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# **At-sea distributions reveal Cassin's Auklets exposure to microplastics in the fall in British Columbia 2014**

**PICES, Qingdao China, October 2015**

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# Co-authors:

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- **Stephanie Avery-Gomm** – University of Queensland, Australia
- **Ken Morgan** – Canadian Wildlife Service
- **Peter S. Ross** – Ocean Pollution Research, Vancouver Aquarium

# Plastics and seabirds

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- 80/135 (59%) spp with plastic (review 1962-2012)
  - 29% incidence rate among individuals
  - 90% predicted if studies conducted today  
(Wilcox et al. PNAS 2015)
- Global issue
  - Northern Fulmar as bio-monitor (Avery-Gomm et al. MPB 2012)
  - Thick-billed Murre in the Arctic (Provencher et al. MPB 2010)
- Lower Trophic Level
  - Ross et al. 2015
  - Dovekies (planktivores) in Eastern Canada (Fife et al. MPB) 2015

# Plastics and seabirds

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- How seabirds are exposed to plastic ingestion?
  - Larger plastic pieces
    - Mistaken as food
    - Dimethyl Sulfide
  - Smaller pieces
    - Mistaken as food
    - Residue from larger pieces
    - Incidental intake
    - Found in lower trophic levels

Do planktivores in BC also contain plastic?

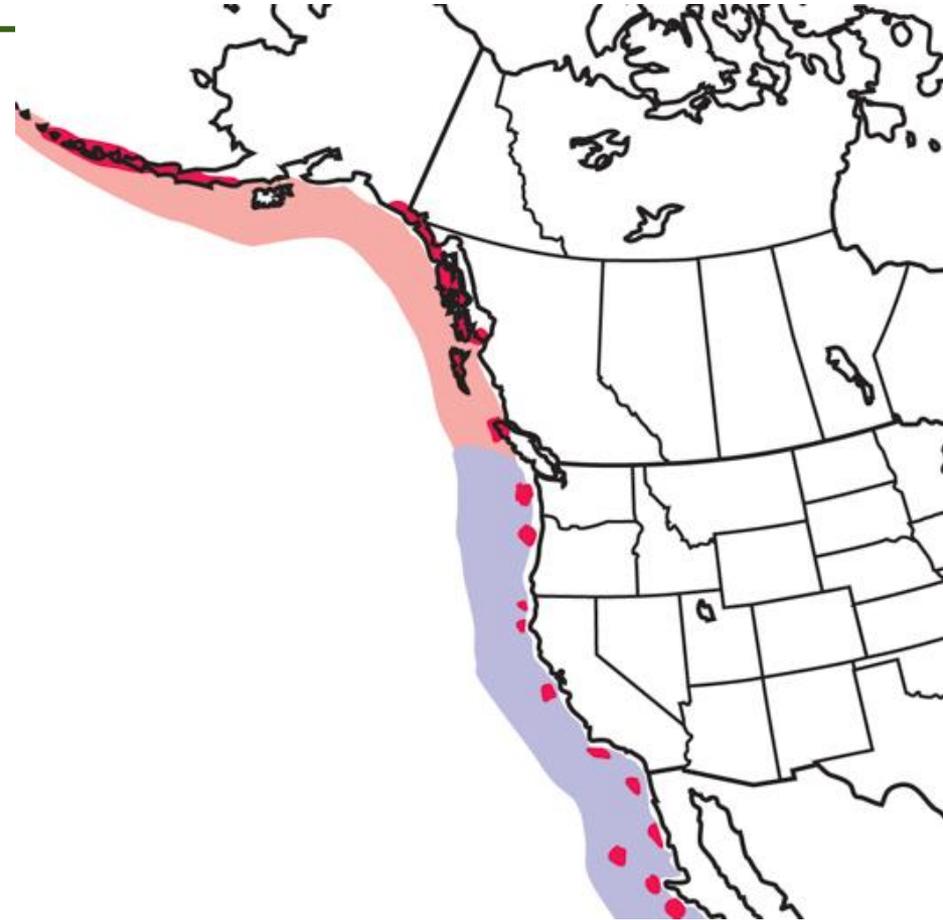


# Cassin's Auklet

- 200 g planktivores
- California Current/Gulf of Alaska
- Over half breed in BC
- Long-lived



