



# Marine bird surveys: one piece of the SWAN Nearshore Monitoring Program

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# Outline

- Nearshore Vital Signs
- Marine birds as a vital sign
- Survey design and methods
- What have we learned analyzing three years of survey data from KATM?
- KEFJ 2008 winter bird surveys

# NPS Vital Signs

- Marine Water Chemistry
- Kelps and Seagrasses
- Intertidal Invertebrates
- *Marine Birds*
- Black Oystercatcher
- Sea Otter

# Why marine birds?



- **Predators near the top of marine nearshore food webs**
- **Long-lived, conspicuous, abundant, widespread members of the marine ecosystem**
- **Sensitive to change = good indicators of change**
- **Many studies have documented that:**
  - **Behavior**
  - **Productivity**
  - **Diets**
  - **Survival****change when environmental conditions change**
- **Public concern exists for the welfare of seabirds because they are affected by human activities**
  - **oil pollution**
  - **commercial fishing**
  - **tourism**



# Marine Birds (and mammals)

- Species composition
- Distribution
- Density
- Trend



# Survey Design

- Previous studies showed that...
  - If we survey 20% of the coastline
  - Using 2.5 to 5 km length transects
  - Should have adequate sample size for most nearshore reliant species
- Shoreline split into equal segments
- Systematic sample with a random start
- Designed without political boundaries taken into consideration
  - Originally designed for the EVOS Gulf Ecosystem Monitoring Plan
  - Encompasses NPS, USFWS and Alaska state parks



# Methods

- Conducted from a small (~16') open skiff
- 200m strip transects (skiff operates 100m offshore)
- All marine bird and mammal sightings as well as behaviors are recorded using Dlog2 survey software (Ford Consulting)
- Any 'off tx' sightings of interest are also recorded such as whales and other marine mammals

\*Barrow's goldeneye (*Bucephala islandica*)

◇ Black-legged kittiwake (*Rissa tridactyla*)

◇ Black oystercatcher (*Haematopus bachmani*)

◇ Cormorants (*Phalacrocorax spp.*)

◇ Glaucous-winged gull (*Larus glaucescens*)

■ Harlequin duck (*Histrionicus histrionicus*)

◇ Pigeon guillemot (*Cepphus columba*)

◇ Scoters (*Melanitta spp.*)

◇ summer only

\* winter only

■ both



# Do we have the right survey design for all these species?

- Examine coefficients of variance (CVs) to determine within year as well as across year variation for each species
  - If  $CV > 50\%$ , indicates that variation is high and that the 95% CI estimate for density will encompass 0
    - We are not adequately surveying for this species possibly because
      - A. the species is highly aggregated and we have too many 0's on other transects, SE high
      - B. focusing on inappropriate habitat
      - C. our sample size is too small

- We said these are nearshore surveys, but the nearshore is not homogeneous
- Subpopulation Analysis:
  - Utilized Environmental Sensitivity Index (ESI NOAA) data to assign a habitat type to each transect
  - Three distinct habitat types were identified
    - Exposed – rocky
    - Protected – rocky
    - Exposed – soft
- Calculated mean density, SE and CV for each species in each of the 3 domains

