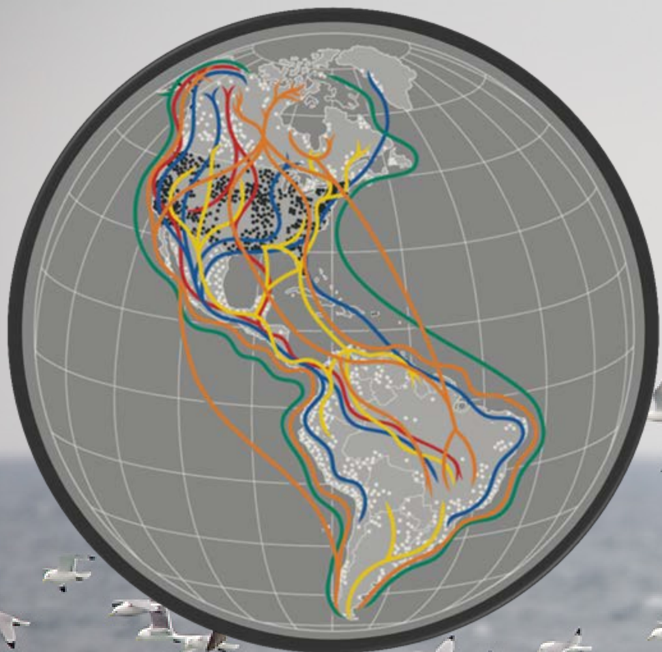


Data to Design: Identifying Important Bird Areas and Seabird Connectivity in the Alaskan Arctic

Melanie Smith, Audubon Alaska

image: Milo Burcham

Overview

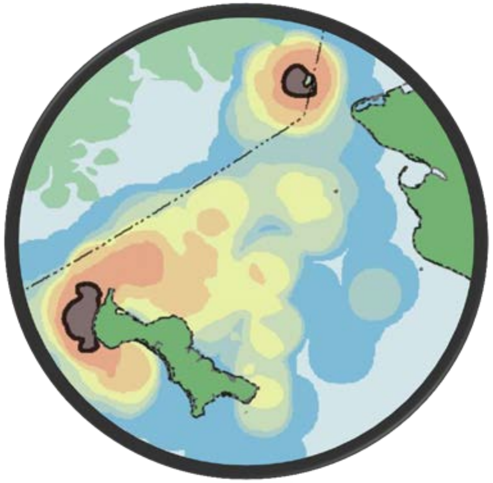
- Process from data to designing Important Bird Areas (IBAs)
- Three main analyses for seabird data
- Challenges related to connectivity

Data to Design

Data Gathering
Identify available data
Acquire and organize

Data Synthesis
Spatial analysis
Draw area boundaries

Conservation Design
Composite maps
Connectivity



Audubon

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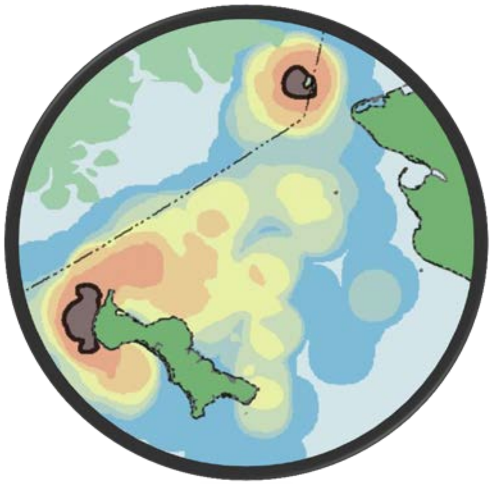
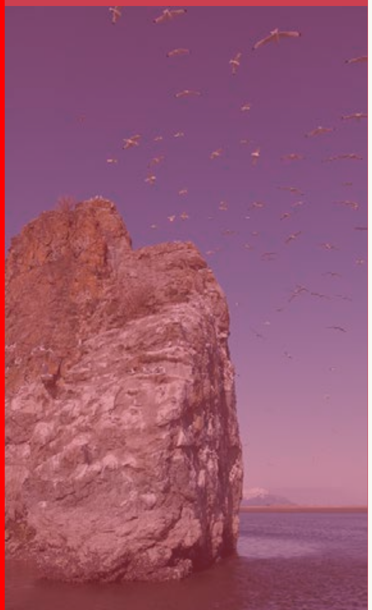
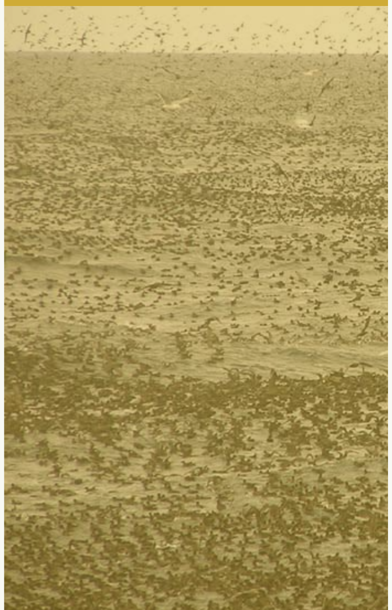