Glen Tepke/VIREO



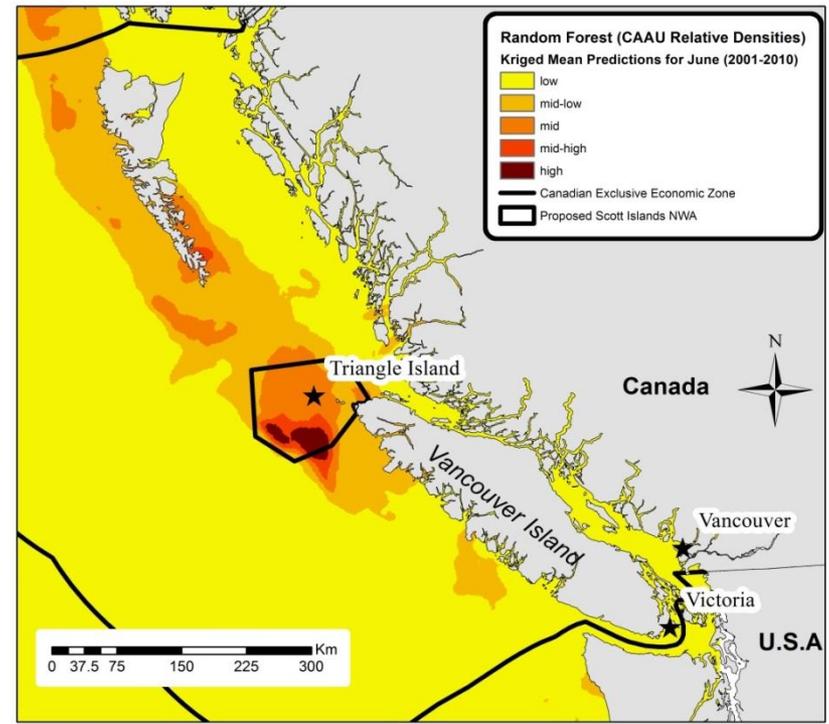
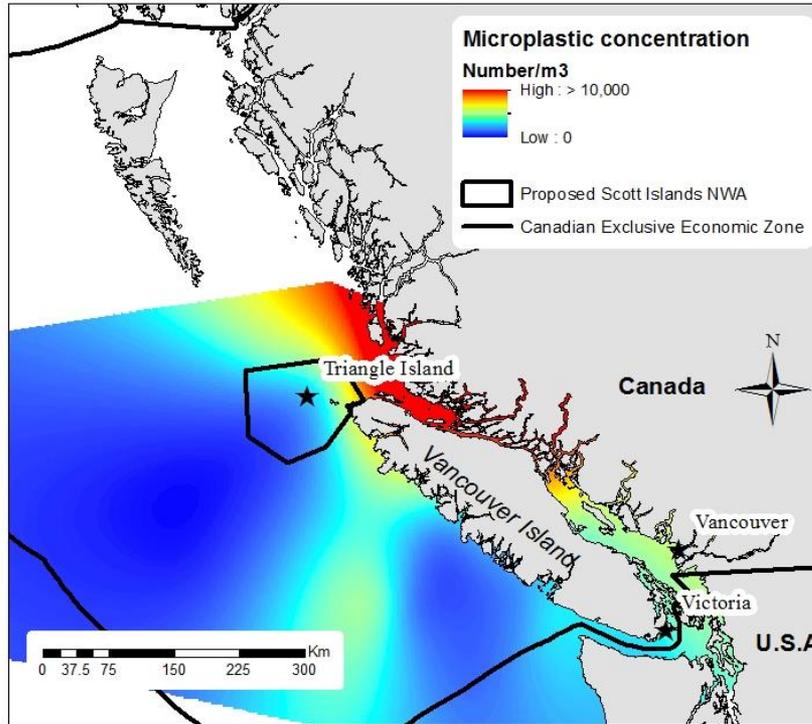
<https://www.audubon.org/field-guide/bird/cassins- auklet>



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# Microplastic pollution and CAAU

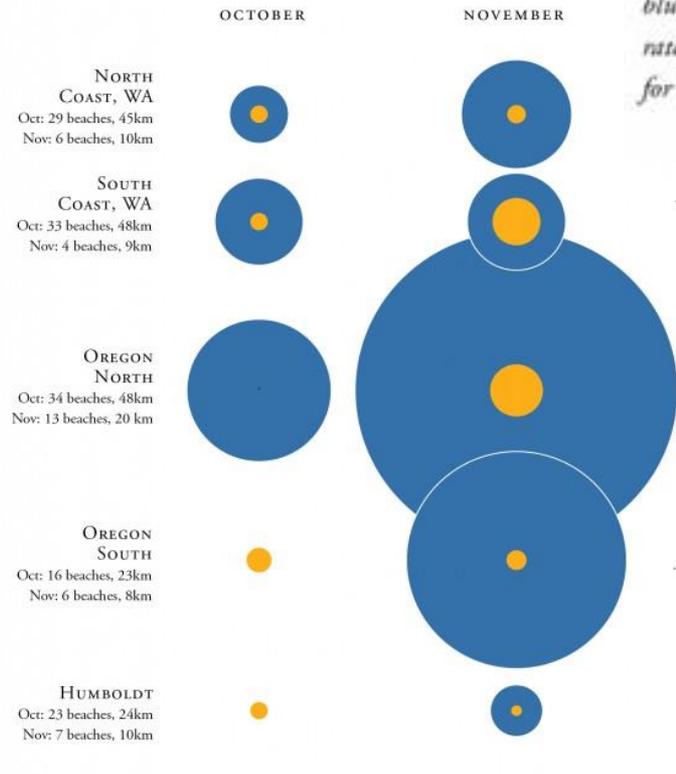


*Desforges et al./Marine Pollution Bulletin (2014)*

# CAAU Wreck Event 2014

## CASSIN'S AUKLET WRECK 2014

Circle area reflects Cassin's Auklet encounter rate: orange circles are the regional baseline (7–10 years) and blue circles are the 2014 statistics. With 40% of sites reporting through November 19, highest encounter rates occurred in November for Oregon North (6 birds/km) and Oregon South (3 birds/km). Sample sizes for October and November 2014 are shown below region headers. Dotted lines show region boundaries.



