribution of aquatic telemetry studies



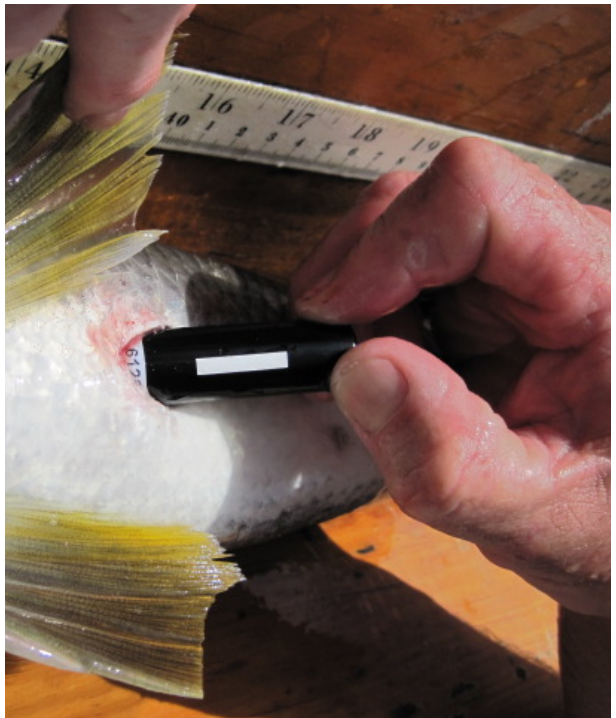
Hussey et al. 2015

PUBLICATIONS OF STUDIES ON FISH USING ACOUSTIC TELEMETRY



n= 903 publications

https://www.somas.stonybrook.edu/2019/01/10/tracking-horseshoe-crabs-by-acoustic-telemetry/



ACOUSTIC TELEMETRY (A TWO PART TECHNOLOGY)

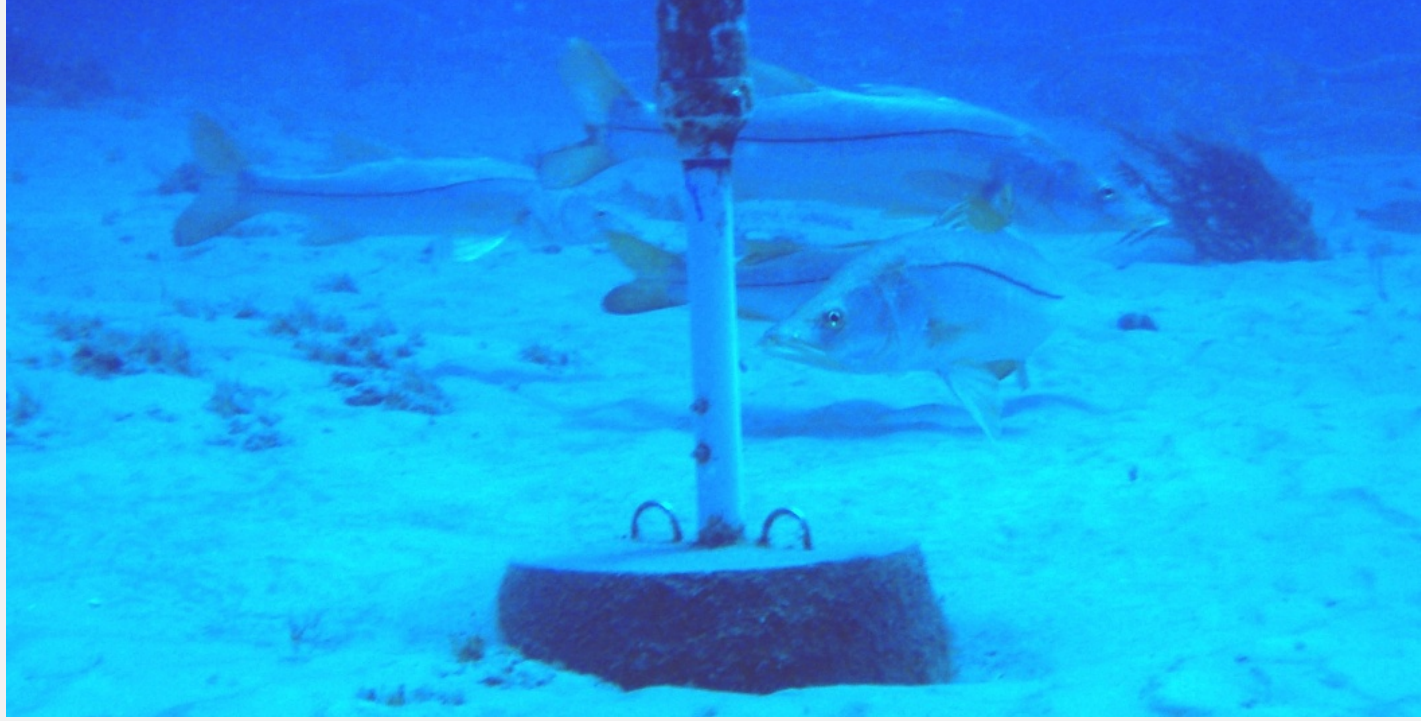
Ultrasonic pingers (tags) are **attached** to or **implanted** in an animal.