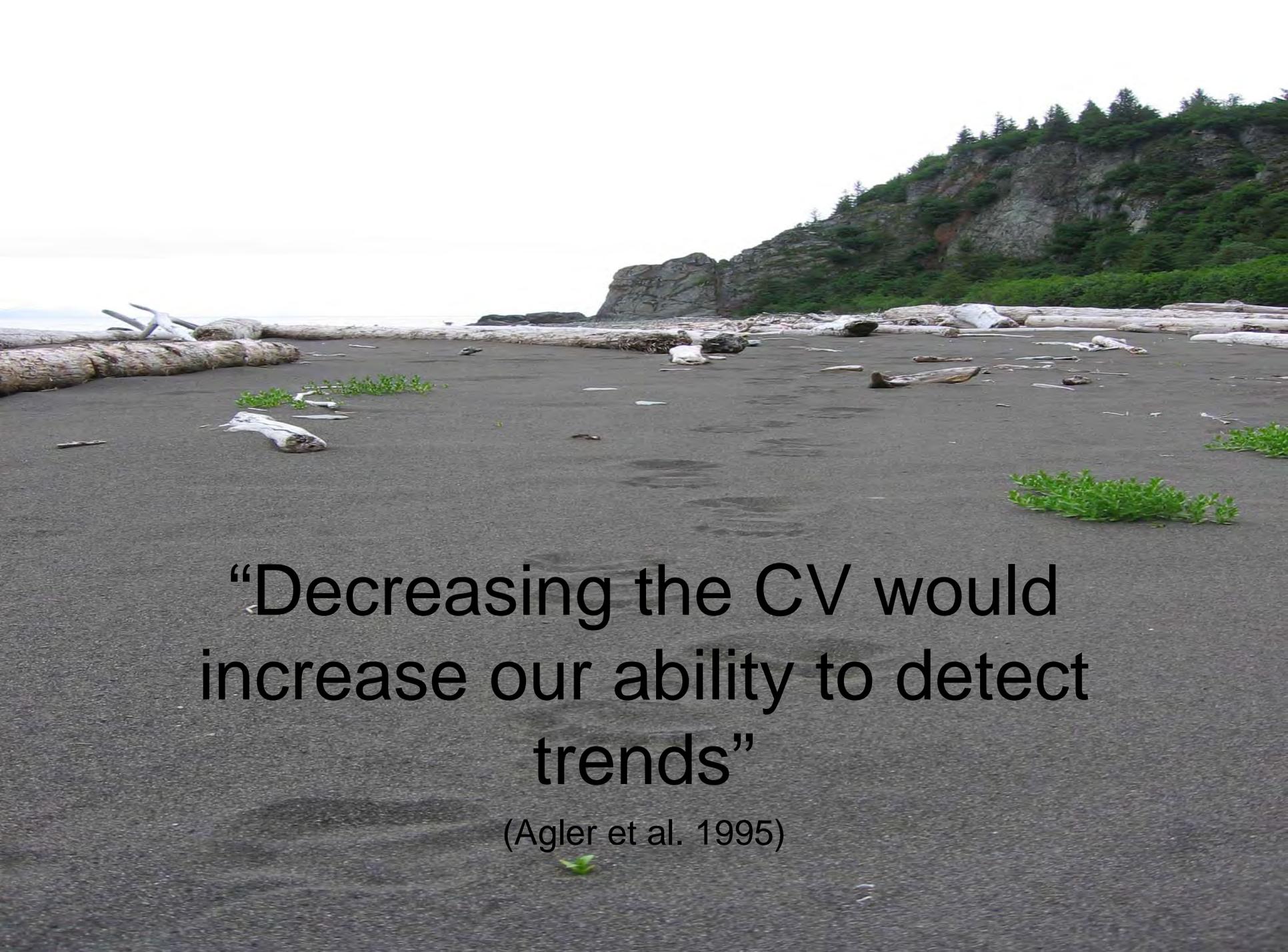
# Results

Each species had consistently low CVs across all three years in at least *one* habitat type

TYPE	Species	CV
exposed - rocky	BLKI	38-50%
exposed - rocky	BLOY	37-50%
exposed - rocky	CORM	25-41%
exposed - rocky	GWGU	26-34%
exposed - rocky	HADU	23-45%
protected - rocky	HADU	22-44%
exposed - rocky	PIGU	22-32%
exposed - soft	SCOT	40-46%