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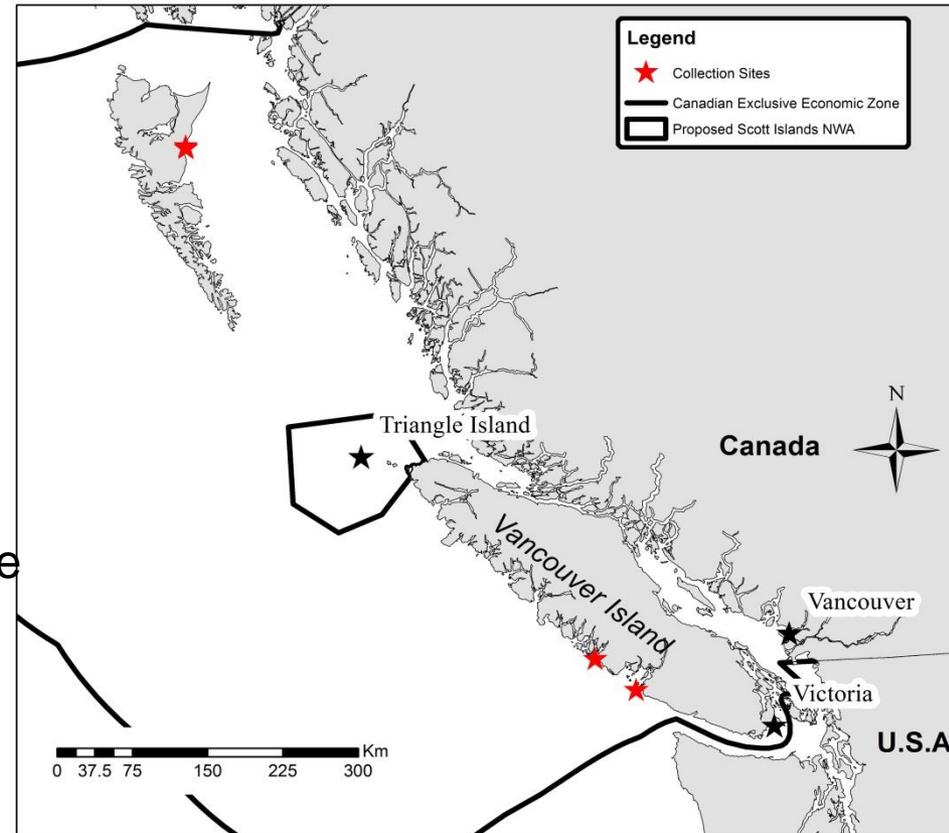
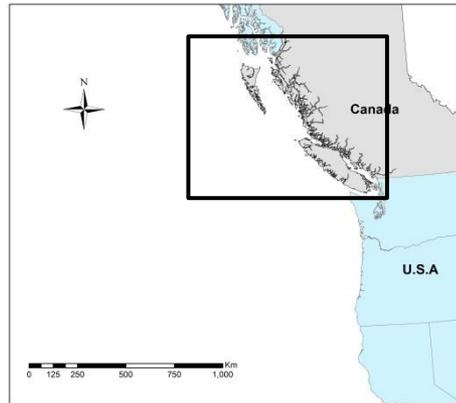
## California Current System phenomenon



COASST, University of Washington



# Wrecked CAAU in Canada 2014



83 CAAU recovered:

- 70% Adult, 30% Juvenile/immature
- 52% Male, 43% Fem., 5% NA



# Plastic in wrecked CAAU?

## (Preliminary results – DO NOT CITE)

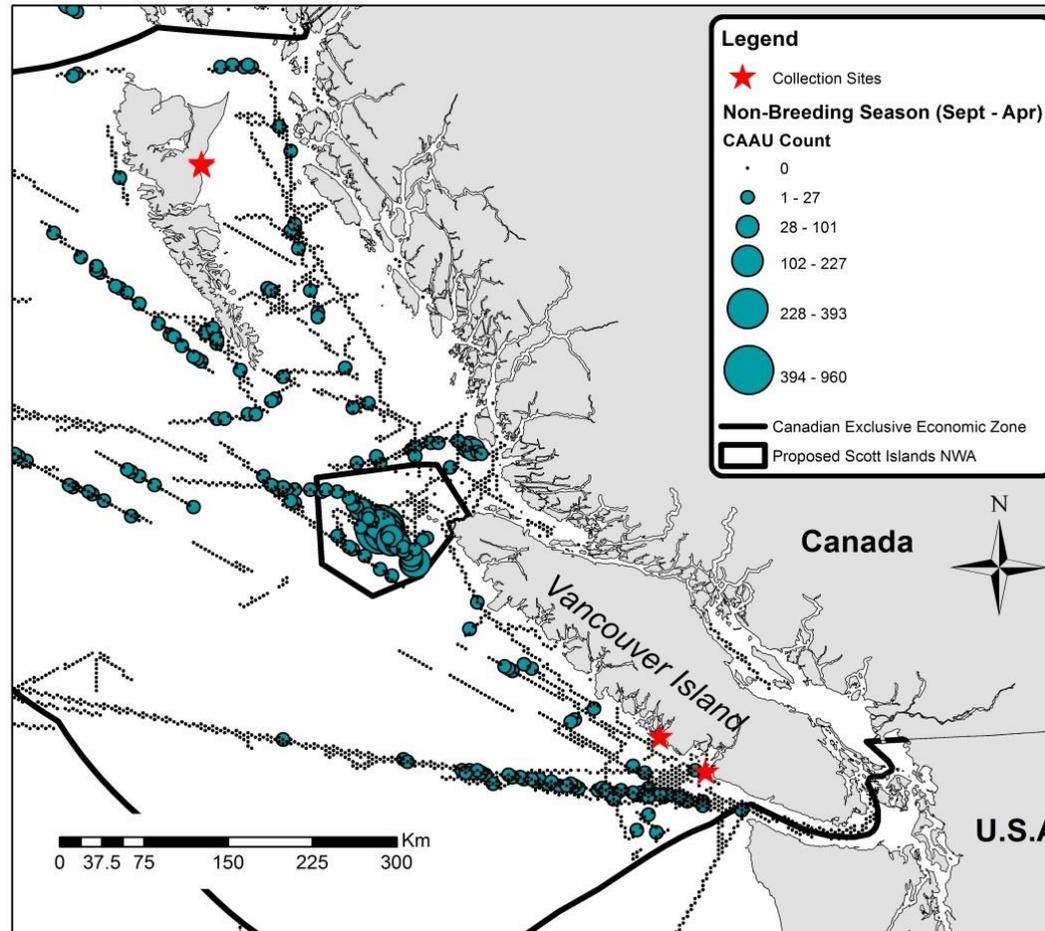
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- 83 CAAU recovered
  - 41% (34/83) had plastic (Dovekies – 14%)
  - 40% (23/58) adults
  - 44% (11/25) juveniles/immatures
- Plastics found
  - 83% user (vs. industrial)
  - Average mass/bird = 0.022 g
  - Range mass/birds = 0.0006 – 0.32 g
    - < 0.16% of body mass (average body mass = 200 g)

