



Assigning birds to regions in the Bering Sea using stable isotopes of feathers



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Background



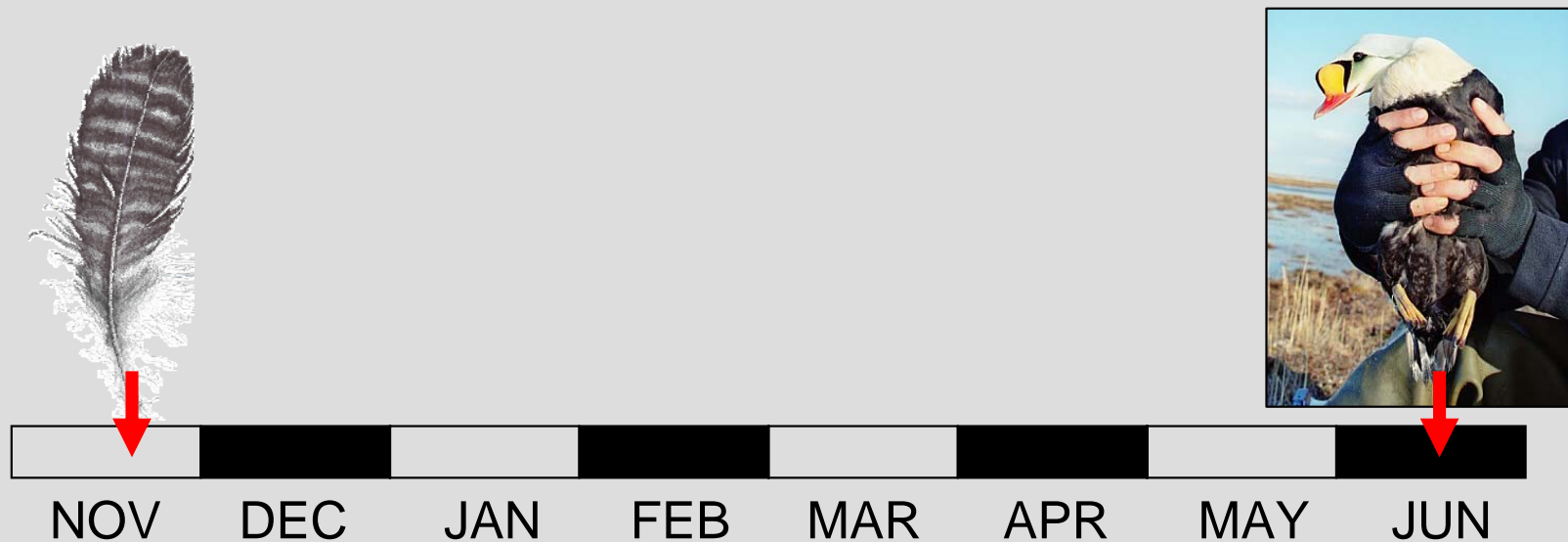
- Seabird distribution at sea often poorly known
- capture is easy on breeding grounds
- external markers often inefficient





Stable Isotope Ratios ($^{13}\text{C}/^{12}\text{C}$, $^{15}\text{N}/^{14}\text{N}$)

- reflect bird diet during feather synthesis
- isotope ratio does not change in feather



requires geographic variation




Question

Do feather ^{13}C and ^{15}N isotope ratios differ among regions in the Bering Sea?



King Eider wintering regions





Methods: model building

- collected one head feather from 32 King Eiders
- analyzed $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of head feathers
- equipped ducks with satellite transmitter
- discriminant function analysis to classify feathers





