



Olympic Coast National Marine Sanctuary
Sanctuary Advisory Council
January 24 2020

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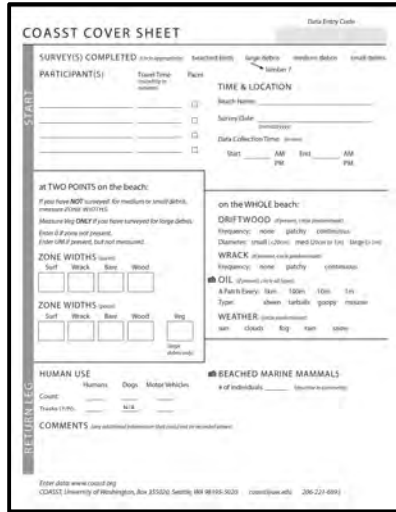
What is COASST?

- A **rigorous citizen science** project of the University of Washington working in partnership with state, tribal, and federal agencies, environmental NGOs, and community groups to **monitor coastal ecosystem health**
- Participants **survey** a beach **once a month**, following a **protocol** for beached birds or marine debris
- Information about beach conditions and human activity is also recorded

COASST Mission: empower citizens to personalized action through individualized science learning and collective data gathering; obtain fine-grain broad extent data

How Does COASST Work?

Recruit and train locals



The image shows a 'COASST COVER SHEET' form. It includes sections for 'SURVEY(S) COMPLETED', 'PARTICIPANT(S)', 'TIME & LOCATION', 'ZONE WIDTHS' (with checkboxes for Surf, Beach, and Wood), 'HUMAN USE', 'BEACHED MARINE MAMMALS', and 'COMMENTS'. There are also checkboxes for 'Driftwood', 'Wrack', and 'Oil'. The form is designed for data collection during beach surveys.

Protocol, field guide, and datasheets



Web-based “smart” data input

Final verification by experts



Data analyzed and presented





Who is COASST? (in the office)