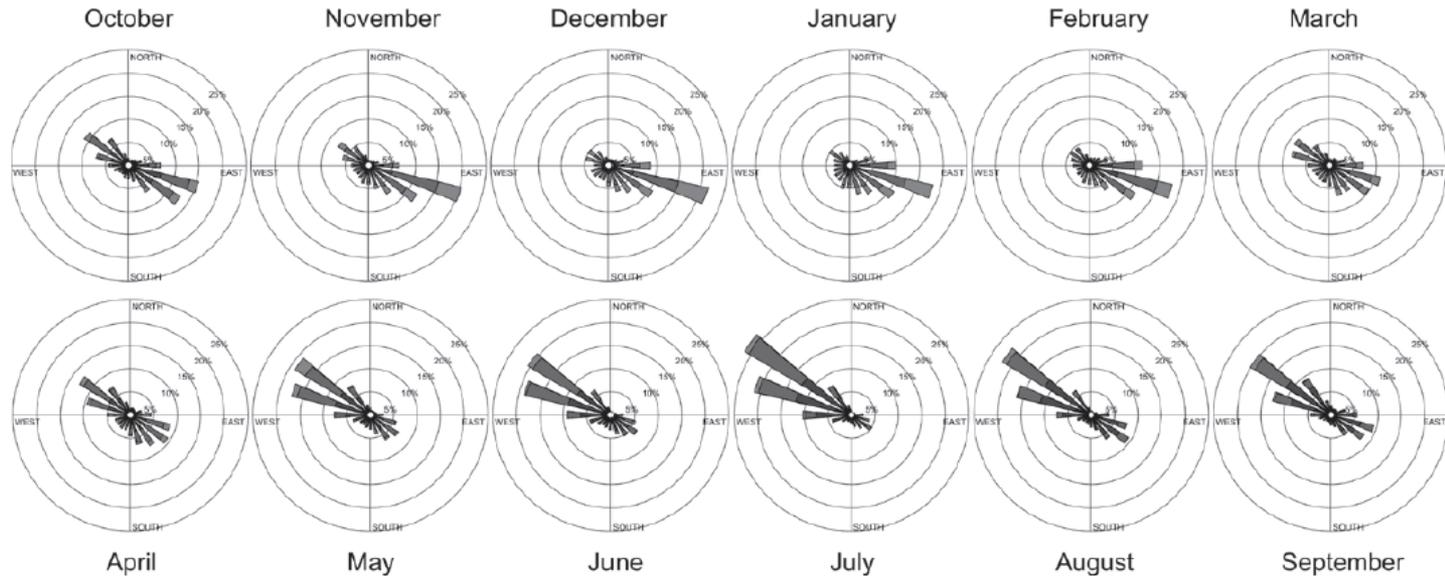
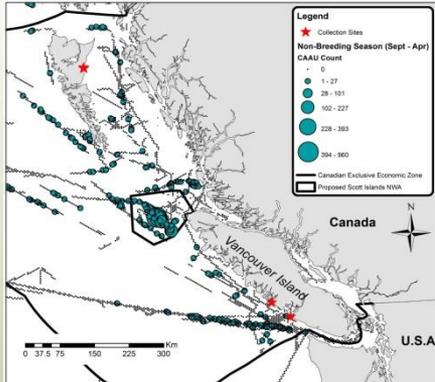
If interested, please contact O'Hara for further information regarding these preliminary results.