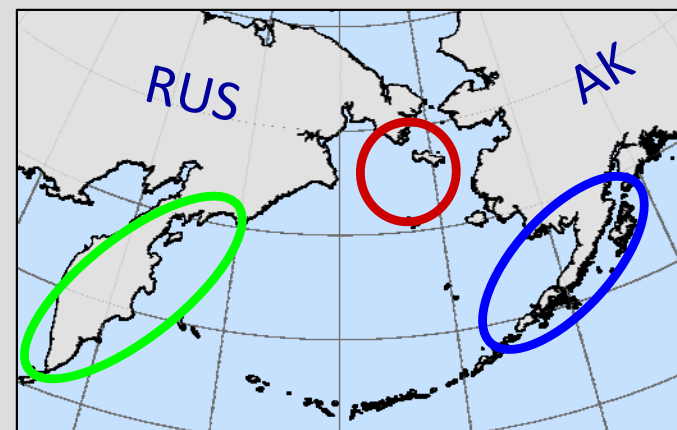
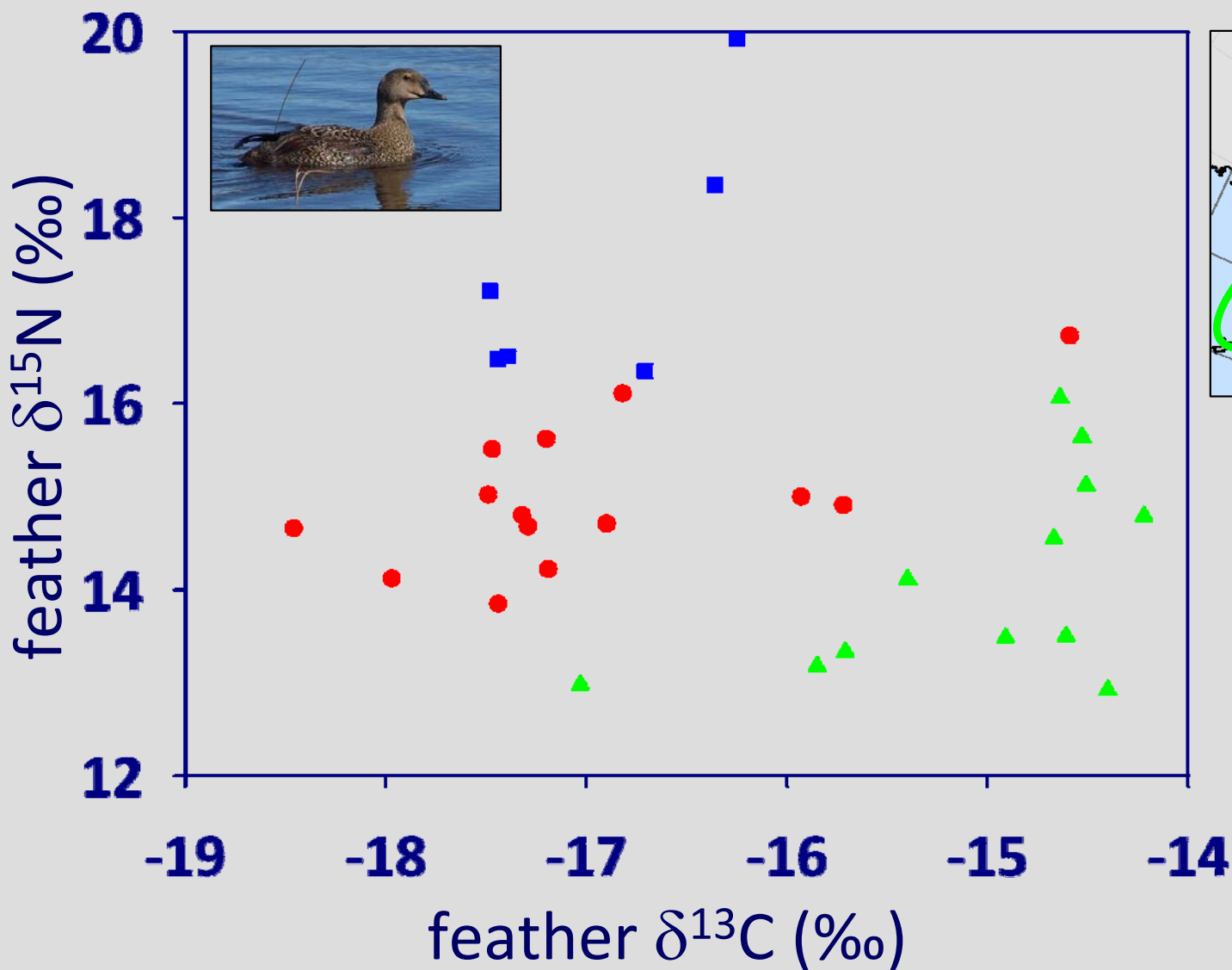
Methods: model application

- analyzed head feather $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of 94 unmarked King Eiders
- assigned birds to a region using model
- excluded feathers with <75% probability