Julia Parrish
*Executive
Director*



Hillary Burgess
*Science
Coordinator*



Jackie Lindsey
*Volunteer
Coordinator*



Yurong He
*Post-Doctoral
Researcher*



Tim Jones
*Post-Doctoral
Researcher*



Charlie Wright
Data Verifier



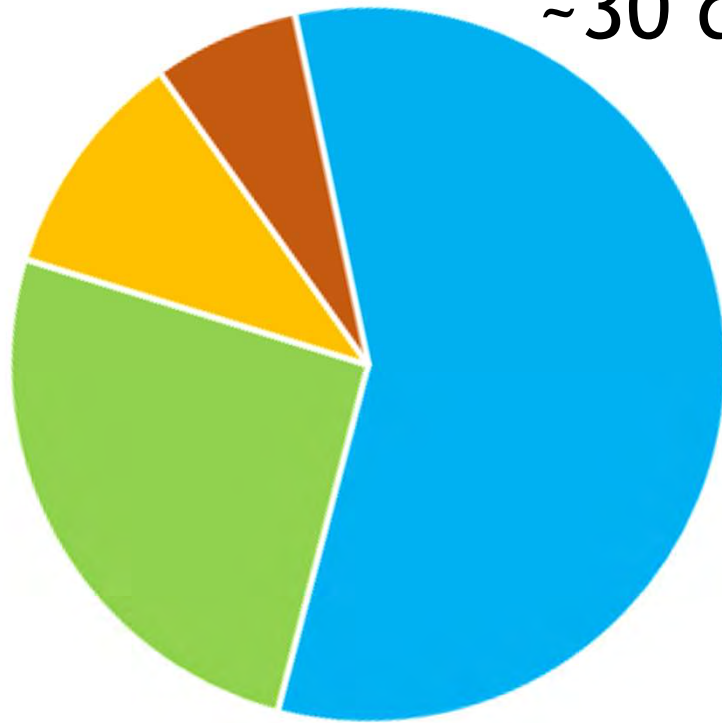
Jazzmine Allen
Graduate Student



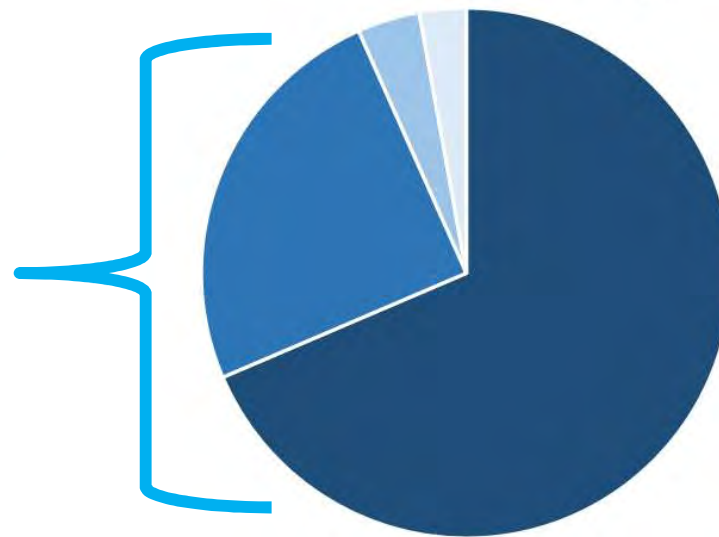
~15 Student Interns



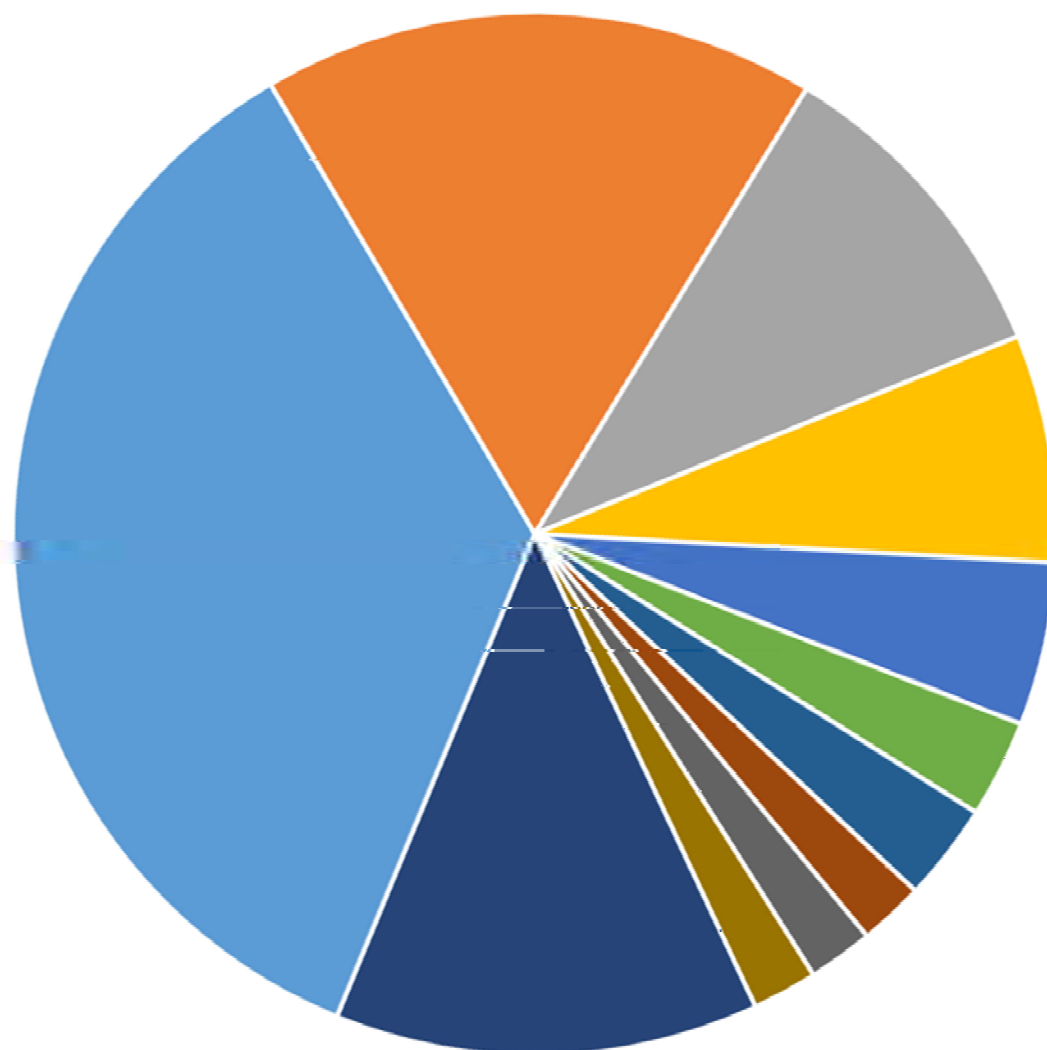
~30 data use requests annually



■ AGENCY
■ ACADEMIC
■ NGO
■ OTHER



■ FEDERAL
■ STATE
■ TRIBAL
■ INTERNATIONAL



- UME
- GEOGRAPHIC PULSE
- METADATA
- SPECIES OF CONCERN
- MARINE DEBRIS
- BYCATCH
- MARINE MAMMALS
- DISEASE
- ENTANGLEMENT
- OIL
- OTHER



Marine Debris

What does it mean to participate?

(2-8 hours, depending on beach and data entry)

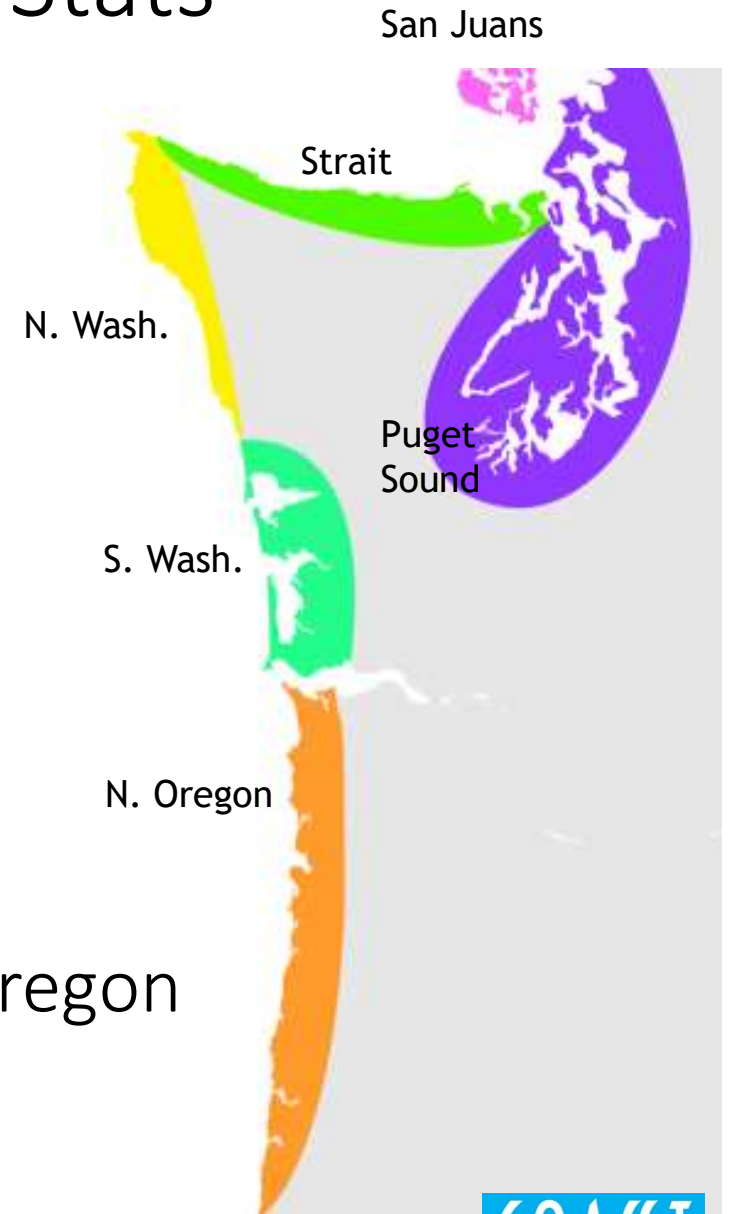
- **survey** and collect **samples** of marine debris on *your* beach monthly
- **characterize** and **photograph** marine debris samples, record quantity and indicators of source and environmental impact



COASST MD Stats



- 4 years
- 230 people trained
- 150 current participants
- 75 sites in Washington and Oregon
- 15033 debris items
- 1000 surveys



as of Apr 2019



COASST Marine Debris

Is there a pattern to...

- *What, when, where, and how much?*
- *Where it comes from?*
- *Impacts on the environment?*



➡ Prioritize prevention and management



How we figure out patterns:

Find it (*size specific*):

Large
> 50 cm



Medium
2.5 – 50 cm

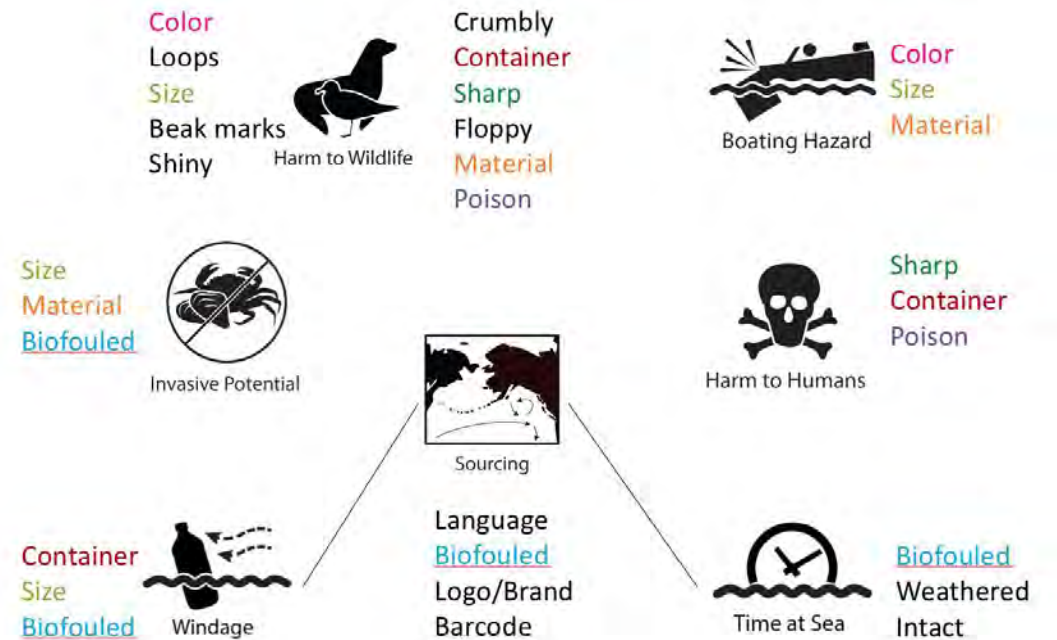


Small
< 2.5 cm



Characterize it:

- Up to **20** characteristics, linked to
- **7** “Clues and Consequences”



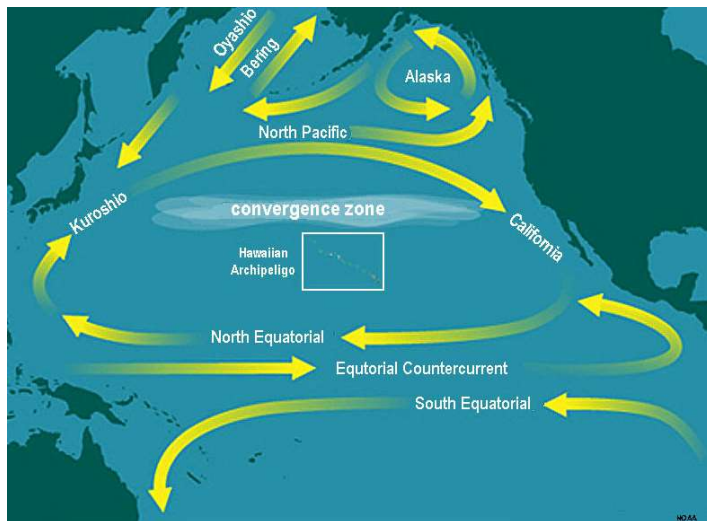
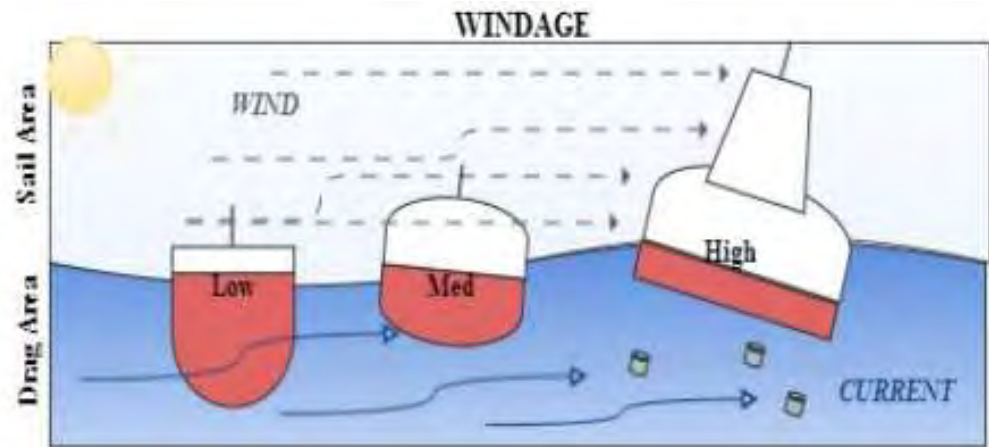
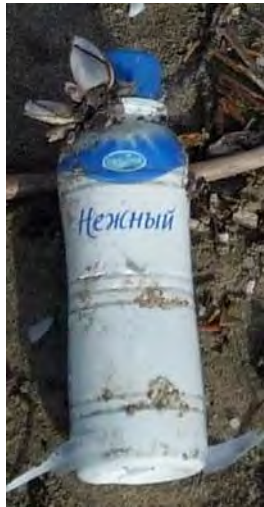
Where does it come from?



Sourcing

Key Characteristics:

Logo/Brand
Language
Barcode
Weathering
Windage
Time at Sea
Biofouling



Impacts of Marine Debris:



Ingestion- *Albatross*

Key Characteristics:

Size: 5-100mm

Color: white, yellow, orange, red

Material: non-degradable



Harm to Wildlife

Is it a squid or a lighter?



COAST

Impacts of Marine Debris:

Entanglement- *Marine Mammals*



Harm to Wildlife

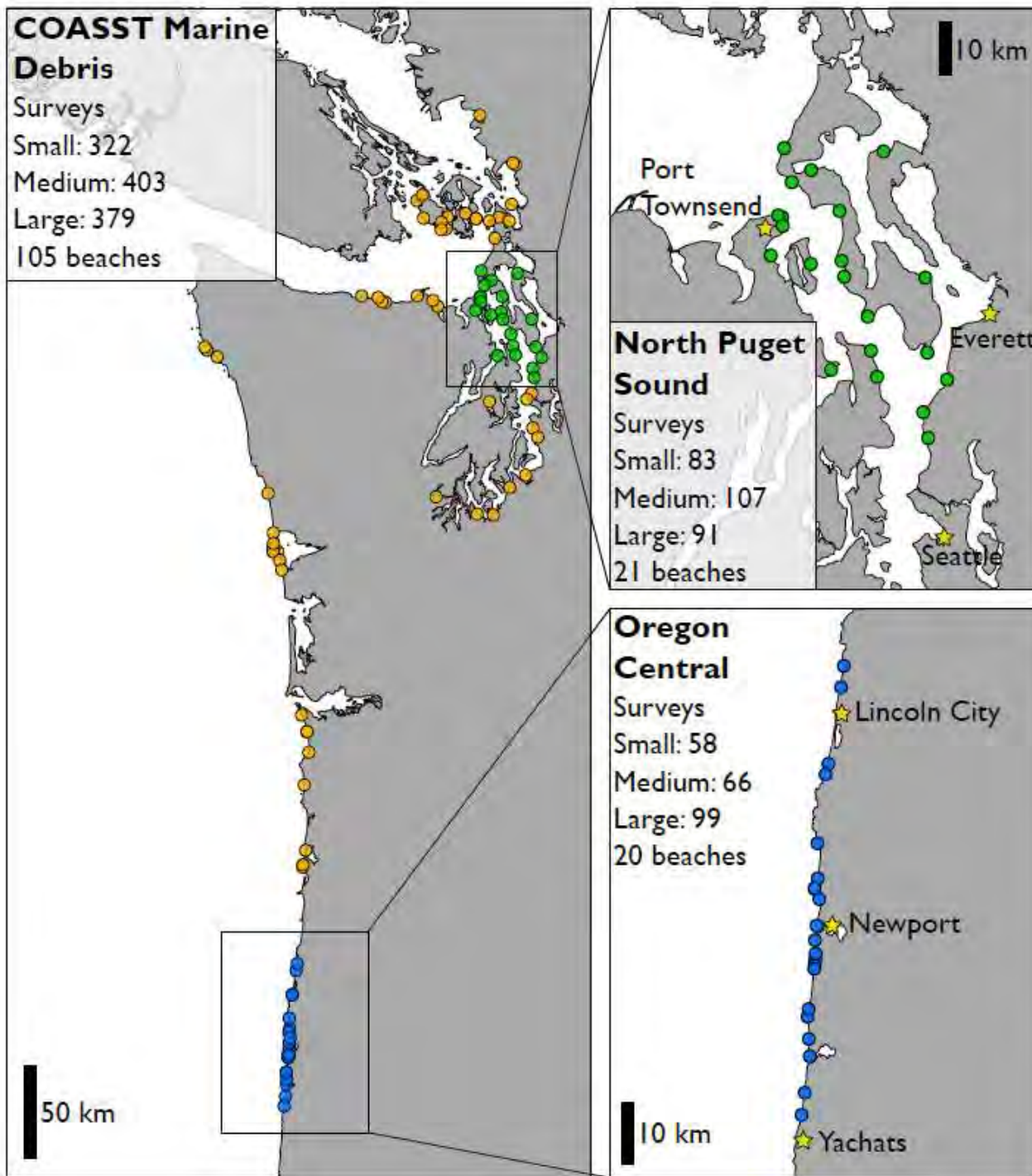
Key Characteristics:

Material: non-degradable

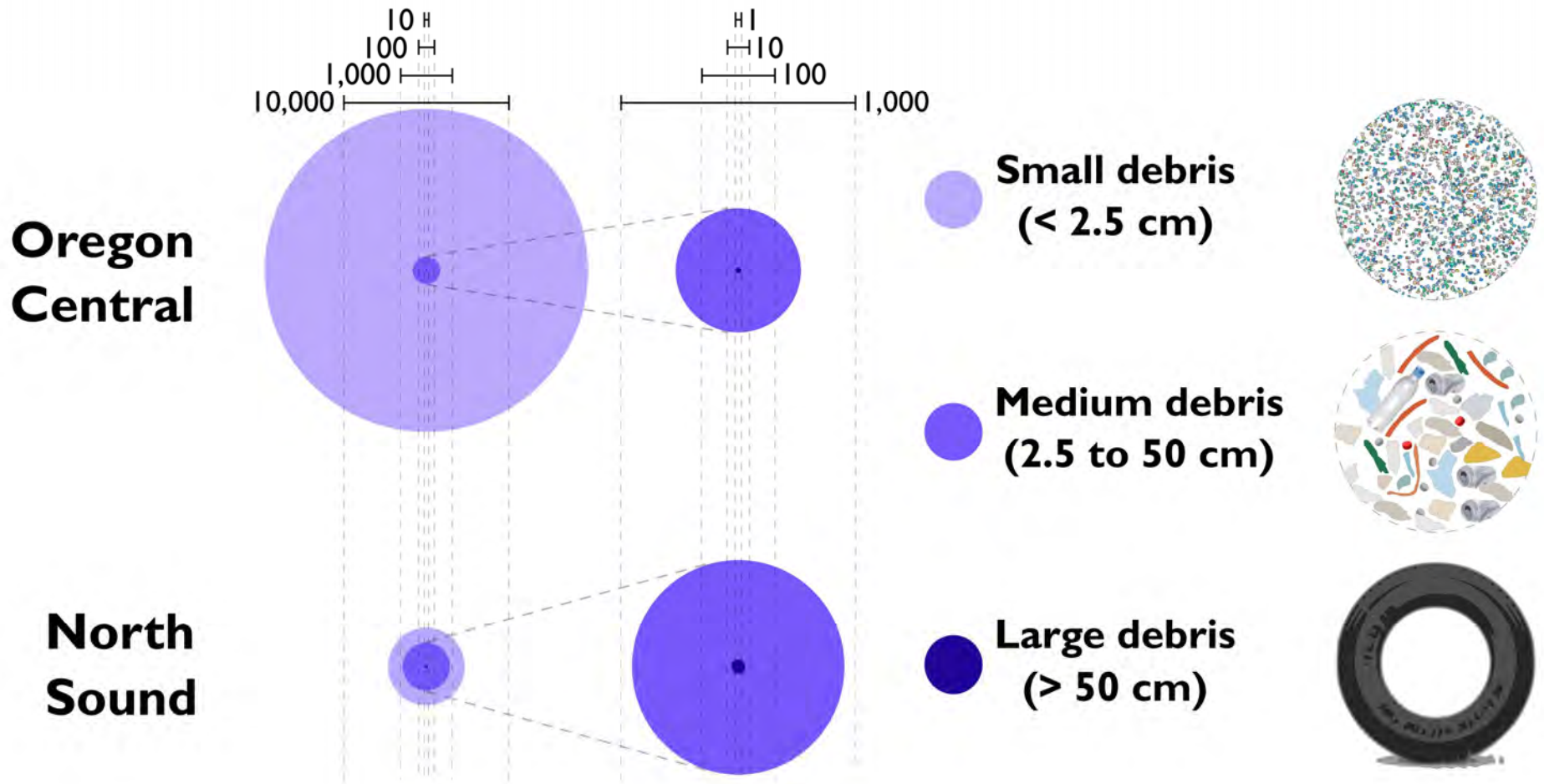
Floppy: Yes **Loopy:** Yes



COAST



**Debris density
(items per 10,000 m²)**

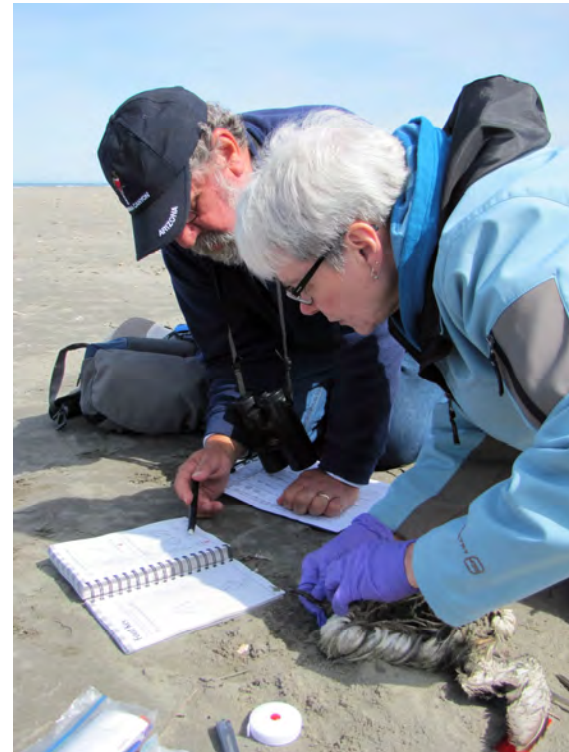




Beached Birds

What does it mean to participate?
(1-5 hours/month, depending on the beach)

- **survey** for beachcast carcasses of marine birds on **your** beach monthly
- **measure, collect condition information, identify** and **photograph** carcasses