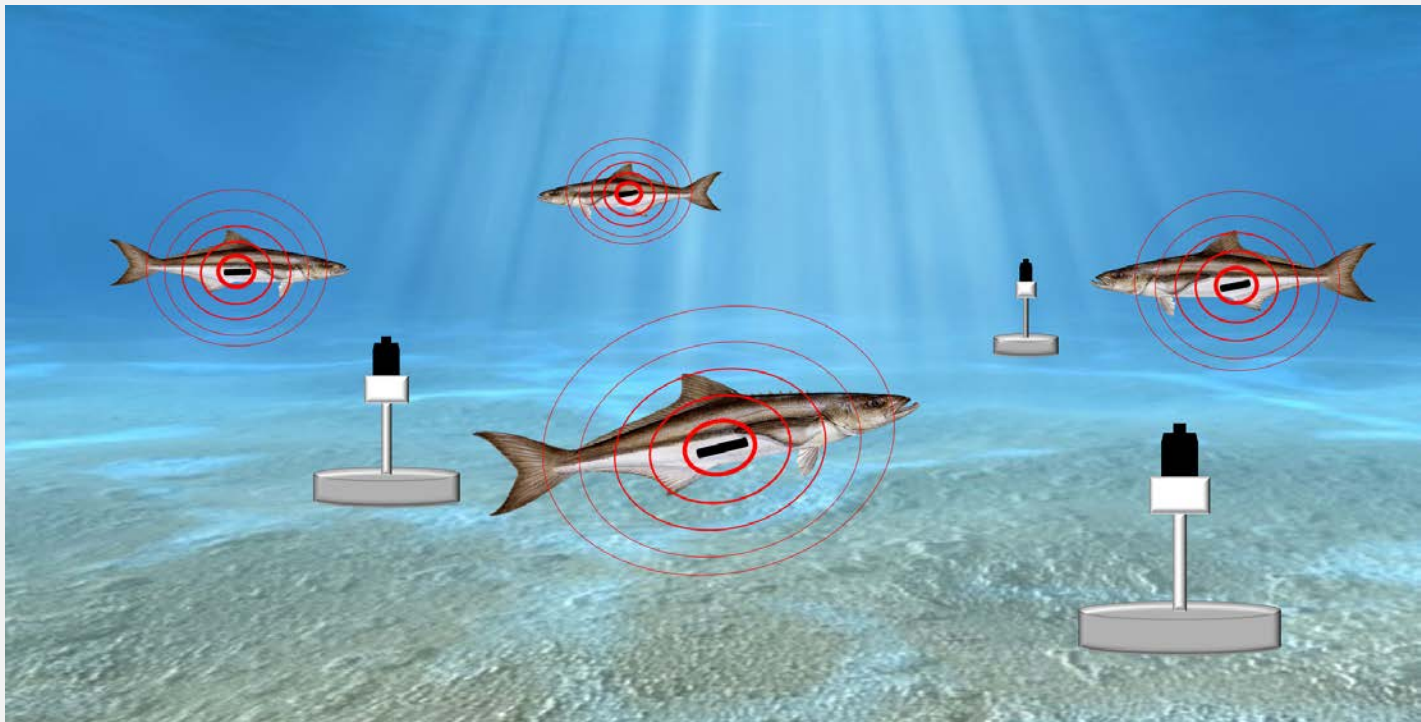
- Every tag has a unique code
- Randomly pings within a set time
- Wide variety of sizes
- Up to 10 years battery life

ACOUSTIC TELEMETRY (A TWO PART TECHNOLOGY)

Receivers are placed underwater.

- Receiver records the unique code and date and time.
- ‘Listening’ range up to one km.
- Serviced by researchers at least once a year.
- Limited to near coastal areas, but…