Results: feathers of satellite tracked birds

head feathers from 32 satellite-tracked King Eiders

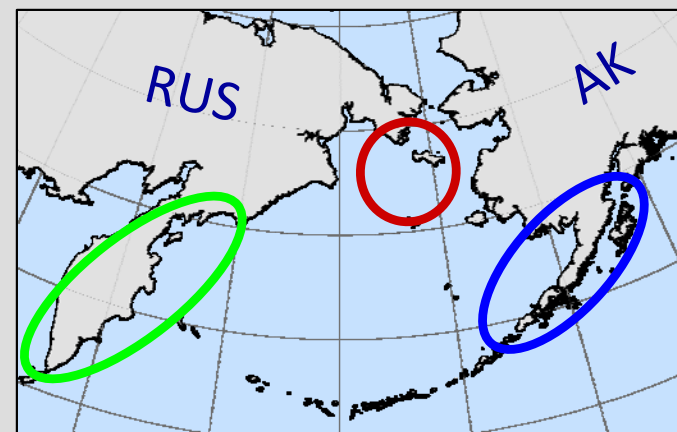
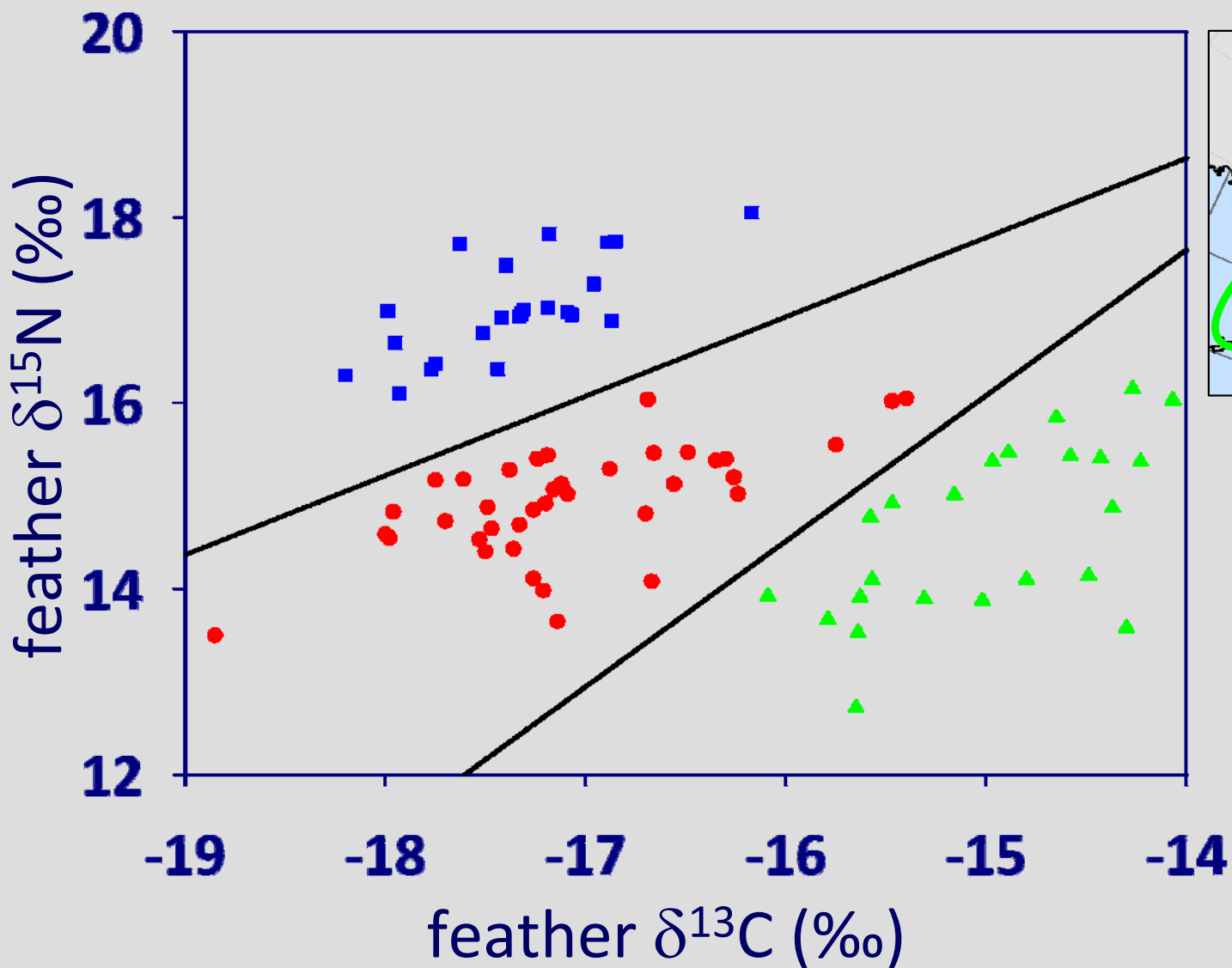