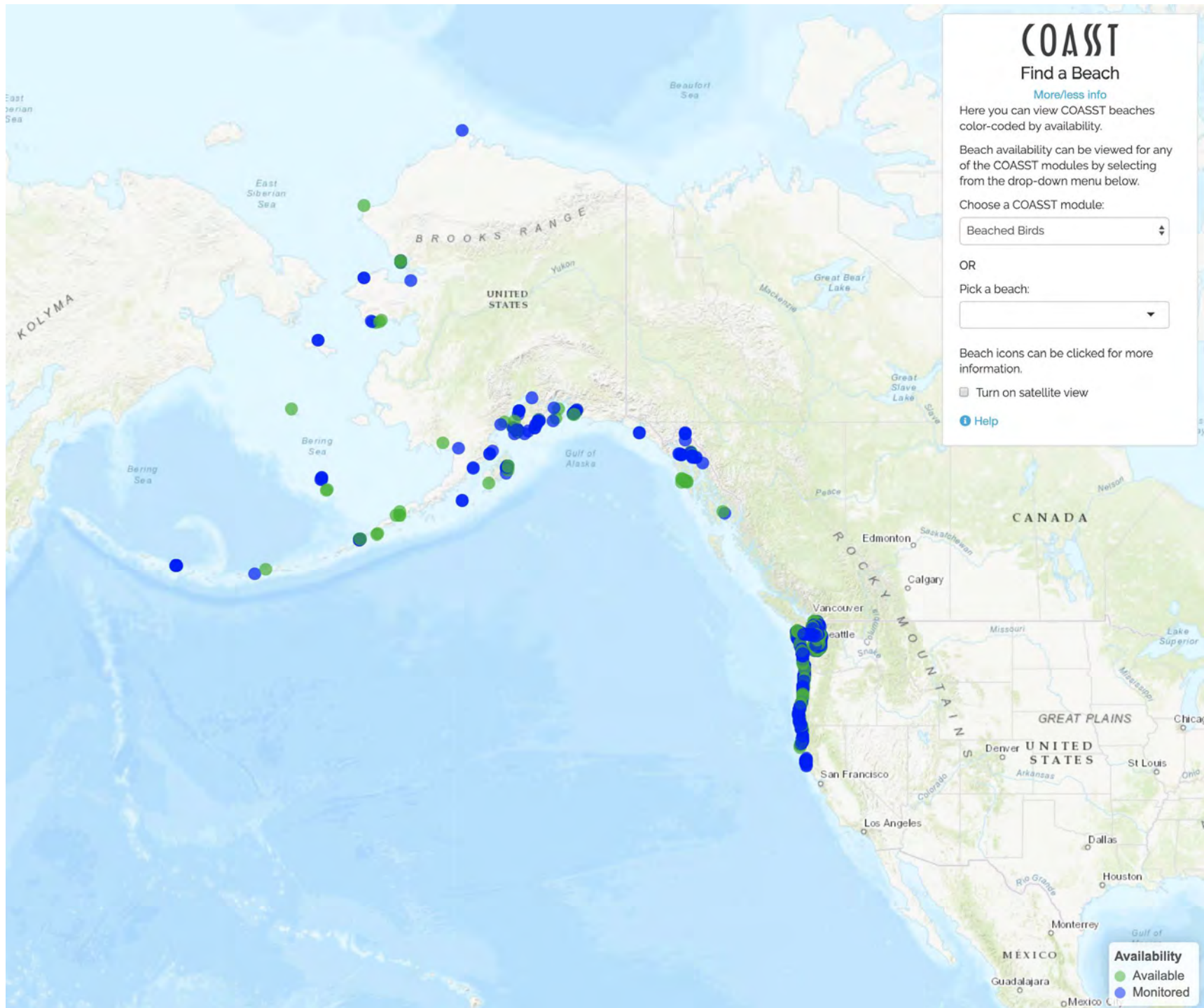
COASST BB Stats



- 20 years
- 750 monthly participants
- 4,700 people since inception
- 400 sites from Mendocino to Kotzebue
- 80,800 bird carcasses found
- 185 bird species



as of Apr 2019



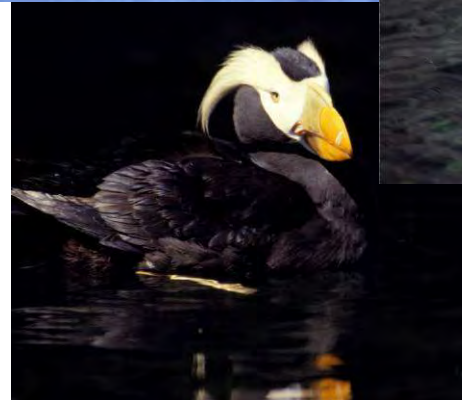
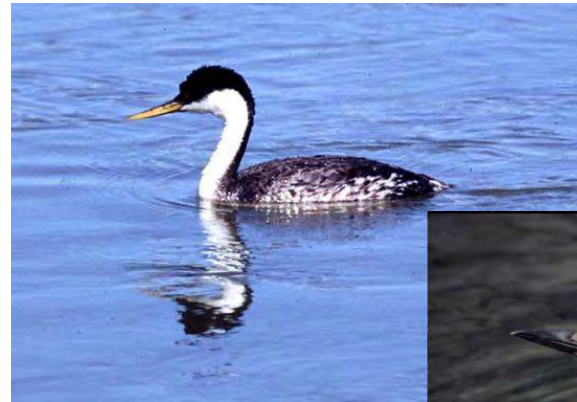
Why Document *Dead* Birds?

- There are a lot of them
- They were once alive
- They can be identified by anyone
- They can be thoroughly examined and are easily photographed
- They contain lots of valuable information

Seabirds as Indicators

- More than 100 species utilize marine ecosystems in the Pacific Northwest
- Long-lived
- Feed across trophic levels
- Occur over many marine habitats

and people love them...

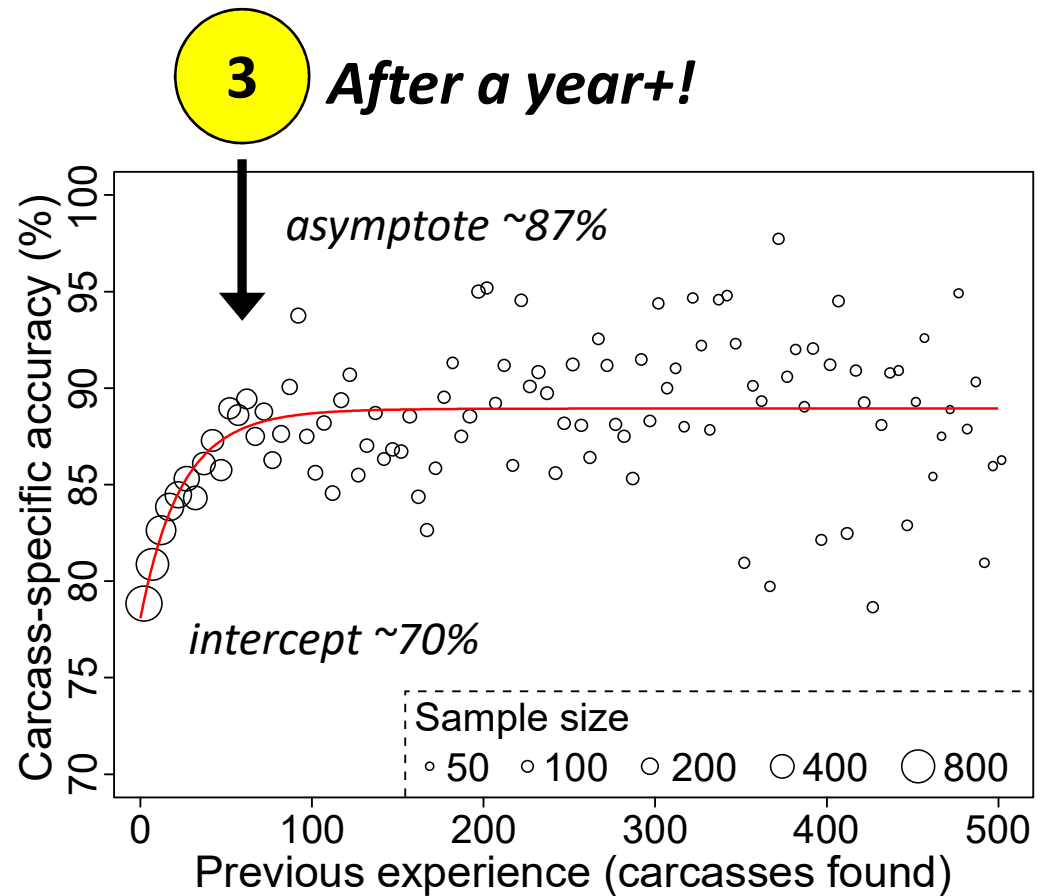
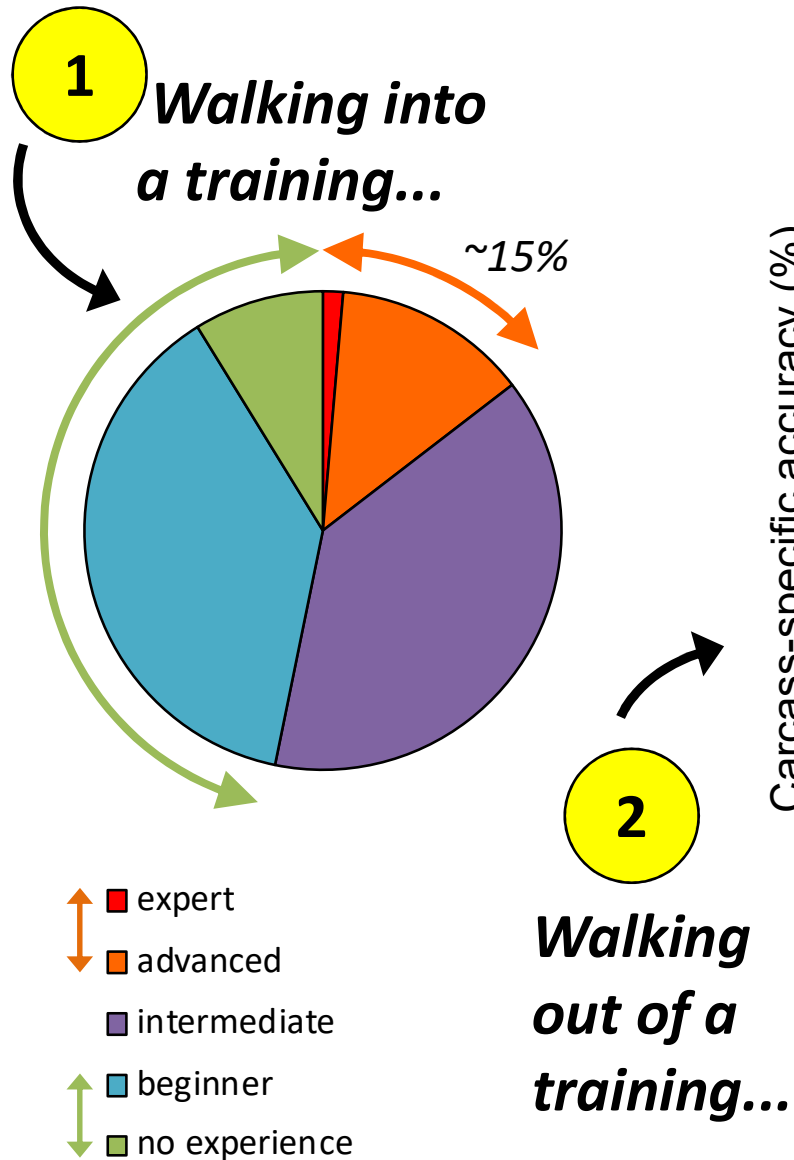