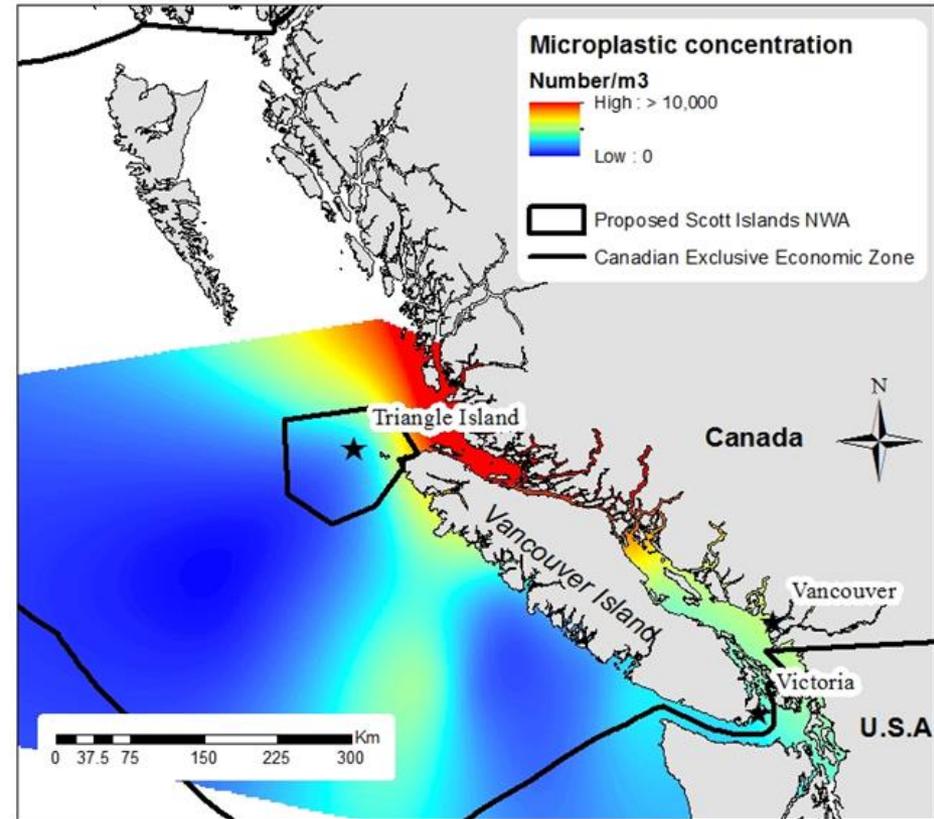
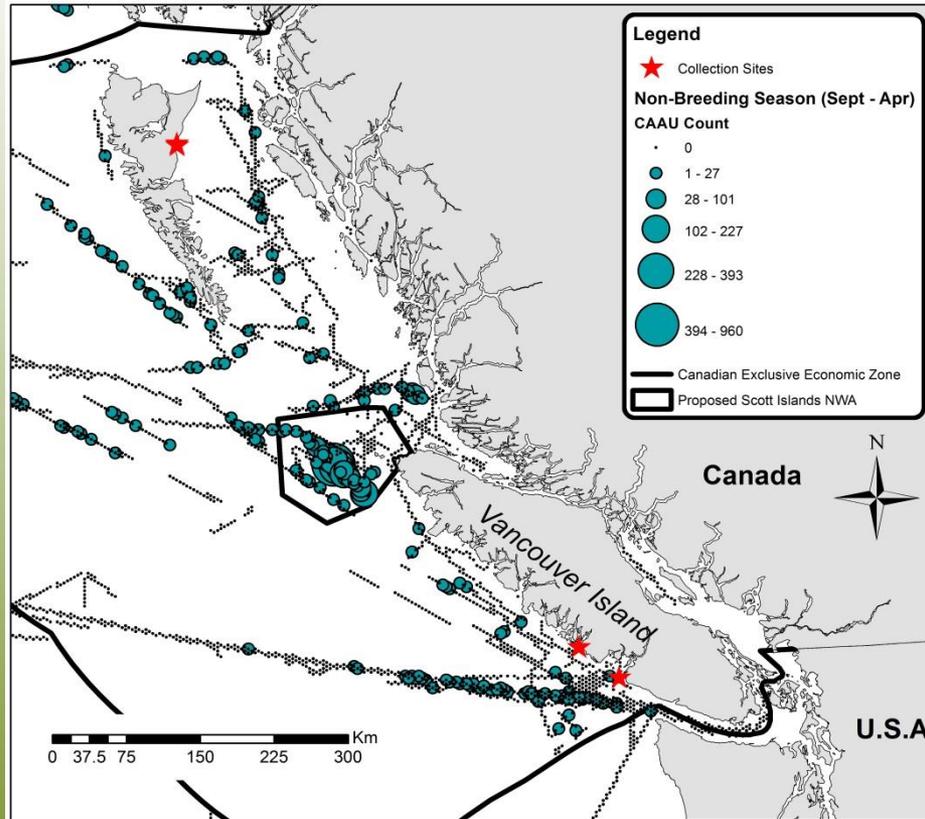
# Non-breeding distributions