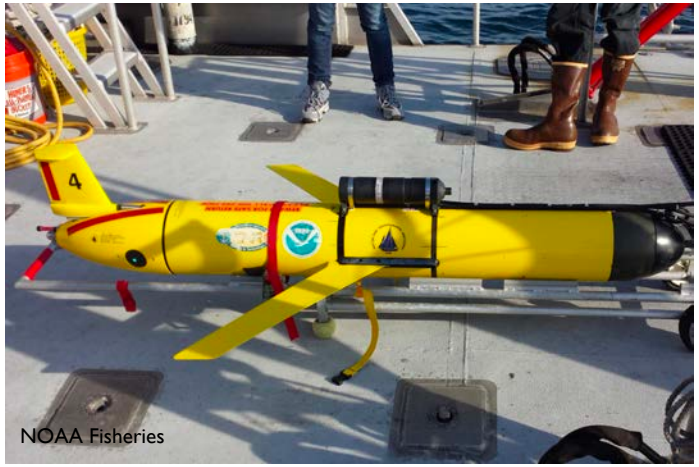




TRACKING ANIMALS OUTSIDE OF NEARSHORE AREAS

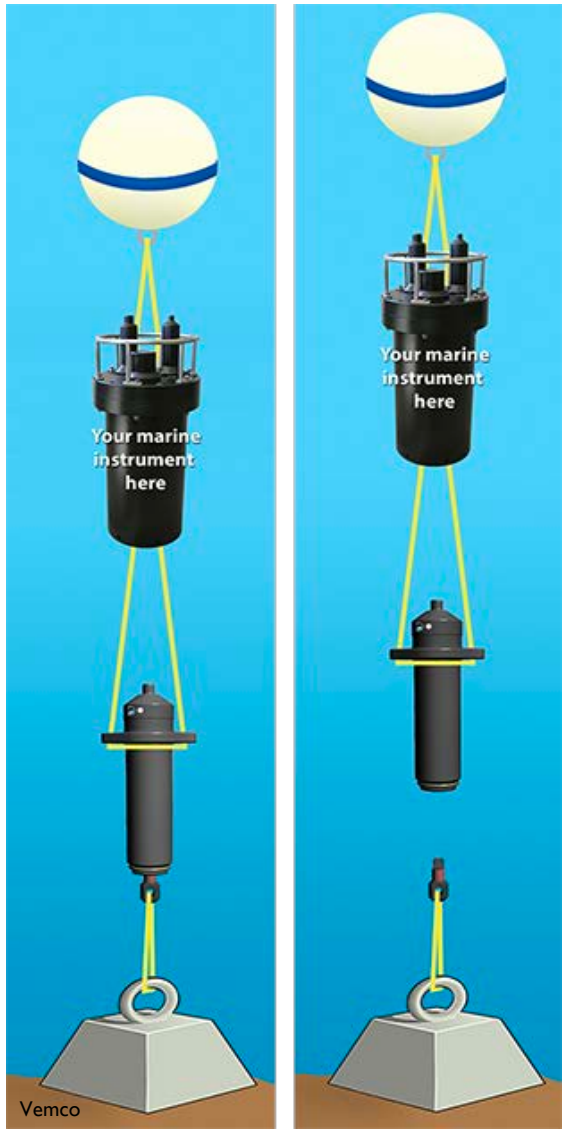
MOBILE

Attached to animals



Gliders

STATIONARY

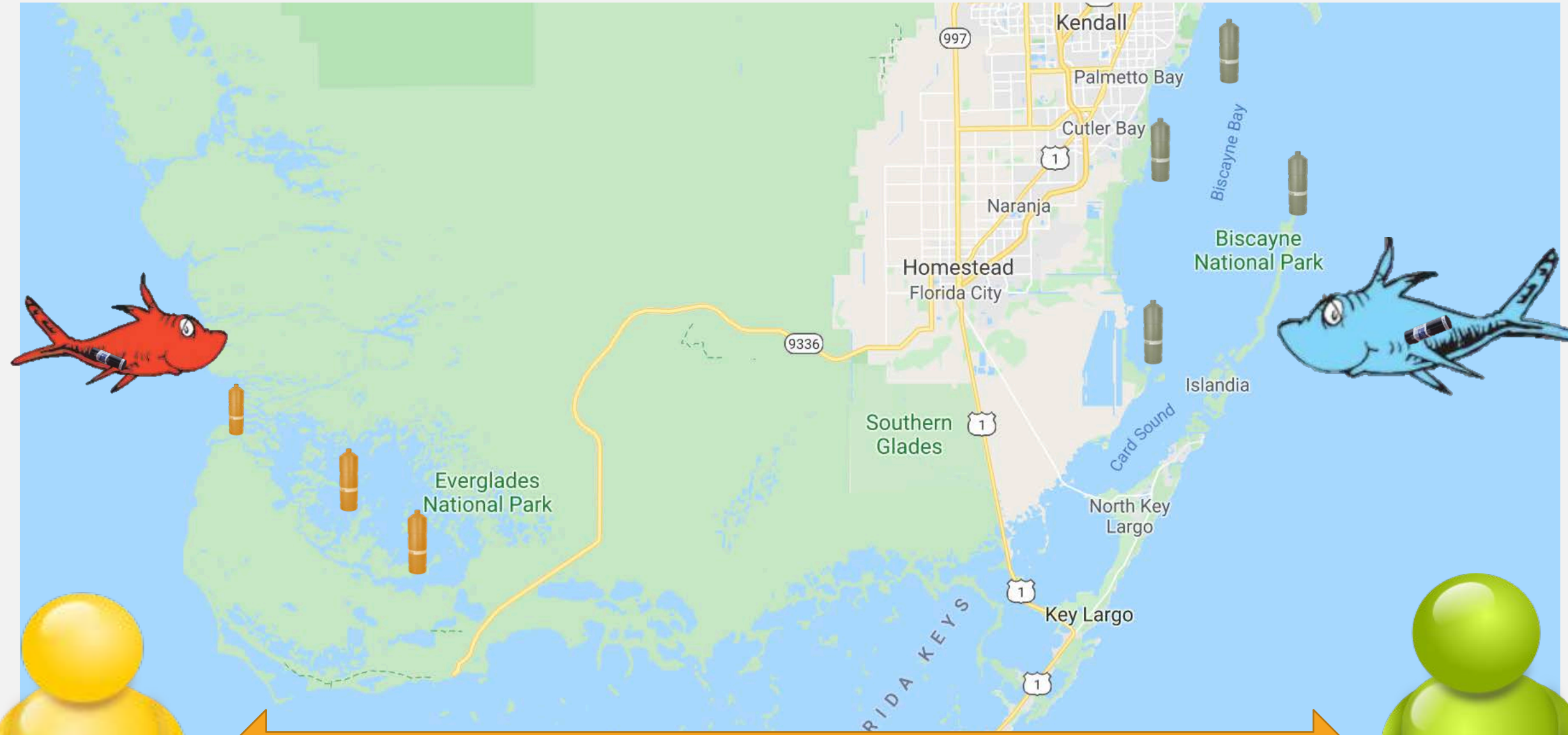


Acoustic release

Use existing infrastructure

Upload from surface

COMPATIBILITY LEADS TO COLLABORATION



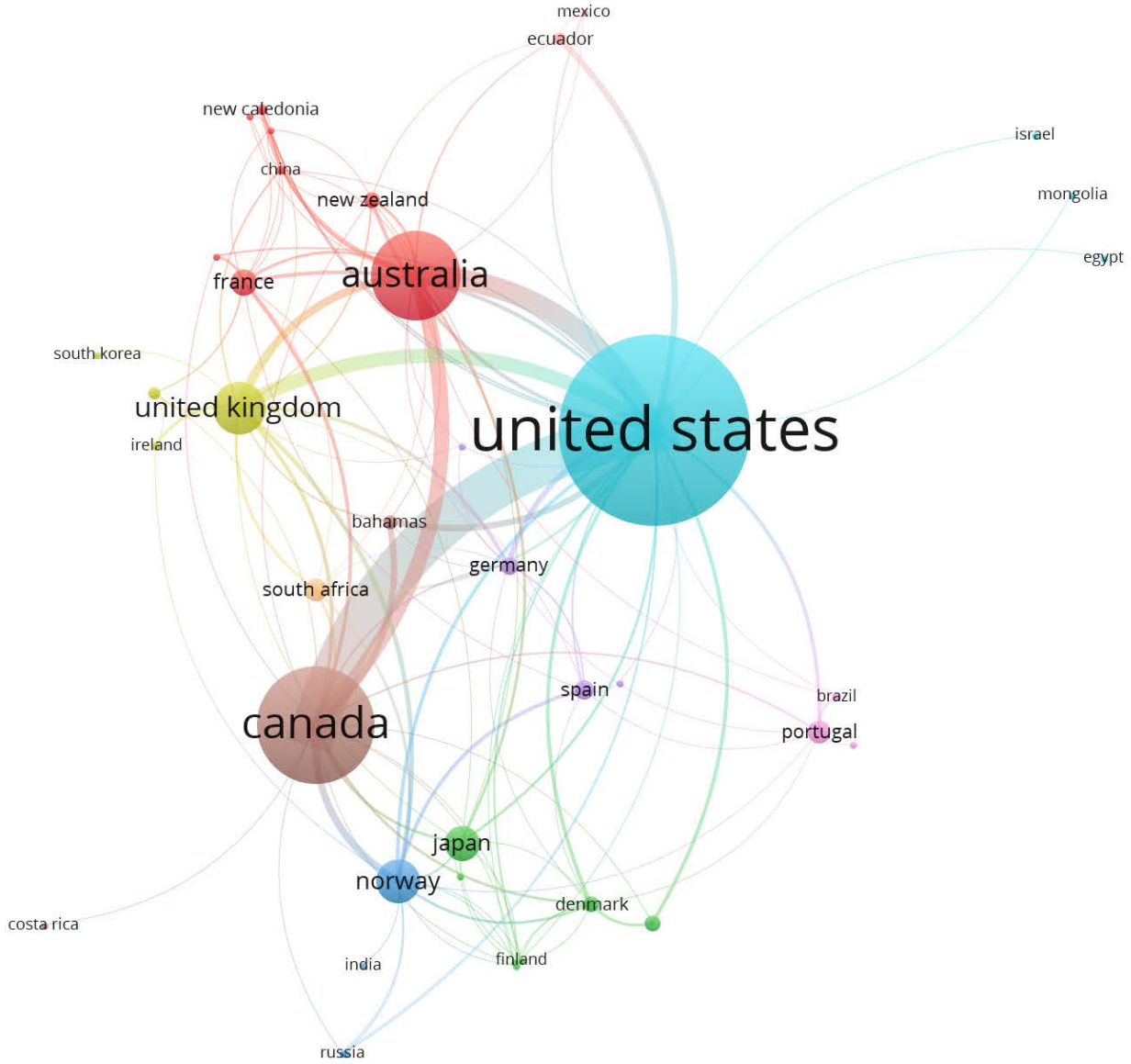
EXAMPLES OF EXPANDED STUDY AREAS

Species	Lead Organization	Animals Detected		Mean Detections Per Animal		Mean Stations Visited Per Animal		Mean Coastline Used Per Animal (km)	
		Lead Org. Only	All Arrays	Lead Org. Only	All Arrays	Lead Org. Only	All Arrays	Lead Org. Only	All Arrays
Finetooth Shark *Carcharhinus isodon*	Bureau of Ocean Energy Mgmt.	55	55	3,814	4,678	38.6	62.4	78.0	511.4
Blacktip Shark *C. limbatus*	Florida Atlantic University	28	41	857	1,538	1.7	45.8	15.4	897.9
Cobia *Rachycentron canadum*	Florida Fish & Wildlife Cons. Comm.	29	34	5,813	5,153	7.4	9.0	17.8	151.2
Tripletail *Lobotes surinamensi*	Georgia Dept. of Natural Resources	49	49	5,318	10,669	6.0	17.7	4.8	352.1
Goliath Grouper *Epinephelus itajara*	Florida State University	46	50	33,633	74,728	3.2	12.8	41.7	143.3

FACT Fish Move.

