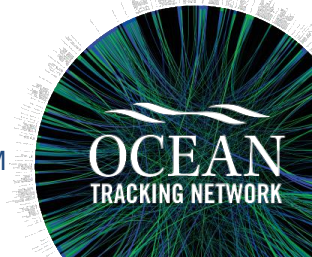
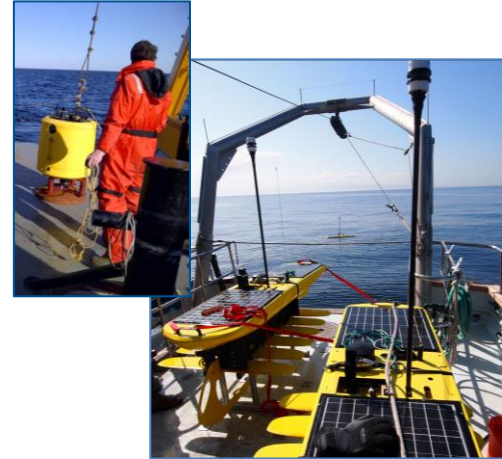


# Involving Citizens in the Identification, Development and Use of Research Infrastructures

Sara Iverson  
Scientific Director, Ocean Tracking Network



# Involving Citizens in the Identification, Development and Use of Research Infrastructures

- principles
- case studies
  - *approaches*
  - *successes*
  - *challenges / limitations*
  - *lessons learned*



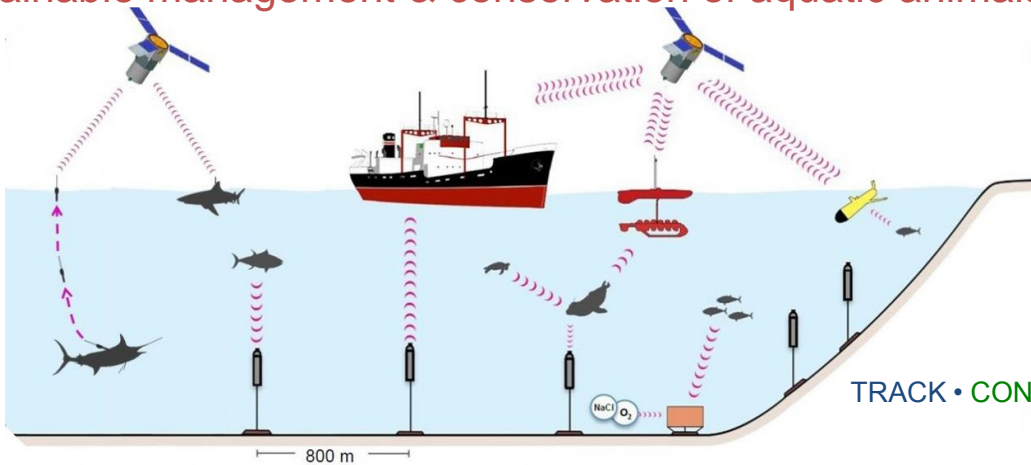
# Principles for Involving Citizens and Communities in Research Infrastructures

- Ultimately, public funds invested in Research Infrastructures (RIs) should generate returns to society. Society should be able to provide input to RIs & use them to answer the questions they need answered
- Stakeholder needs *should* be forefront to RIs
- Potential benefits to both RI and public/stakeholders
- Can promote increased uptake of information by society (trust in data gathered)
- RIs in turn can benefit from use of (local) knowledge-holders' information
- Potentially powerful tool for education of individuals and communities

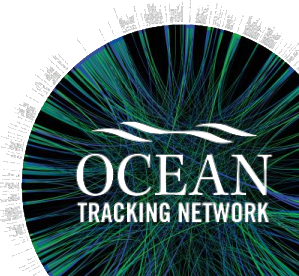
# Context of Ocean Tracking Network's RI & its use:

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- OTN partners nationally & internationally to sustain a *global network* of acoustic receivers, autonomous vehicles & other oceanographic monitoring equipment; supports all users of acoustic, satellite, radio, data-archival telemetry
- *Tracks local to global* movements, interactions & survival of valued aquatic animals in relation to changing environments
- Sustains an internationally sanctioned *global Data Centre & shared analytical tools* serving the international user community
- Informs *sustainable management & conservation of aquatic animals*