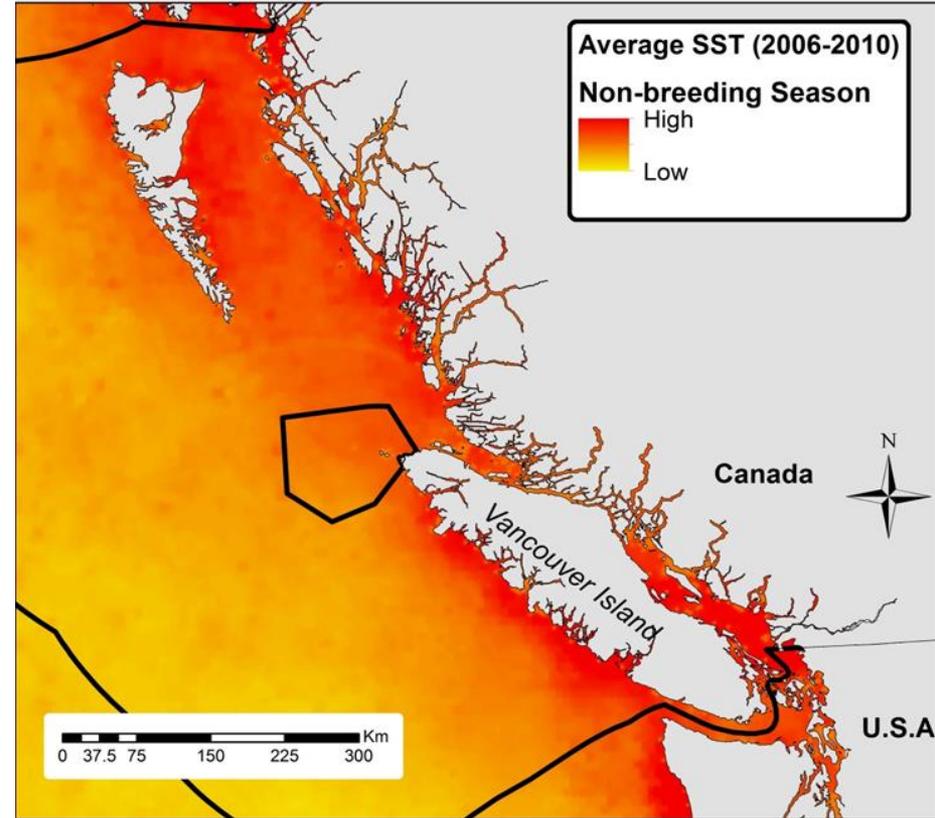
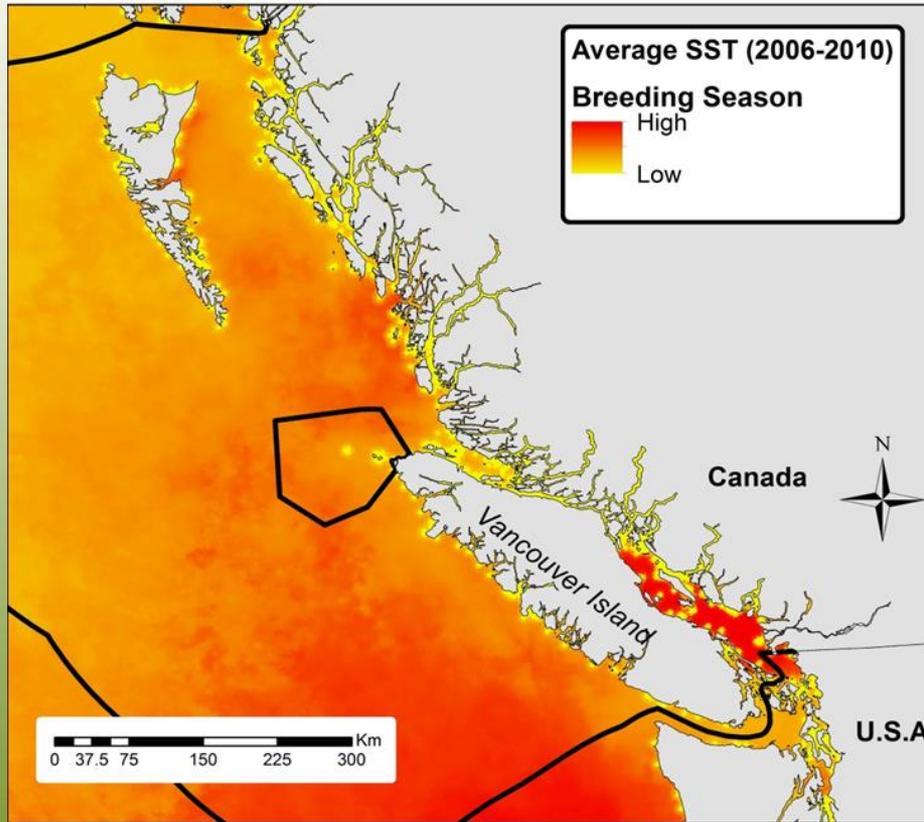
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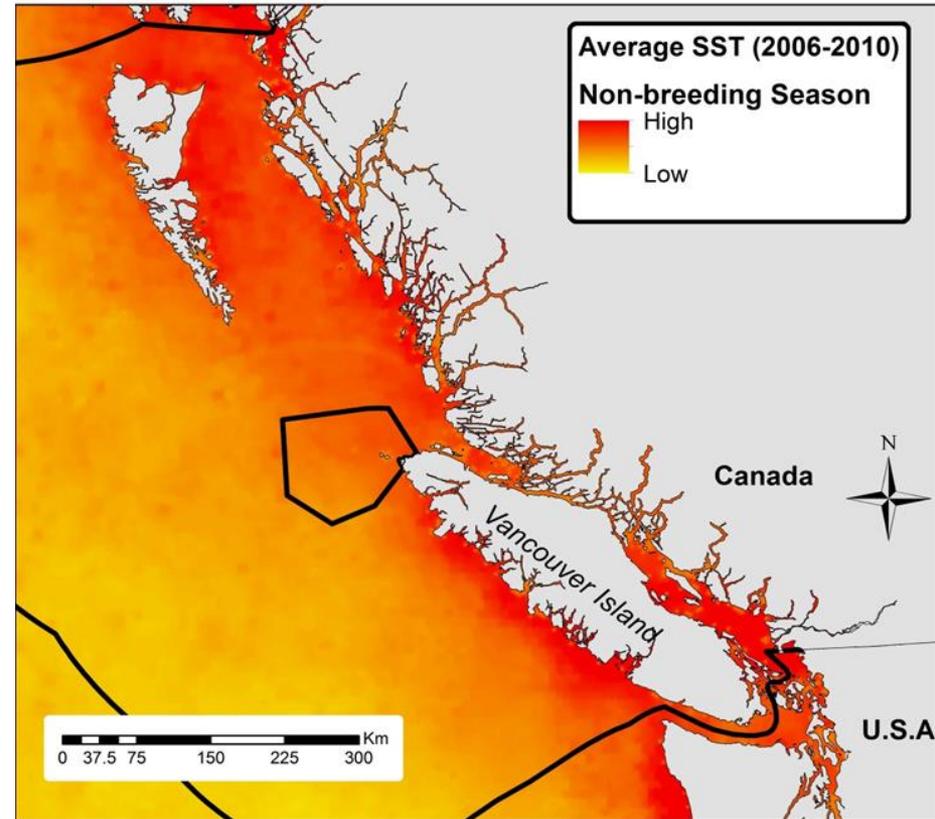