How Accurate are COASSTers?

Percent correct identifications

	Foot-Type Family	Species
Program-wide	93%	87%
After COASST ✓	98%	92%

They Get Pretty Darned Accurate



left: Haywood et al. *Con. Biol.* 2016 right: Parrish et al. *PNAS* 2019

So What?

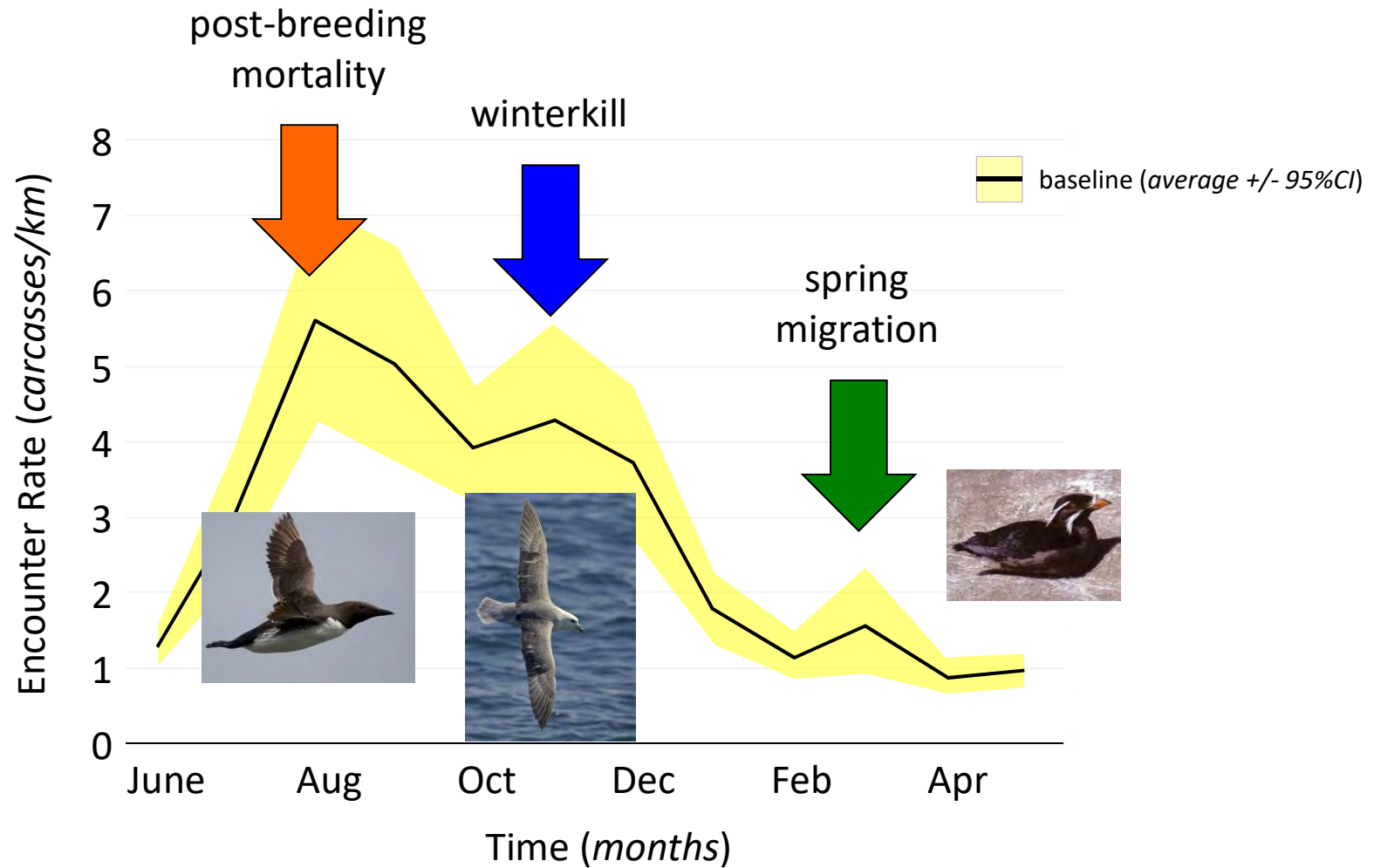
Creating a Baseline

Against Which Change Can Be Measured

- **Catastrophes** - like oil spills or harmful algal blooms
- **Cyclic Change** - like post-breeding mortality
- **Chronic Stress** - like CO₂ effects in the atmosphere