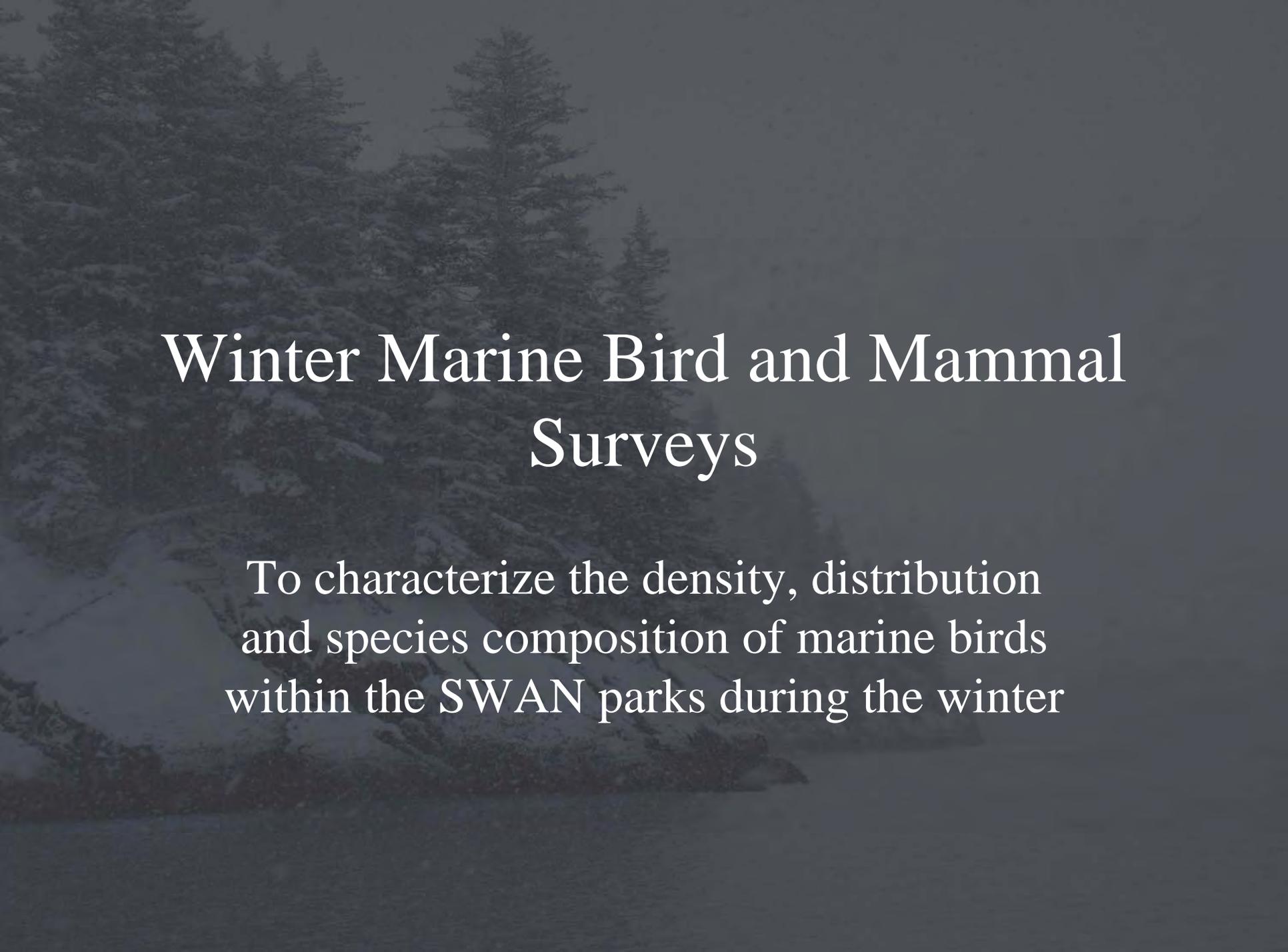
# Recommendations

- Power analysis to determine appropriate sample size for each species
- Efforts may want to be allocated to specific habitat types, increasing our ability to detect trends for some species, but decreasing it for others
- Continue subpopulation analysis

A wide-angle photograph of a black sand beach. The foreground is dominated by dark, fine-grained sand. Scattered across the beach are numerous pieces of weathered, light-colored driftwood. In the middle ground, a large, prominent log lies horizontally. To the right, a small patch of bright green vegetation grows on the sand. In the background, a steep, rocky cliff rises from the beach, covered with sparse green shrubs and trees. The sky is overcast and grey.

“Decreasing the CV would  
increase our ability to detect  
trends”

(Agler et al. 1995)