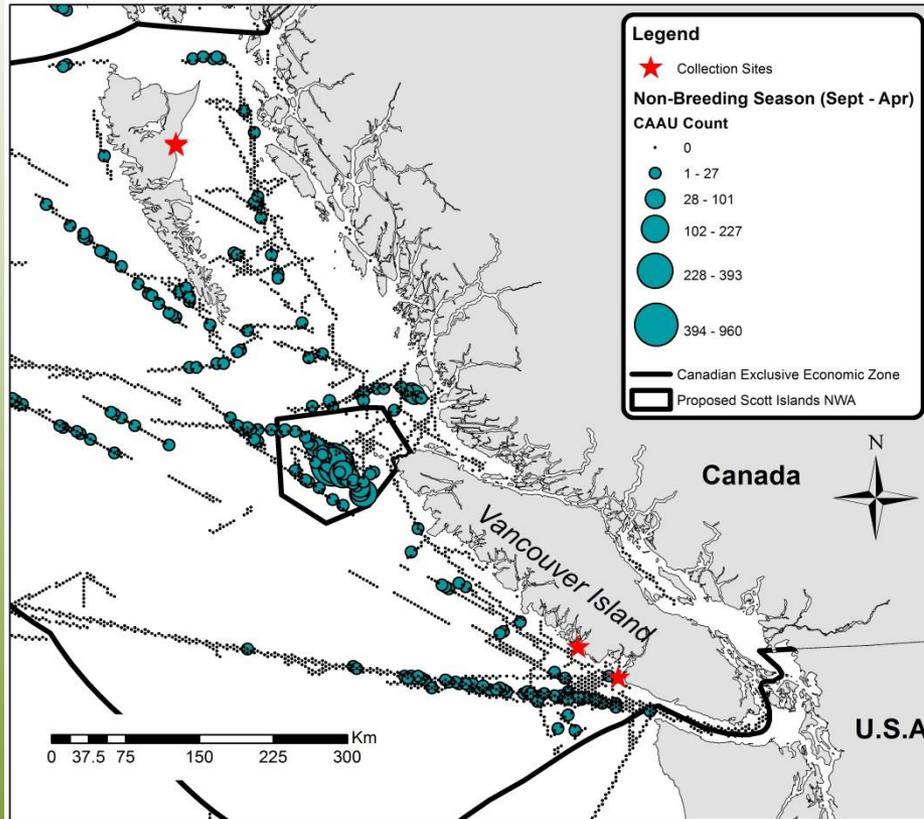
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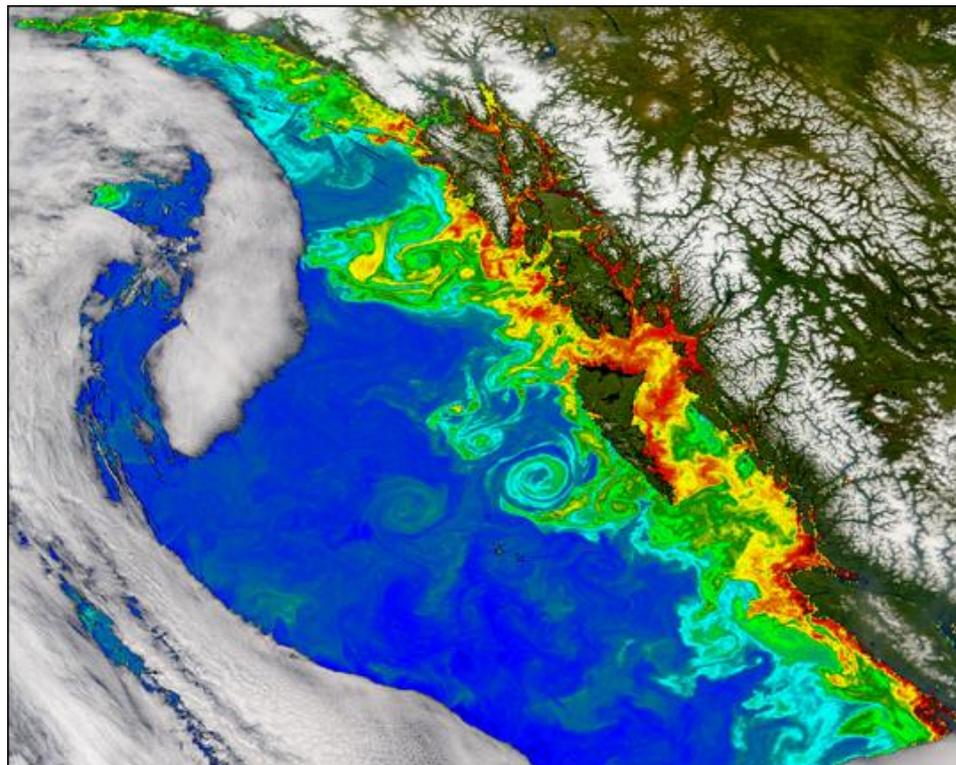
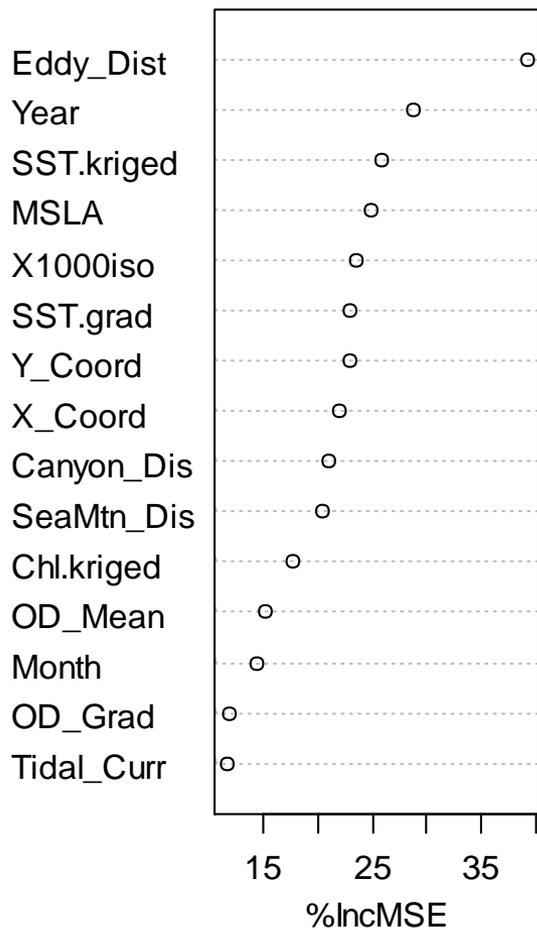
# Upwelling vs. Downwelling