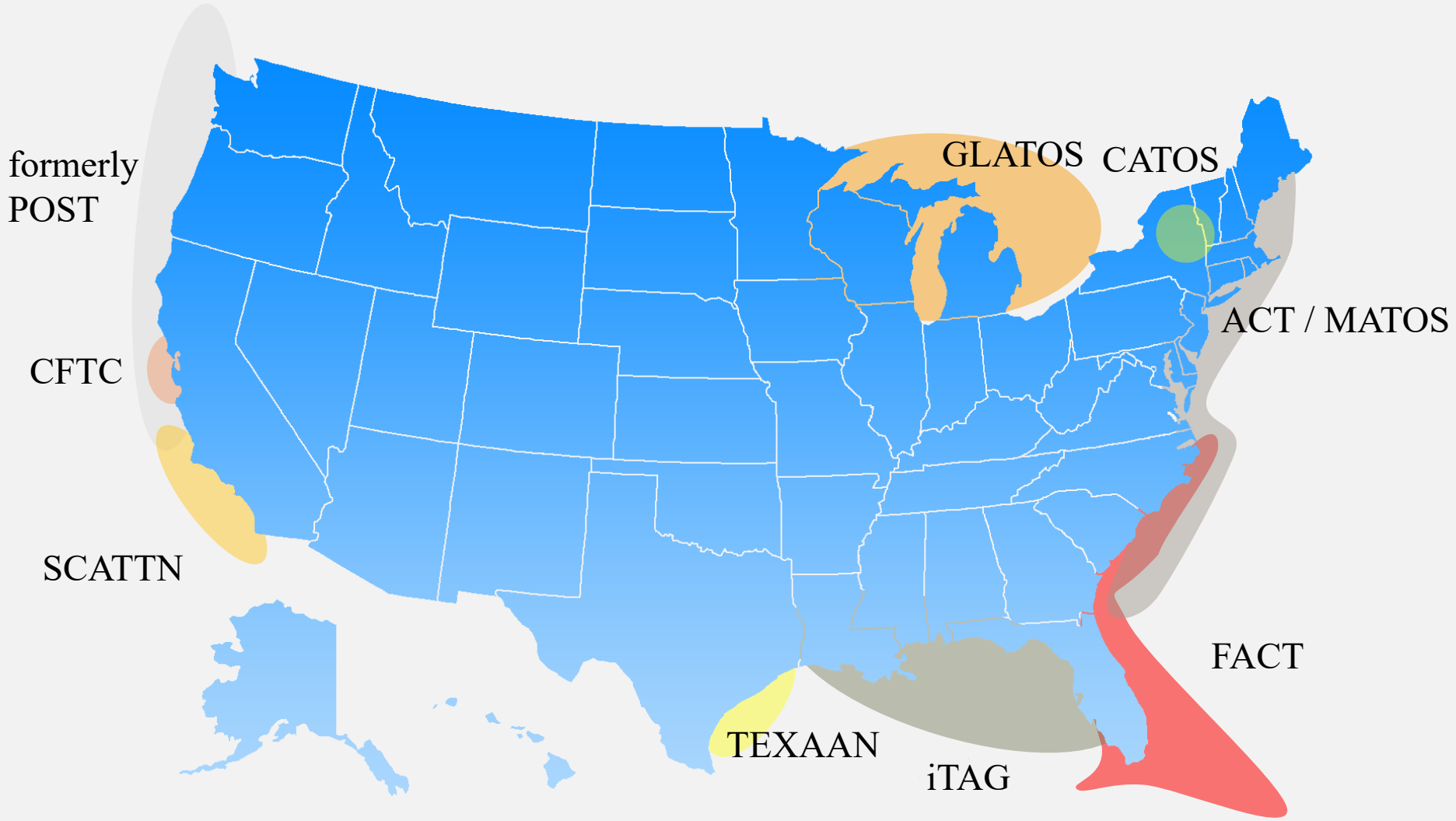
GLOBAL MAP OF COLLABORATIVE NETWORKS

LEADERS IN TELEMETRY RESEARCH

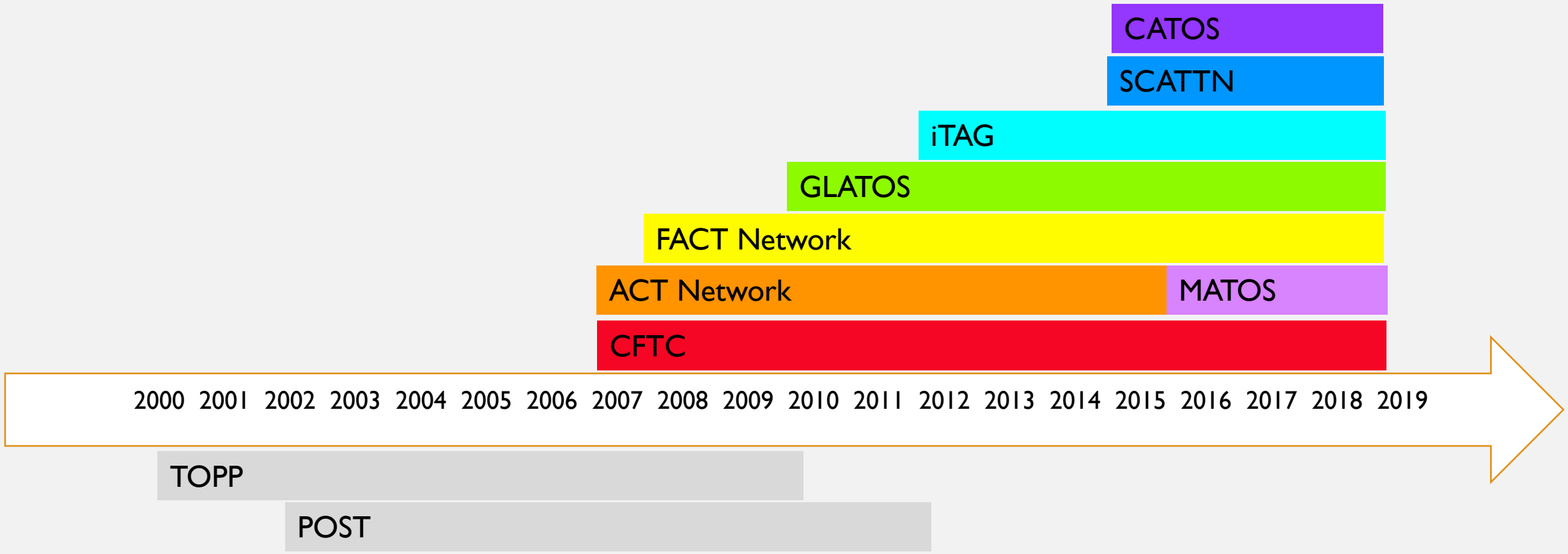


iewer

MAP OF REGIONAL COLLABORATIVE NETWORKS IN THE CONTINENTAL US



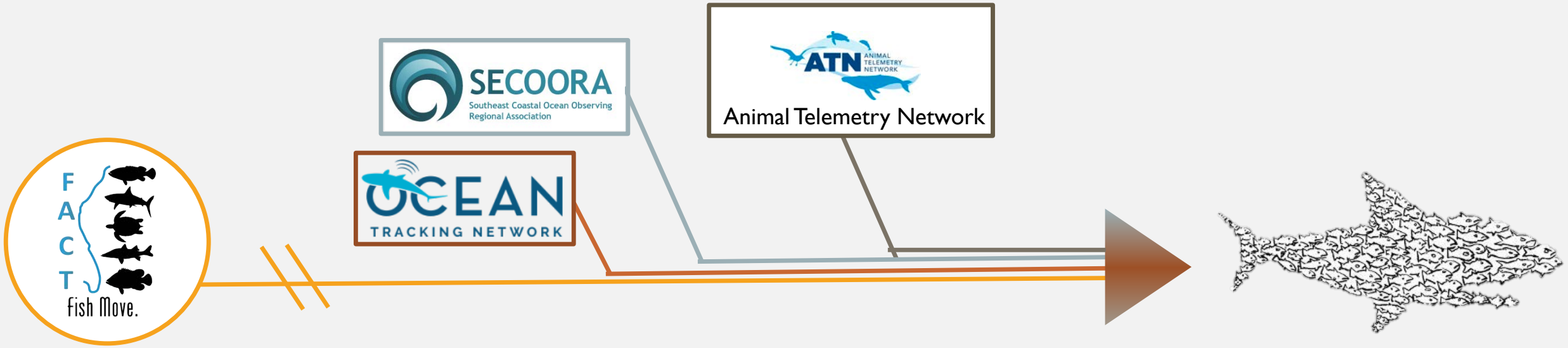
TIMELINE OF REGIONAL COLLABORATIVE NETWORKS IN THE CONTINENTAL US



ACT - The Atlantic Coast Telemetry Network
CATOS – Champlain Acoustic Telemetry Observation System
CFTC – California Fish Tracking Consortium
FACT - The FACT Network
GLATOS – Great Lakes Acoustic Telemetry Observation System
iTAG – Integrated Tracking of Animals in the Gulf of Mexico
MATOS – Mid-Atlantic Telemetry Observation System
POST – Pacific Ocean Shelf Tracking
TOPP – Tagging of Pacific Predators
SCATTN – Southern California Animal Telemetry Tracking Network

Unknown dates
TEXAAN – Texas Acoustic Animal Tracking Network
USCAN – US Caribbean Acoustic Network