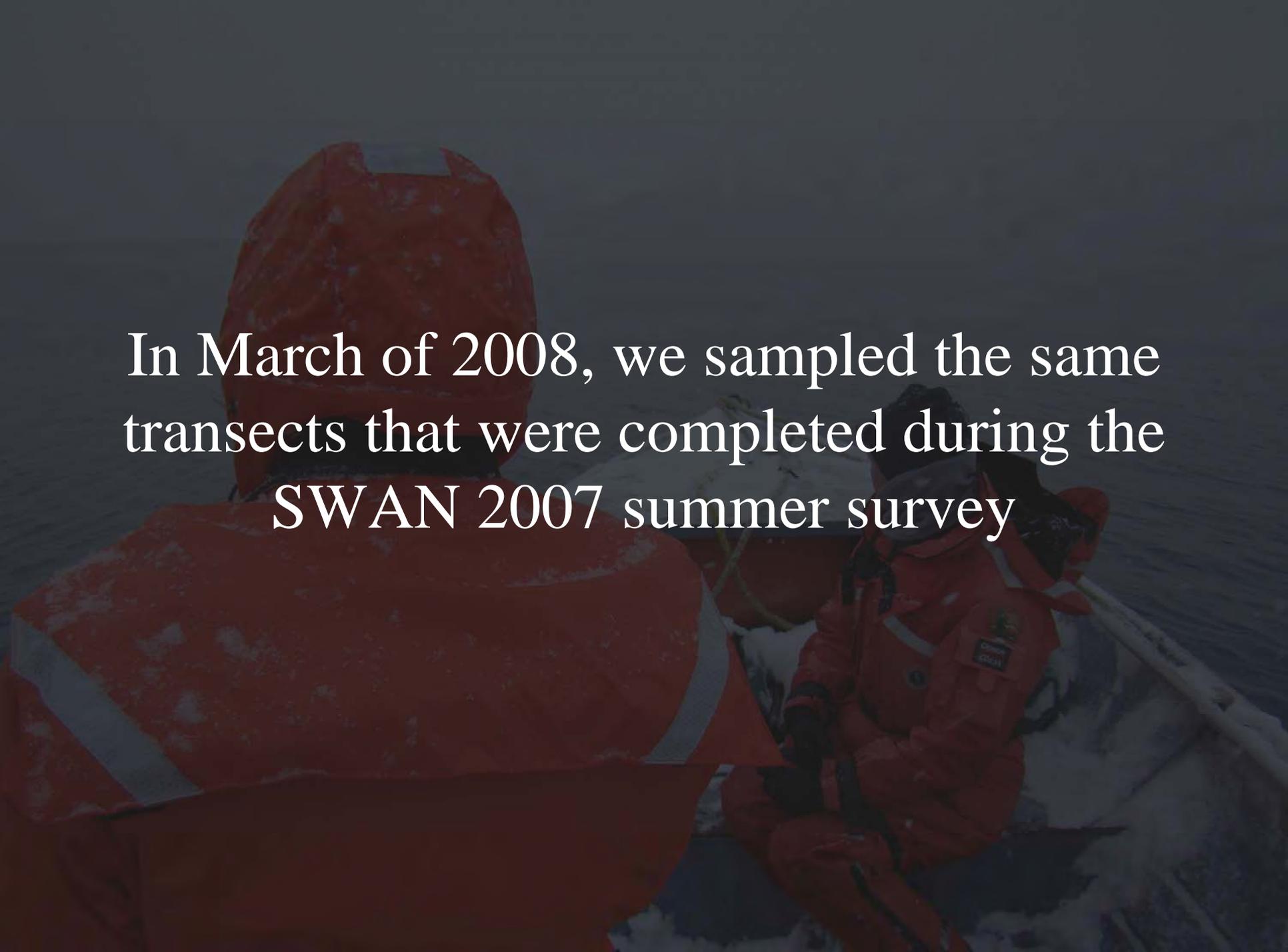


# Winter Marine Bird and Mammal Surveys

To characterize the density, distribution  
and species composition of marine birds  
within the SWAN parks during the winter

# KEFJ Winter Bird Surveys

- Only one late winter survey had been conducted in KEFJ prior to 2008 - a survey before and after oil reached KEFJ (Exxon-Valdez oil spill) in 1989
  - Late winter baseline data did not exist prior to this survey
  - Survey conducted prior to spill would have captured the over-wintering populations
  - Survey conducted after spill occurred at the start of the spring migration

A photograph showing two individuals in bright orange survival suits on a boat. The person in the foreground is seen from the back, wearing a hooded jacket with reflective white stripes. The second person is further back, also in an orange suit, looking towards the right. The background shows the dark water of the sea. The text is overlaid in white, serif font, centered on the image.