# Upwelling vs. Downwelling



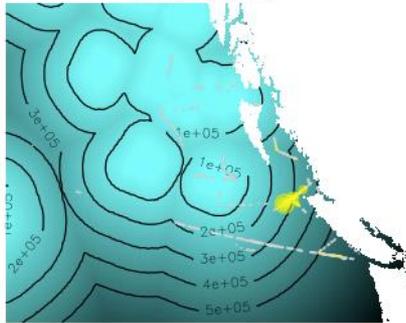
# Meso-scale Eddies



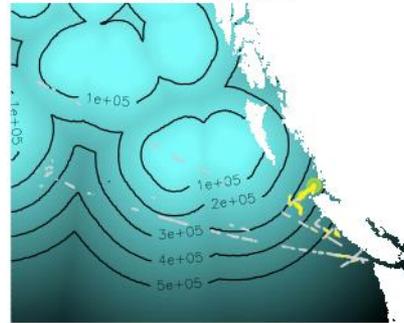
# CAAU Density and Eddies

## Eddy Distance

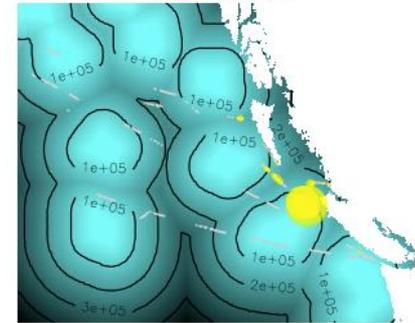
June 2001



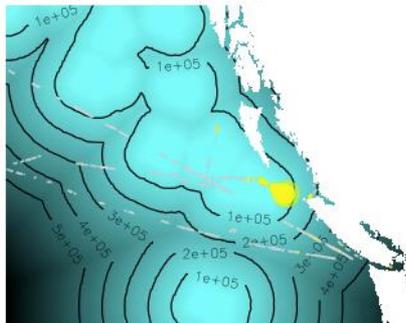
June 2002



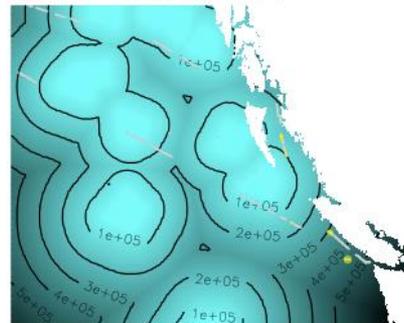
June 2003



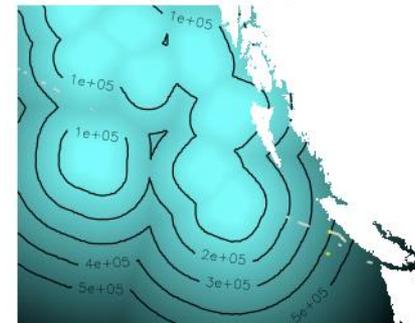
June 2004



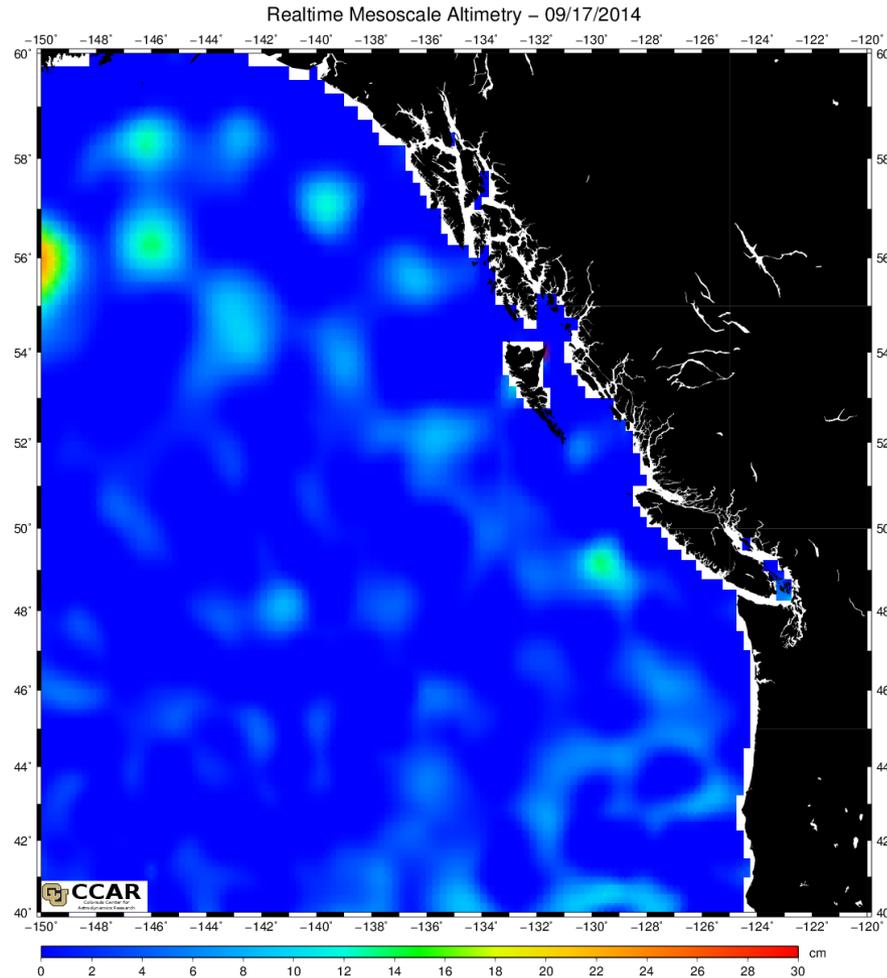
June 2005



June 2006



# CAAU Density and Eddies



# In summary

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- CAAU in wrecks likely California Current System breeders
  - Not same as birds breeding in BC
- CAAU exploit:
  - Upwelling features during breeding
  - Mesoscale eddies during both non-breeding and breeding seasons
  - Exposure to microplastics - summer < winter
- Unclear if targeting plastic or incidental but CAAU incidence rate lower than higher trophic level but higher than Dovekies