THE FACT NETWORK- BRIEF HISTORY



2007

FACT membership

6 organizations
Aprox. 100 stations

2014

FACT membership

23 organizations
488 stations

Milestones

- Joint ACT/ FACT meeting
- First FACT data sharing agreement

2017

FACT membership

> 45 organizations
>900 stations

Milestones

- New online data sharing
- Website

2020

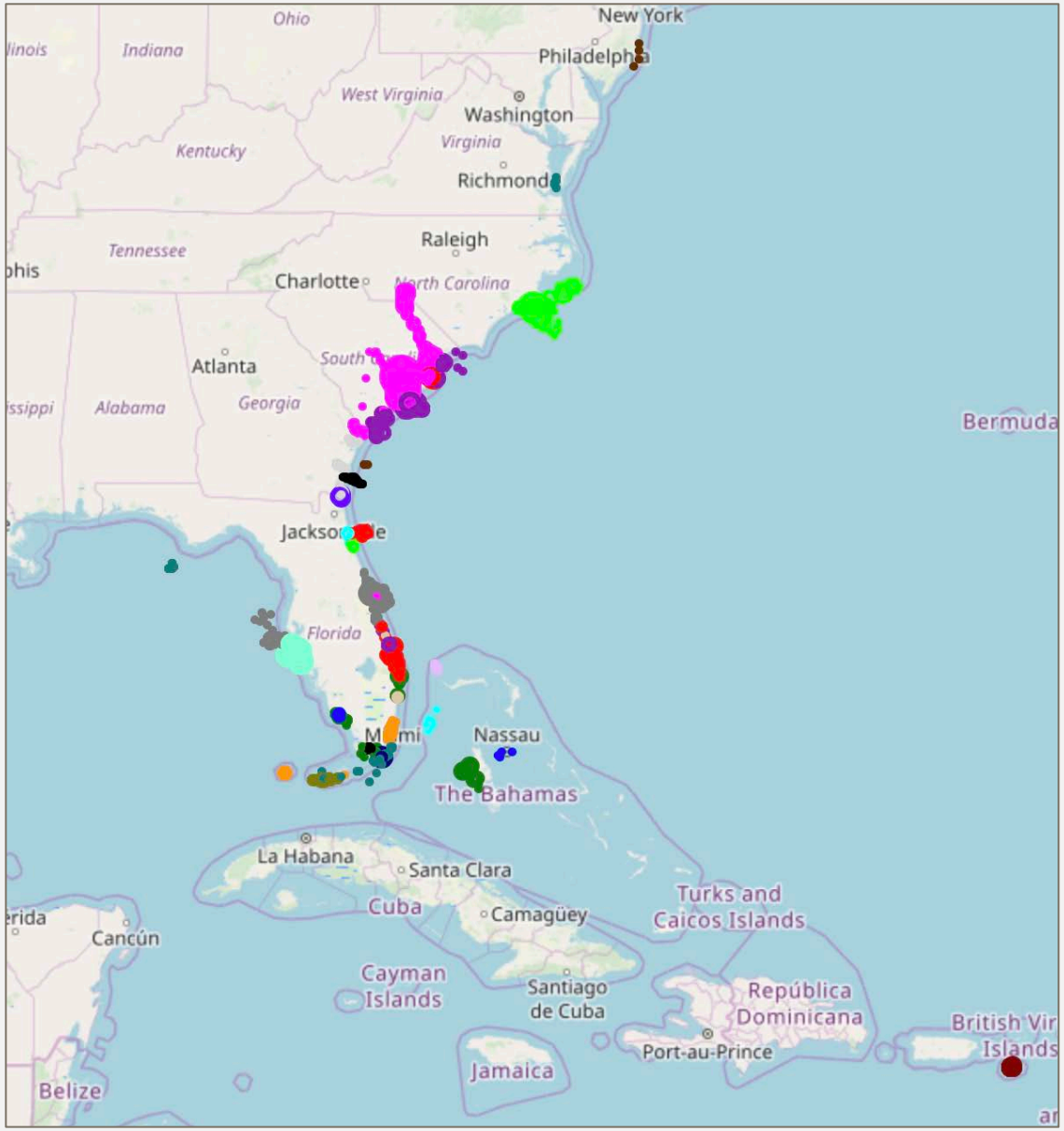
FACT membership

> 93 organizations
>2,800 stations

Milestones

- Dedicated Data Manager
- Fully online
- Grant seeking

THE FACT NETWORK



Map of receivers registered in the FACT Network.

Telemetry Assets

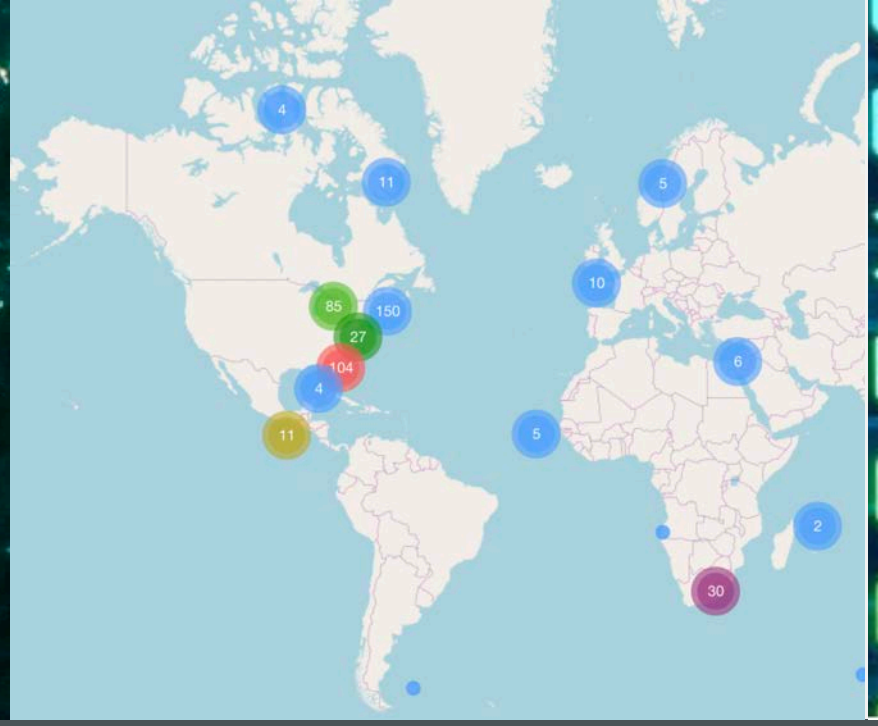
8049 tags deployed total on 99 species

2474 active tags

~ 2,817 total receiver stations

Chris Kalinowsky and son tag a tripletail.

FACT Fish Move.



DATA SHARING MADE EASY FOR RESEARCHERS

- Researchers upload data to a secure website.
- Detections are automatically matched and provided to tag owner.
- Data are formatted and archived.
- Data are cross-matched against all compatible databases.