Classification
accuracy =
88 %




Results: feathers of unknown origin

head feathers from 94 unmarked King Eiders

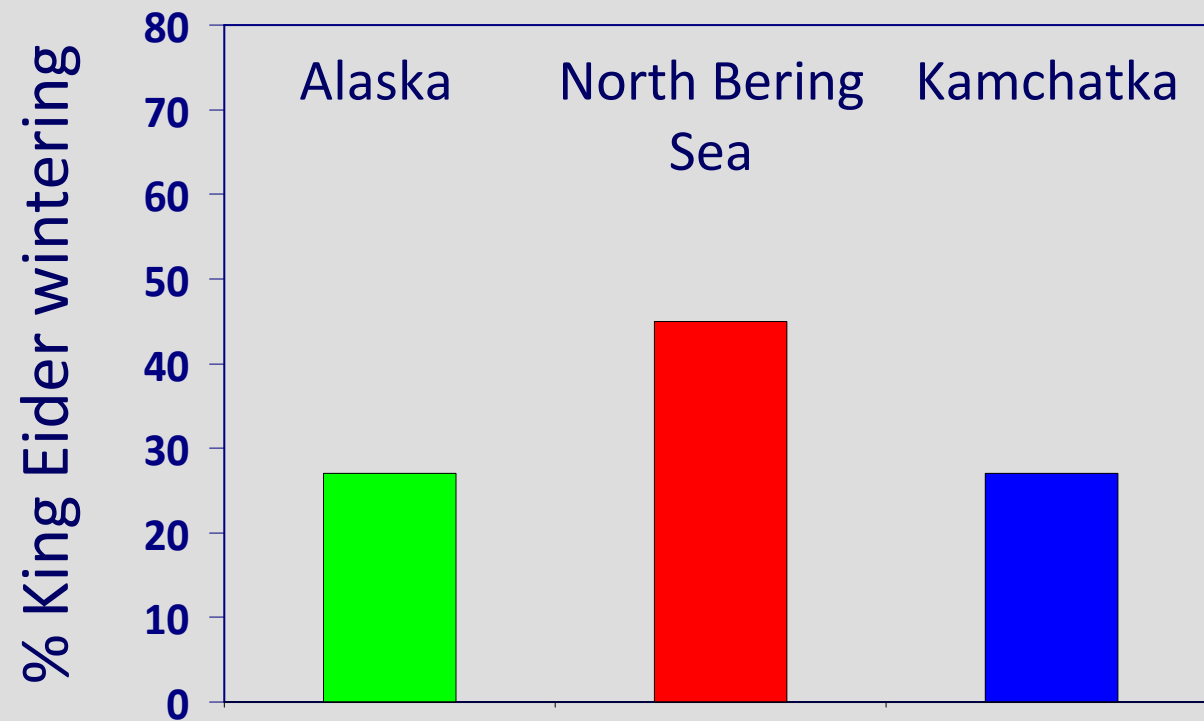


11% of
feathers not
reliably
classified

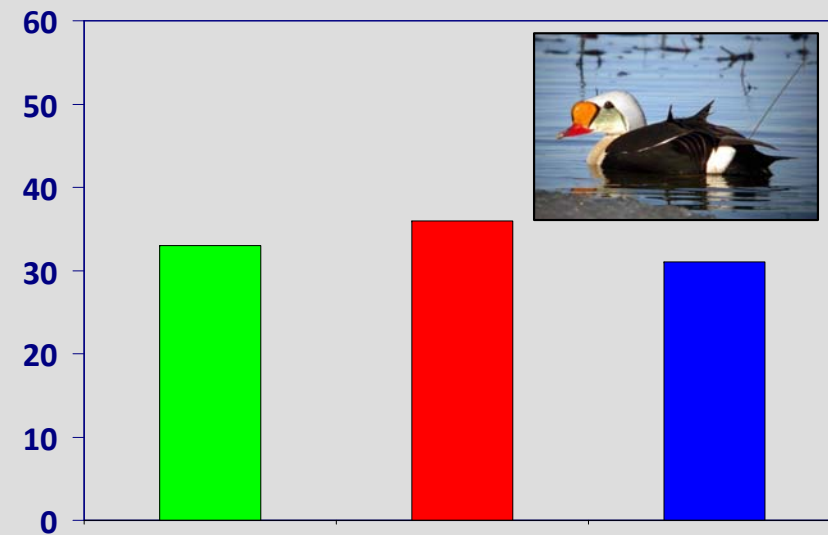


Results: feathers of unknown origin

winter distribution across regions



Satellite telemetry data 2002-2008
($n = 88$ adult King Eiders):





Discussion

- regions in Bering Sea isotopically distinct
- reliable technique to identify spatial distribution





Future research

- isotope signatures of offshore regions?
- similar pattern for pelagic foragers?





Acknowledgments

Minerals Management Service

US Fish and Wildlife Service

Sea Duck Joint Venture

Coastal Marine Institute

North Slope Borough

ConocoPhillips, AK

US Geological Survey

ABR, Inc.

Alaska Stable Isotope Facility

Troy Ecological Research Associates, Inc.

Alaska Cooperative Fish and Wildlife Research Unit

Mike Knoche
Chris Latty
Rebecca Bentzen
Robert Suydam
Sumiyo Sekine
Micah Miller
Diane O'Brien

....and many field assistants





Questions?

<http://mercury.bio.uaf.edu/kingeider>



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