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OCEAN  
TRACKING NETWORK

166

SPECIES  
TRACKED GLOBALLY

47,500

INDIVIDUALS TRACKED  
OVER 293 PROJECTS

400

SENIOR SCIENTISTS  
FROM 30 COUNTRIES

5

SPIN-OFF  
ORGANIZATIONS

45,000

KILOMETRES  
COVERED BY GLIDERS

2,021

RECEIVERS  
DEPLOYED GLOBALLY

260 MILLION

ANIMAL DETECTION RECORDS  
COLLECTED





**Involving Citizens in**

**OTN's RI:**

**3 Case Studies**



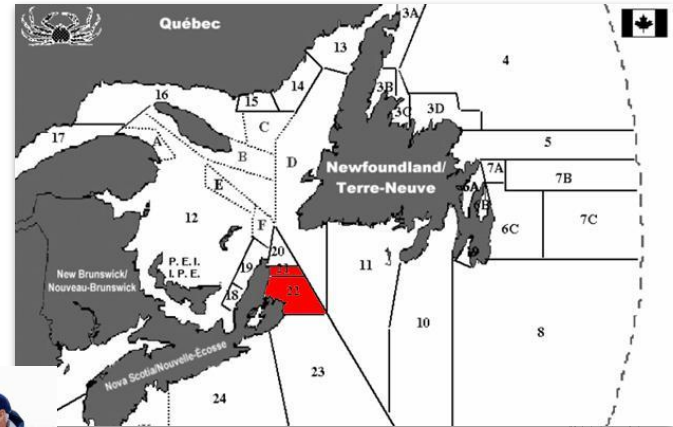
# Snow Crab Research Infrastructure

*(Cape Breton, Nova Scotia)*

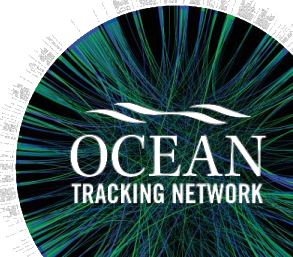
*Snow crab generates economic opportunities (\$70-130M annually); ensures food security and supports vibrant coastal communities.*

Joint collaboration on research infrastructure involving:

- Academia  
(OTN/Dalhousie)
- Private sector  
(Emera Inc./ Nova Scotia Power Corp.)
- Government  
(Dept. of Fisheries and Oceans- DFO)
- Local stakeholders  
(fishers in northern Cape Breton)
- Local governance  
(municipality)



*community & citizen RI collaboration - 1*

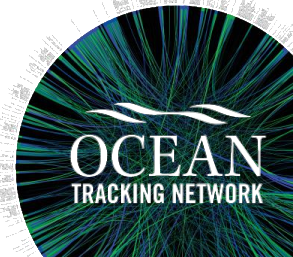


# Snow Crab RI - Engagement

- **Fishers approached OTN** to explore telemetry as a validation tool
- Fishers & local governance (municipality) **purchased their own acoustic tags**; deployed in collaboration with OTN (2015)
- Telemetry arrays in region owned & operated by OTN, power company & government to track snow crab
- Community & harvesters **leverage research infrastructure**
- **Findings shared** at annual snow crab summit, hosted by OTN; host all stakeholders (government, academia, fishers/harvesters, private sector)

→ **Grassroots recognition of investments in science & RI**

*community & citizen RI collaboration - 1*





# Snow Crab RI - Successes

- **Critical questions being answered on movements & population structure:**
  - impacts of new underwater power cables on population movements (env. Impact assessment required)
  - population changes with changing climate & warming waters
  - revisions to just access to resource for individuals, communities & commercial operations



# Snow Crab RI

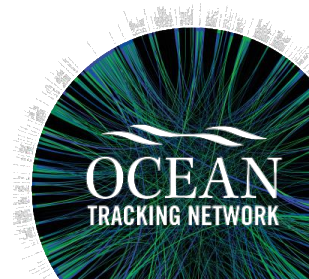


## Challenges

- Differing belief in & reliance on information among govt. managers & fishers
- Barriers to communication among academics, govt. scientists & harvesters
- Harsh environments & expensive equipment: difficulty in conducting the science by any single group alone
- Human resources: limited budgets for personnel from govt. and academia