- Online Database
- **120 registered projects**
- 174.5 million detections from
  - 81.2 mil verified animal detections
  - 77.7 mil non-animal
  - 15.4 mil unverified detections

FACT Fish Move.

BENEFITS OF REGIONAL COLLABORATIVE GROUPS

Networking

Capacity building

Assistance with new projects

Reaching group consensus on issues and creating policy

Lobbying for technological advancements/changes and funding

Conduits of information and promotion of projects

Development and sharing of analytical tools

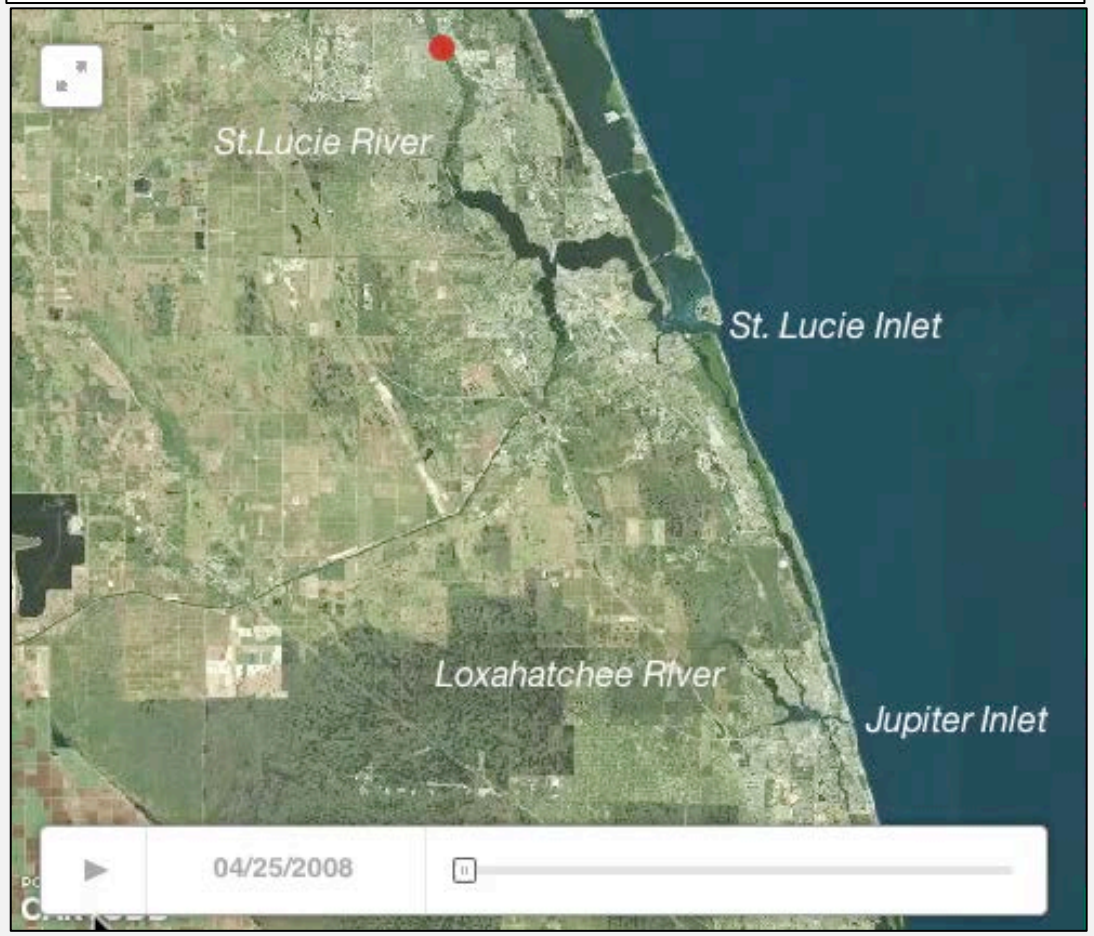
Collaboration

Sense of Community

WITH COLLABORATION, WE CAN ASK MORE QUESTIONS

MOVEMENT IN A SINGLE SYSTEM

43 in. (1100 mm) TL female during the 2008 spawning season



Why does this matter?

NOVEL MOVEMENTS

Tripletail, *Lobotes surinamensis*

> 600 km annual migration

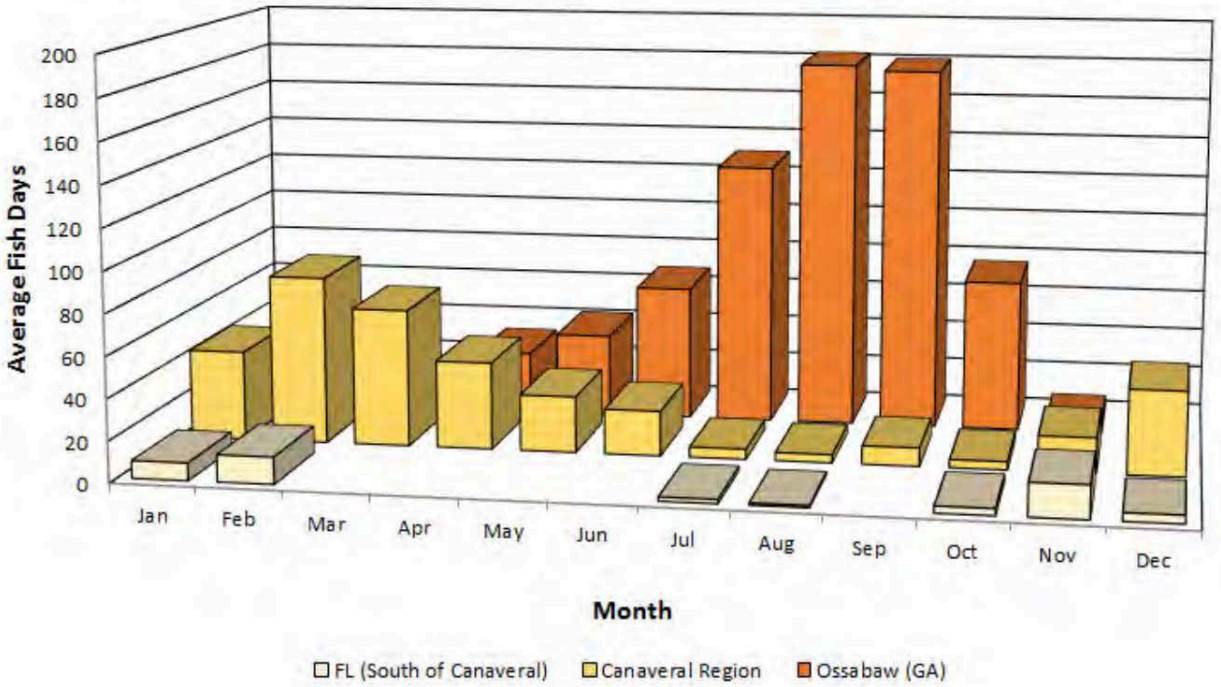


Figure 3.15 Average monthly fish days by region 2009-2012 from the GADNR acoustic tagging study. South Florida region includes waters south of Canaveral to Jupiter Inlet, Florida (GADNR 2015).