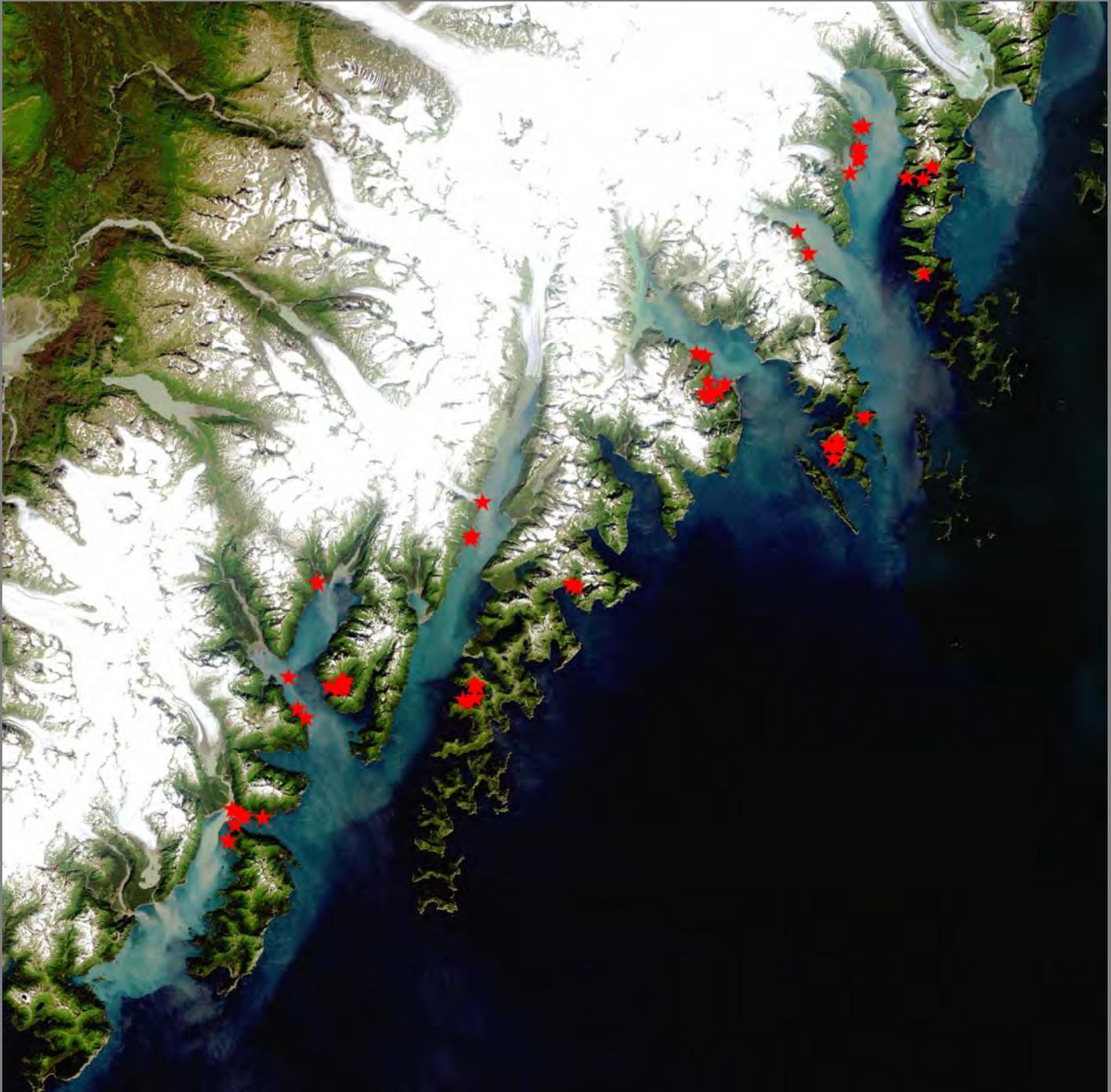
In March of 2008, we sampled the same  
transects that were completed during the  
SWAN 2007 summer survey