## Lessons learned

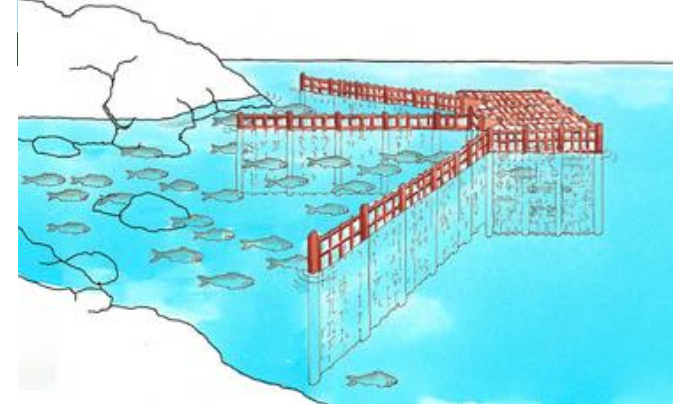
- Bringing **all stakeholders to table from the outset** builds enhanced relationship & trust
- Intermediary, like OTN, can **facilitate working partnerships**, connect otherwise disparate groups ☺ conduct better science
- Sharing data at “town hall” workshops allows groups to comment on all aspects of the research; **results are disseminated more broadly**



# Bramber Wier Research Infrastructure

(*Bay of Fundy, Nova Scotia*)

- **Fishing weirs** are large pens that trap fish during outgoing tides. Commercial fish are selectively harvested; unwanted fish are placed in pools outside weir until the tide comes back in
- The **weir** is built each spring and torn down in late summer; it uses recycled wooden stakes and is built over 60-100 consecutive tides
- **Weirs** remain one of the most sustainable and low-impact types of fishing



# Bramber Wier RI – Engagement & Successes

- **Fishers & OTN collaborated** to use weir to capture & tag sturgeon (threatened/endangered) & other important species in area where turbine development planned (env. Impact assessment)
- Weir developed into a full-fledged research infrastructure collaboration that has **greatly enhanced monitoring capacity in the region**
- Weir is a **grassroots centre for learning and teaching**: inviting students, tourists & locals to learn about weir fishing & marine species
- Weir owner & OTN are both **advocates for local knowledge inclusion in academic-led research**

**Fisherman pings tagged great white shark in Bay of Fundy**

STUART PEDDLE THE CHRONICLE HERALD  
Published July 16, 2016 - 6:30pm  
Last Updated July 17, 2016 - 8:23am

f t in r +



Atlantic White Shark Conservancy  
Massachusetts Division of Marine Fisheries

'Pumpkin'  
WS 16-14  
7-15-2016

Pumpkin the great white shark has been detected via tracking beacon in the Minas Basin. The female shark is shown here in a photo from the Atlantic White Shark Conservancy dated July 15, 2016.

The first acoustic tag-bearing great white shark to visit Nova Scotia waters this spring has been detected in the Minas Basin.

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*community & citizen RI collaboration - 2*





# Bramber Weir RI - Engagement



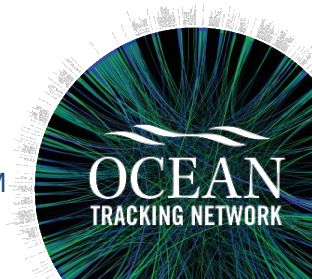
## THE BRAMBER WEIR

COASTAL COMMUNITY COLLABORATION

The Bramber weir is the subject of a short OTN-produced documentary, which details the importance and benefits of **community-level collaboration towards effective scientific research**

- *2-min clip of the film:*

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# BRAMBER WEIR

Coastal Community Collaborations

# Bramber Wier RI

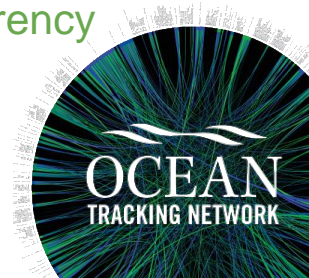


## Challenges

- Tides & fish capture not on 9-5/academic schedule – requires help from community
- Local knowledge holders typically not included during planning stages; researchers miss out on baseline information; critically understudied areas don't receive priority
- Coastal communities often earn living on resources that are the subject of academic-led research; **misunderstanding & non-inclusive approaches to science result in mistrust** & ineffective infrastructure compared to an inclusive approach