Biological Profile for Tripletail in the Gulf of Mexico and the Western Central Atlantic

<u>As a result….</u>

- New Florida Regulations
- Larger, multi-state tagging study

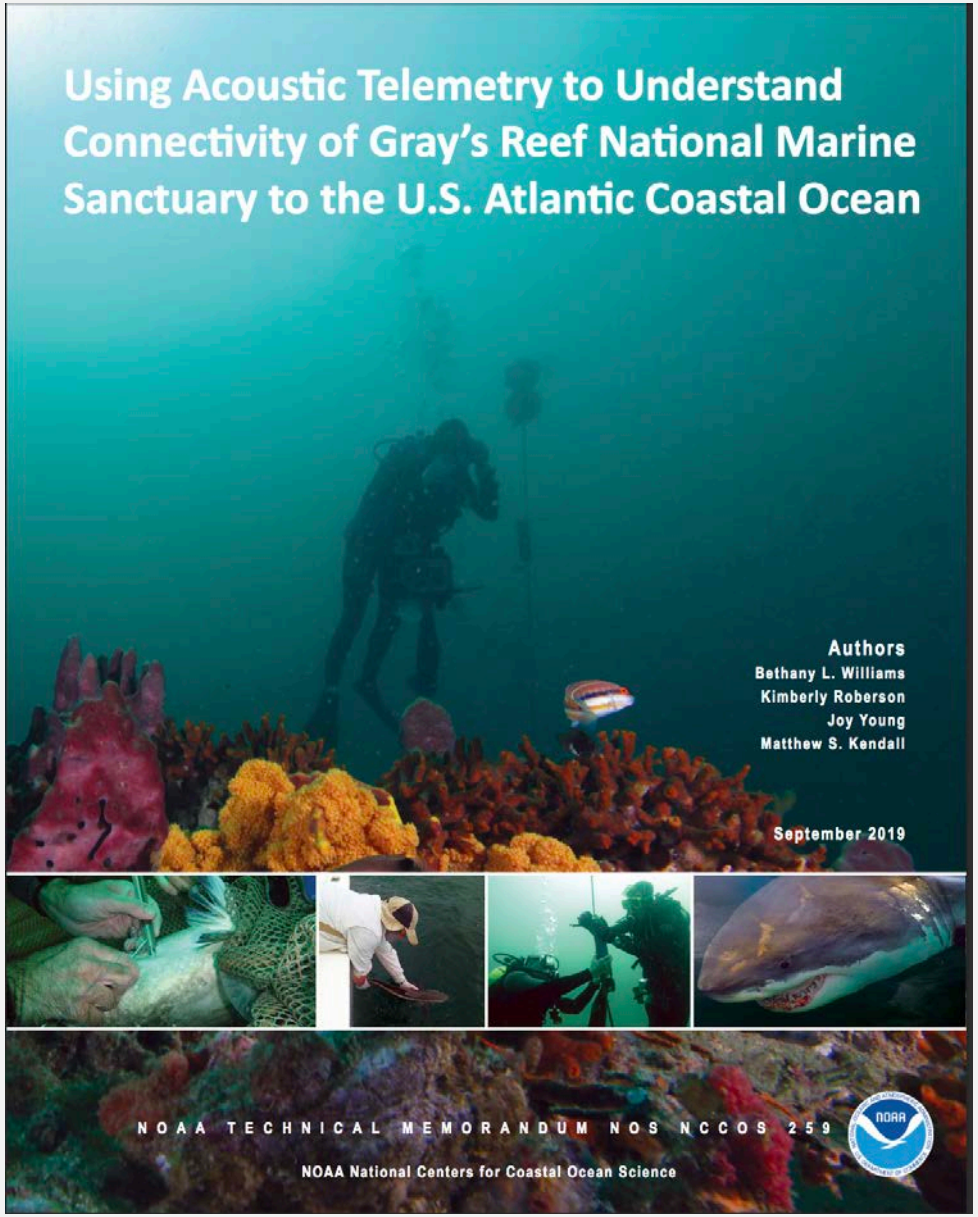
MULTI-STATE COLLABORATION

Cobia, *Rachycentron canadum*

Detections of tagged cobia in the ACT, FACT, and iTAG Networks. Detections are colored by deployment locations: South Carolina (red), Georgia (orange), north Florida (yellow), central Florida (green), south Florida (blue).

	Rec ACL	Rec Catch	Com ACL	Com Catch	Closure
2015 GA-NY (ATLANTIC)	630,000	1,541,575	60,000	53,364	Rec 2016 Season to be shorted
2015 E. FL (GULF)	830,000	372,118	70,000	53,255	

MULTI-SPECIES SYNTHESIS



10 Years of telemetry data

Identified all animals detected in the array

(32 researchers, 160 animals, 18 species)

Described timing and seasonality of species and connectivity to greater area

FUTURE DIRECTIONS OF COLLABORATIVE NETWORKS

Coordination amongst networks

Promote collaborative analysis of past studies

Foster synergy between areas of science

Address the gap between science, public, and fisheries managers

Photo credit: Walt Stearns

MATOS
Mid-Atlantic Acoustic Telemetry Observation System

SCATTN

CALIFORNIA FISH TRACKING CONSORTIUM

iTAG INTEGRATED TRACKING of AQUATIC ANIMALS in the GULF OF MEXICO

The Atlantic Cooperative Telemetry Network

GLATOS
Great Lakes Acoustic Telemetry Observation System

FACT Fish Move.

#FACT_Network

Thank you!

www.SECOORA.org/FACT