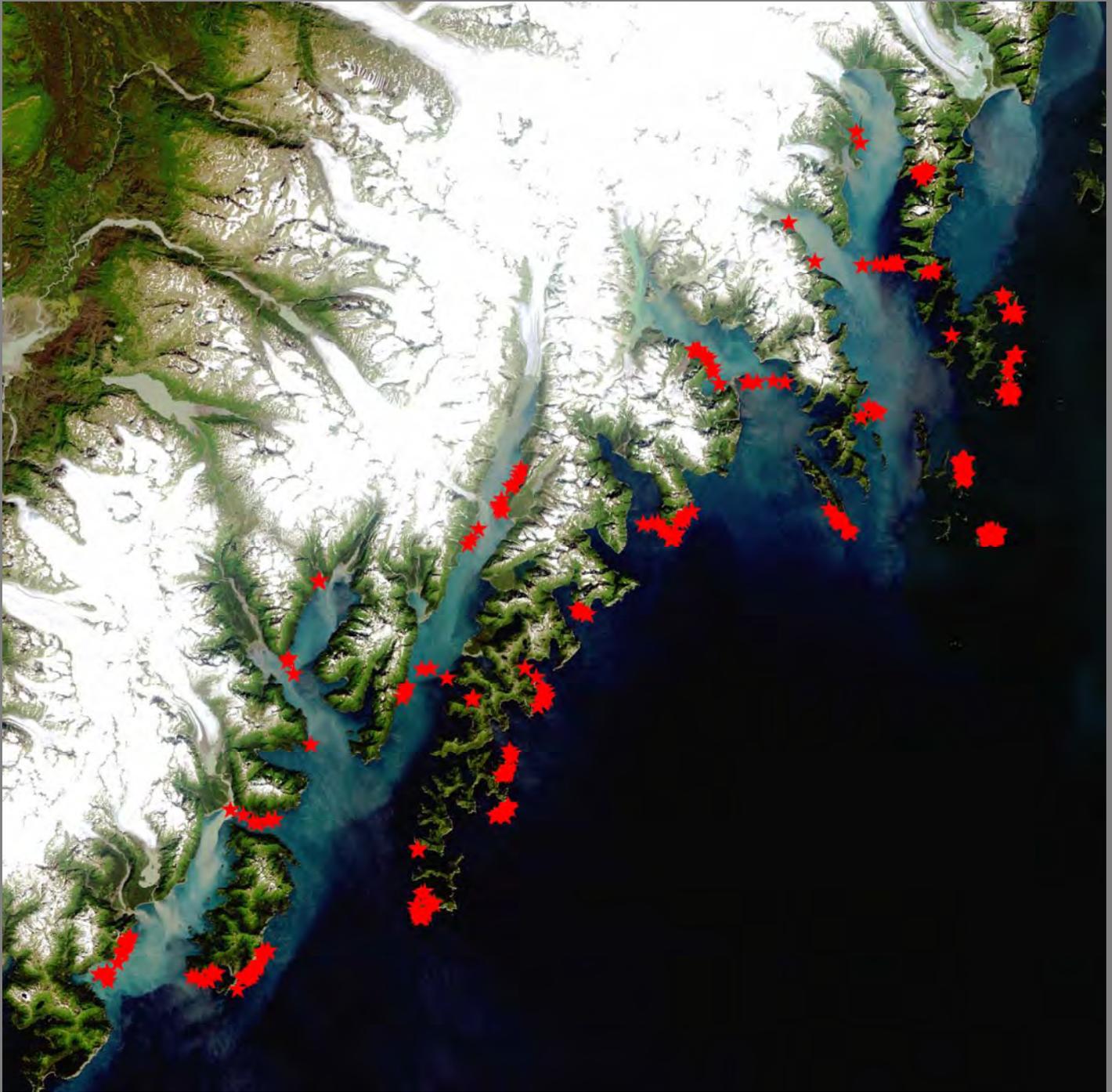
# Winter vs. Summer Densities

## KEFJ 2008

Species	Winter	Summer	Average winter density (#/km <sup>2</sup> )	Average summer density (#/km <sup>2</sup> )
Barrow's goldeneye	447	65	12.95	1.23
Black-legged kittiwake	2	858	0.04	22.97
Common goldeneye	31	0	0.52	0
Glaucous-winged gull	82	4683	2.42	94.53









# Recommendations

Future winter surveys :

emphasis will be given to areas within the Parks that may have habitat characteristics suitable to support marine ducks in the winter such as protected bays and lagoons

# Winter Marine Bird and Mammal Surveys - Revisions for subsequent surveys

- KATM: Add lagoons as potential habitat for overwintering sea ducks:
  - Swikshak Lagoon
  - North end of Hallo Bay
  - Head of Kukak Bay
  - Other areas?
- KEFJ: Add
  - Pederson Lagoon
  - McCarty Lagoon
  - James Lagoon
  - Other areas?

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**THANKS!**