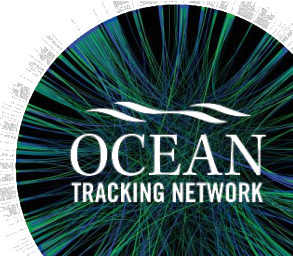
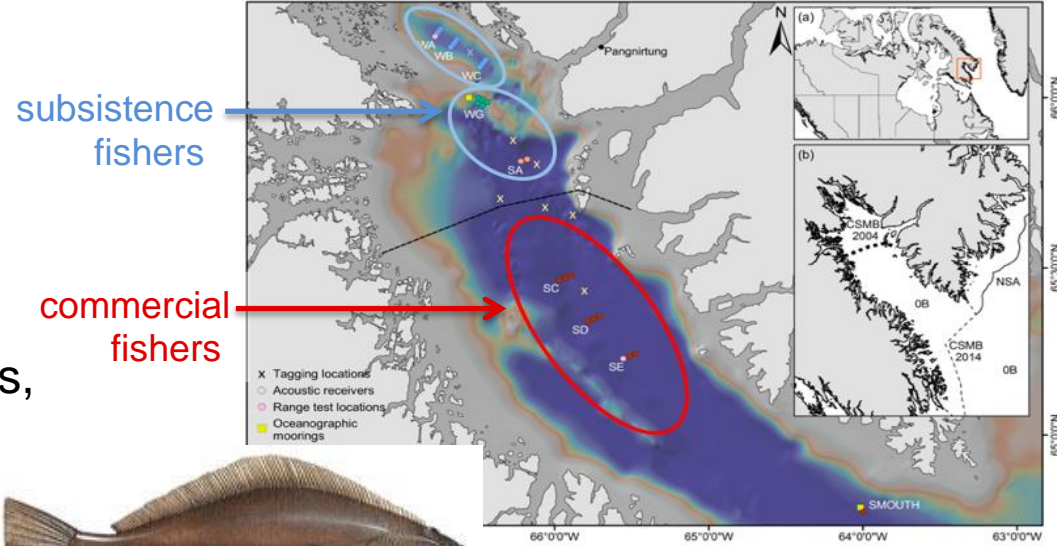
## Lessons learned

- Local knowledge holders (e.g. *fishers*) & traditional knowledge holders (e.g. *Indigenous Peoples*) contribute greatly to **developing effective research planning that serves their communities**
- Next-level citizen science (being trained to deploy, recover, offload monitoring infrastructure; assess data) **enhances monitoring & uptake of data / knowledge**
- Community inclusion fosters **understanding, trust & transparency at stakeholder level**



# Developing Arctic Fisheries Research Infrastructure

- Inuit people in Canadian Arctic are rapidly developing commercial fisheries in areas where little biological information exists to guide decision making
- Valuable Greenland halibut fishery divided northern & southern portions, assuming them to be separate & controlled separately, with an *arbitrary management line* dividing the two fisheries





# Developing Arctic Fisheries RI - Engagement

- Hunters and Trappers Associations (HTAs) were **main contact & acted as liaison** between OTN & community members
- In challenging Arctic environments, HTAs facilitated research by providing equipment (boats) & services (navigation, local knowledge)
- **Regular presentations** were given in communities of operation, informing & engaging residents with science program



# Developing Arctic Fisheries RI - Successes

- OTN telemetry data revealed it was a single population of halibut that regularly crossed the management boundary & were being exploited by both fisheries
- Working with Inuit communities, OTN Arctic research successfully influenced the relocation of the management boundary to guide sustainable & effective management of the population
- Allowed process for fair access to the resource by local Inuit





# Developing Arctic Fisheries RI

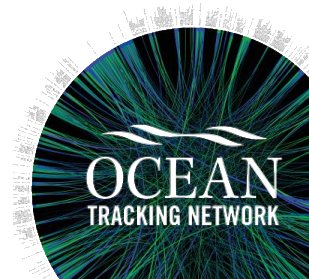


## Challenges

- Initial fear of telemetry (acoustic signals) by local Inuit of influencing animal movements (e.g., driving subsistence animals like seals away)
- Navigating historically complicated relationships between academia & Inuit peoples
- Challenging climate is disruptive, expensive, complicated for the RI to tackle alone / in isolation