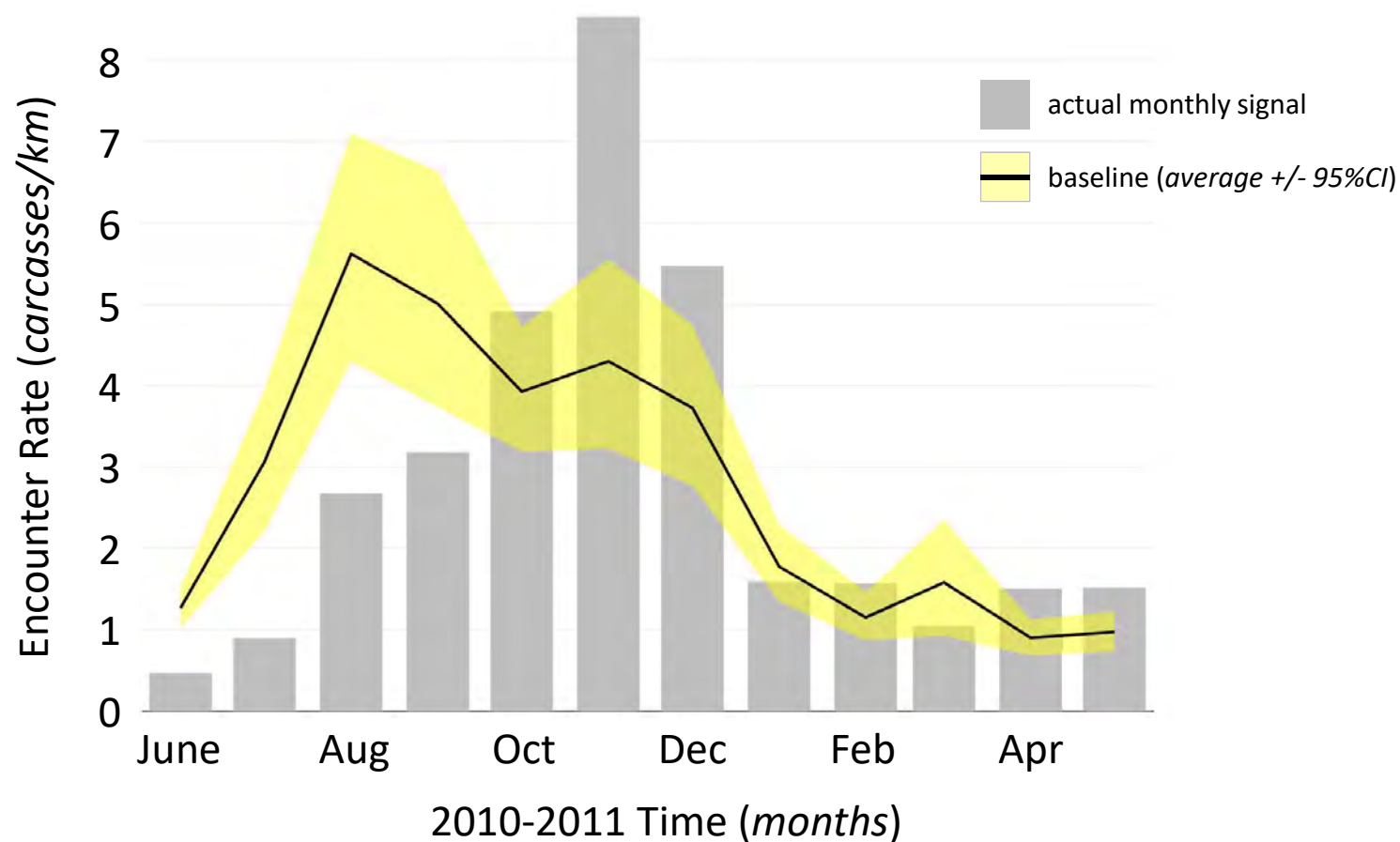
Creating a Baseline

the Cyclic Pattern



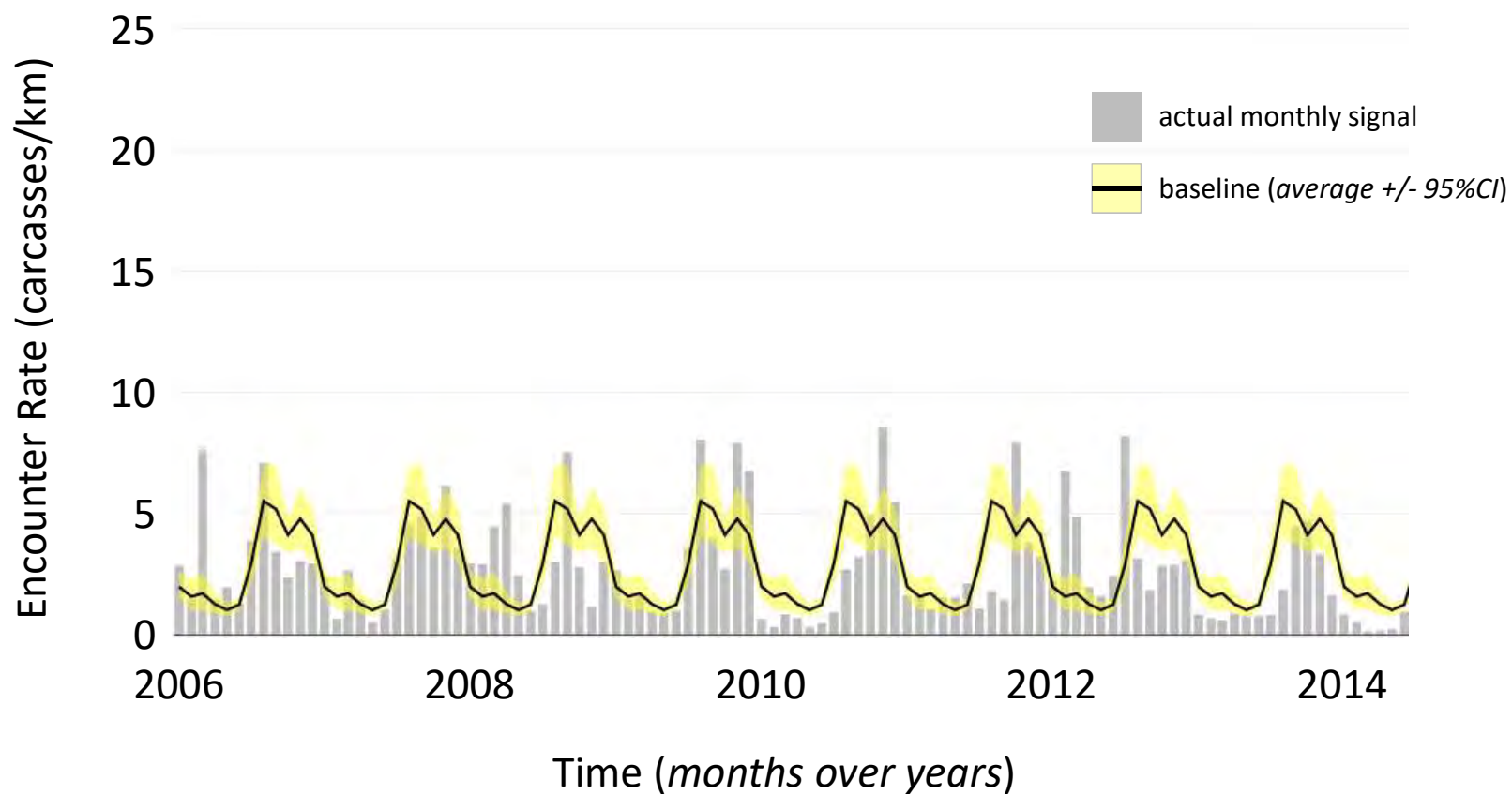
Creating a Baseline

matching to an actual signal

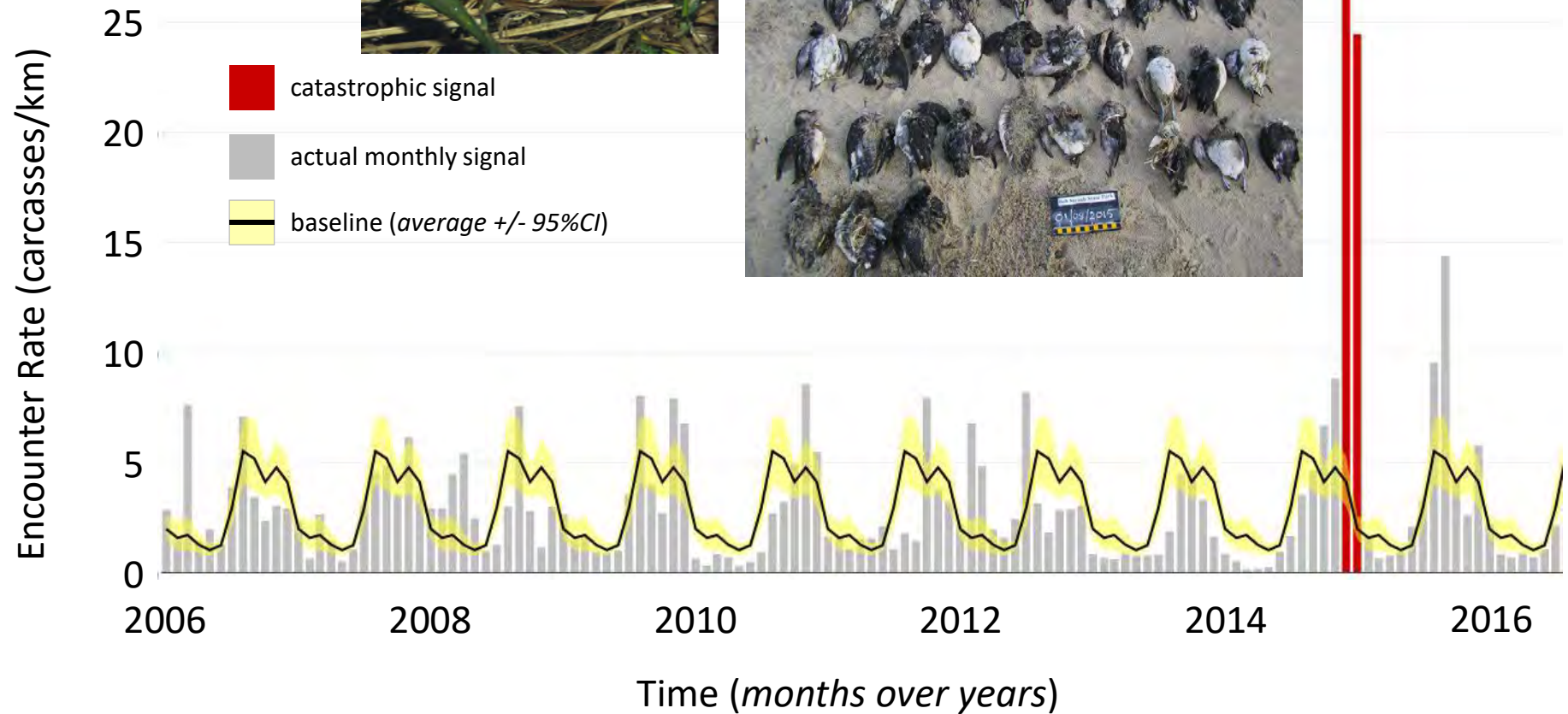


Creating a Baseline

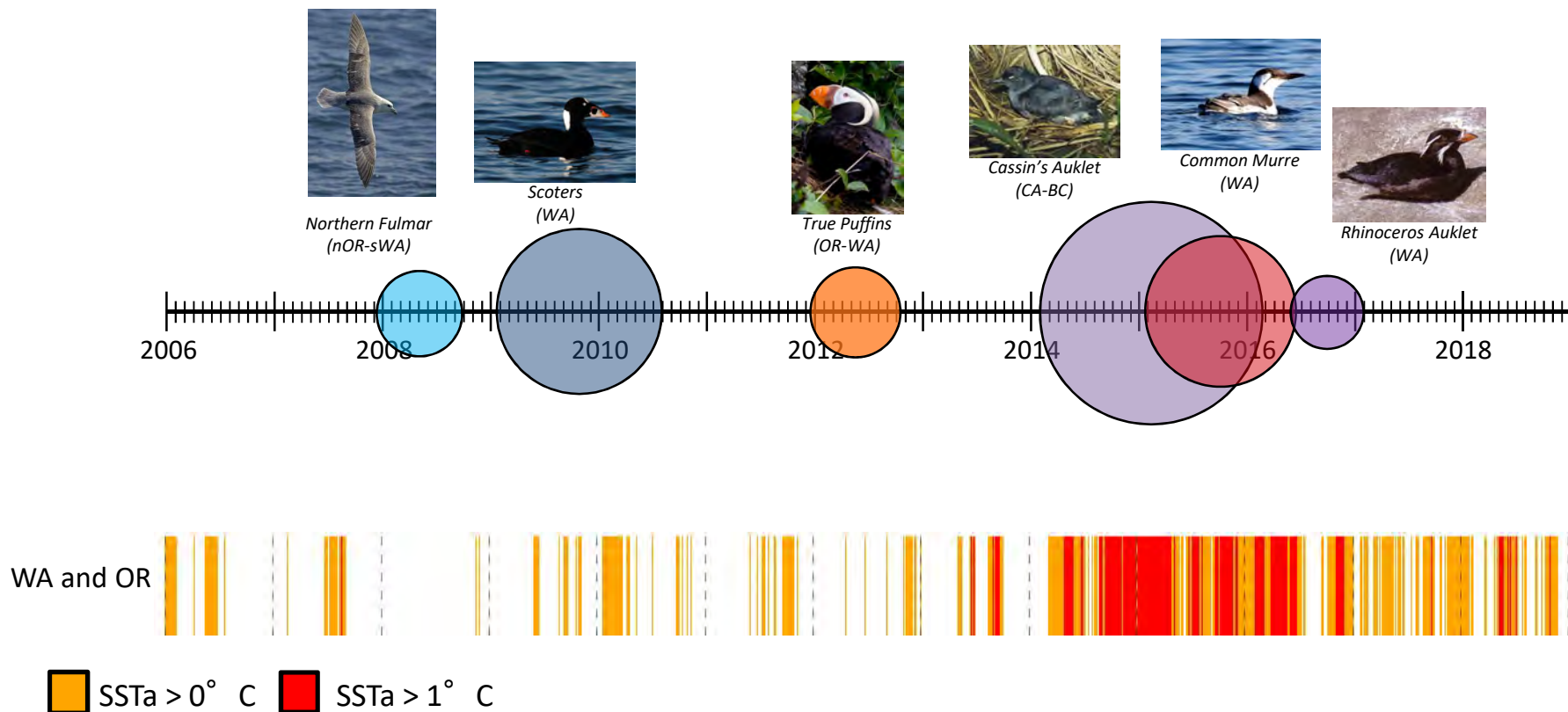
comparing to several years



Baselines and Mass Mortality Events



Mass Mortality Events: Washington



fine print: bubbles scaled to peak regional encounter rate estimate. smallest: RHAU@2.7 carcasses/km, largest: COMU in AK@61 carcasses/km. Average sea-surface temperature anomaly (SSTa) by day for each region (≤300 km from shore). Relative to SST climatology 1971-2000. NOAA High Resolution SST data provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA, from their website at <https://www.esrl.noaa.gov/psd/>