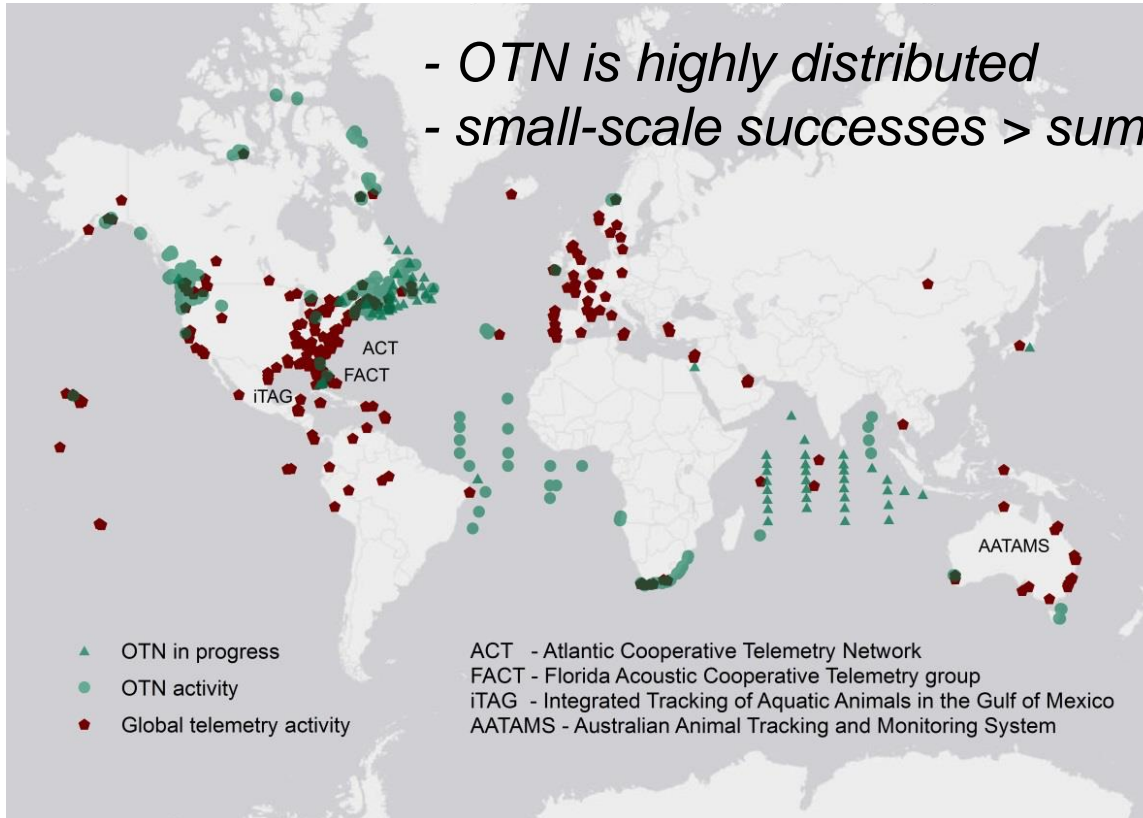
## Lessons learned

- Researchers sought to understand the impact of changing climates on communities: **local knowledge & ideas had to be central**
- **Inclusion fosters trust & understanding**
- Individuals and communities are trainable & willing to **learn to use RI & thereby accept results & move into their knowledge systems**



# Global Acoustic Telemetry RI

- OTN is highly distributed
- small-scale successes > sum of the parts



# Involving Citizens - Conclusions

- Yes, there can be challenges, but ultimately, there can be **great gains** – for **both the RI and citizens / community**
- To succeed **must start with trust** – have to believe in the motives & in the information the various groups are bringing to the table
- **Trust achieved through early involvement, communication & partnership-building**; must work through solutions together – **transparently**, not by trying to steam-roll over
- Ideas – **good ideas** – **originate from many different places**; not just from the scientists, but bubbling up from the local community who observe

# Involving Citizens - Conclusions

- Helping members of the public meet their needs at the same time as addressing significant issues is very powerful
- Incorporating citizen / community perspectives – **from design to implementation – means everyone is pre-primed to pull in & accept results & feed them back into their knowledge systems**
- **Strong education opportunity** & can bring about **powerful advocacy**
- **Win-win** if done effectively