Identify Available Data

Audubon

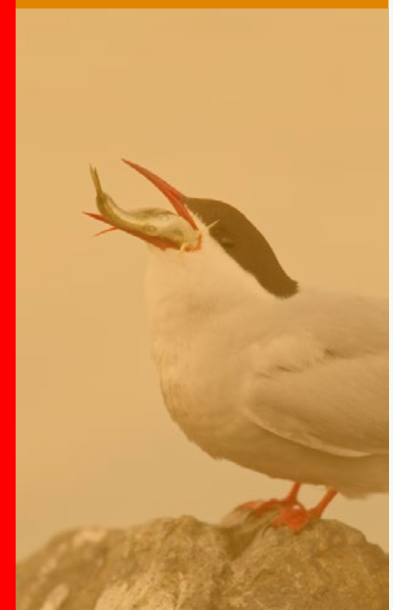


Colony
- Census count



Survey Transects
- Ship-based
- Aerial

Telemetry
- PTT
- GPS
- Geolocator



Expert
- Ecological, local, traditional knowledge

Genetic
- Genetic markers
- Isotopes

images: Milo Burcham, USFWS

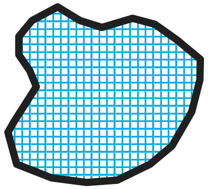
Audubon

Connecting the Annual Cycle

	Colony	Survey	Tracking
Breeding	x	x	x
Foraging	x	x	x
Staging		x	x
Molting		x	x
Wintering		x	x

Important Bird Areas =

- 1% or more of global or biogeographic population OR
- Congregation of species of special concern



Audubon

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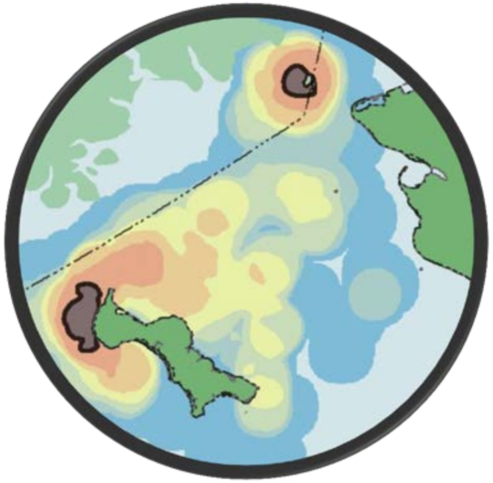

Acquire and Organize

Audubon

Survey Transect

Telemetry

Colony

Contents | Preview | Description

Name	Type
Bathymetric	File Geodatabase Feature Dataset
Beluga_Whale	File Geodatabase Feature Dataset
Birds	File Geodatabase Feature Dataset
Bowhead_Whale	File Geodatabase Feature Dataset
Ecosystem_Analysis	File Geodatabase Feature Dataset
Energy	File Geodatabase Feature Dataset
Gray_Whale	File Geodatabase Feature Dataset
Marine_Mammals	File Geodatabase Feature Dataset
Polar_Bear	File Geodatabase Feature Dataset
Ringed_Seal	File Geodatabase Feature Dataset
Spotted_Seal	File Geodatabase Feature Dataset
Walrus	File Geodatabase Feature Dataset
benthic_biomass_g_m2	File Geodatabase Raster Dataset
Birds_Int_Glob_Sig_Prop	File Geodatabase Raster Dataset
IBCAO_GEBCO_blendedDEM	File Geodatabase Raster Dataset
IBCAO_GEBCO_hlsd	File Geodatabase Raster Dataset
IBCAO_v3	File Geodatabase Raster Dataset
pct_days_ice_Annual_Average_2008_2012	File Geodatabase Raster Dataset
pct_days_ice_Apr_June_2008_2012	File Geodatabase Raster Dataset
pct_days_ice_Jan_Mar_2008_2012	File Geodatabase Raster Dataset
pct_days_ice_July_Sept_2008_2012	File Geodatabase Raster Dataset
pct_days_ice_Oct_Dec_2008_2012	File Geodatabase Raster Dataset
PolarBear_autumn_mean_scaled	File Geodatabase Raster Dataset
PolarBear_spring_mean_scaled	File Geodatabase Raster Dataset
PolarBear_summer_mean_scaled	File Geodatabase Raster Dataset
PolarBear_winter_mean_scaled	File Geodatabase Raster Dataset
Primary_Productivity_mg_m3	File Geodatabase Raster Dataset

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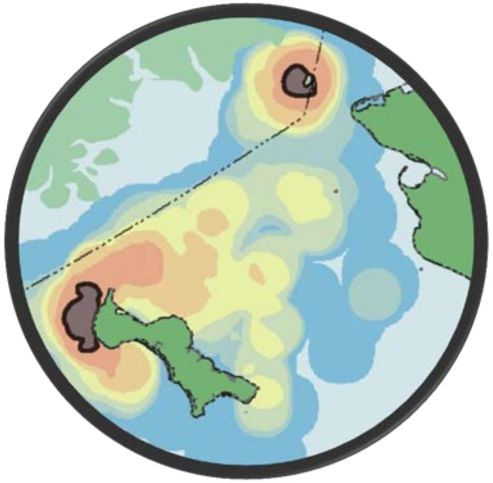


Analytical approaches
- Foraging radius
- Survey data
- Tracking data

Spatial Analysis

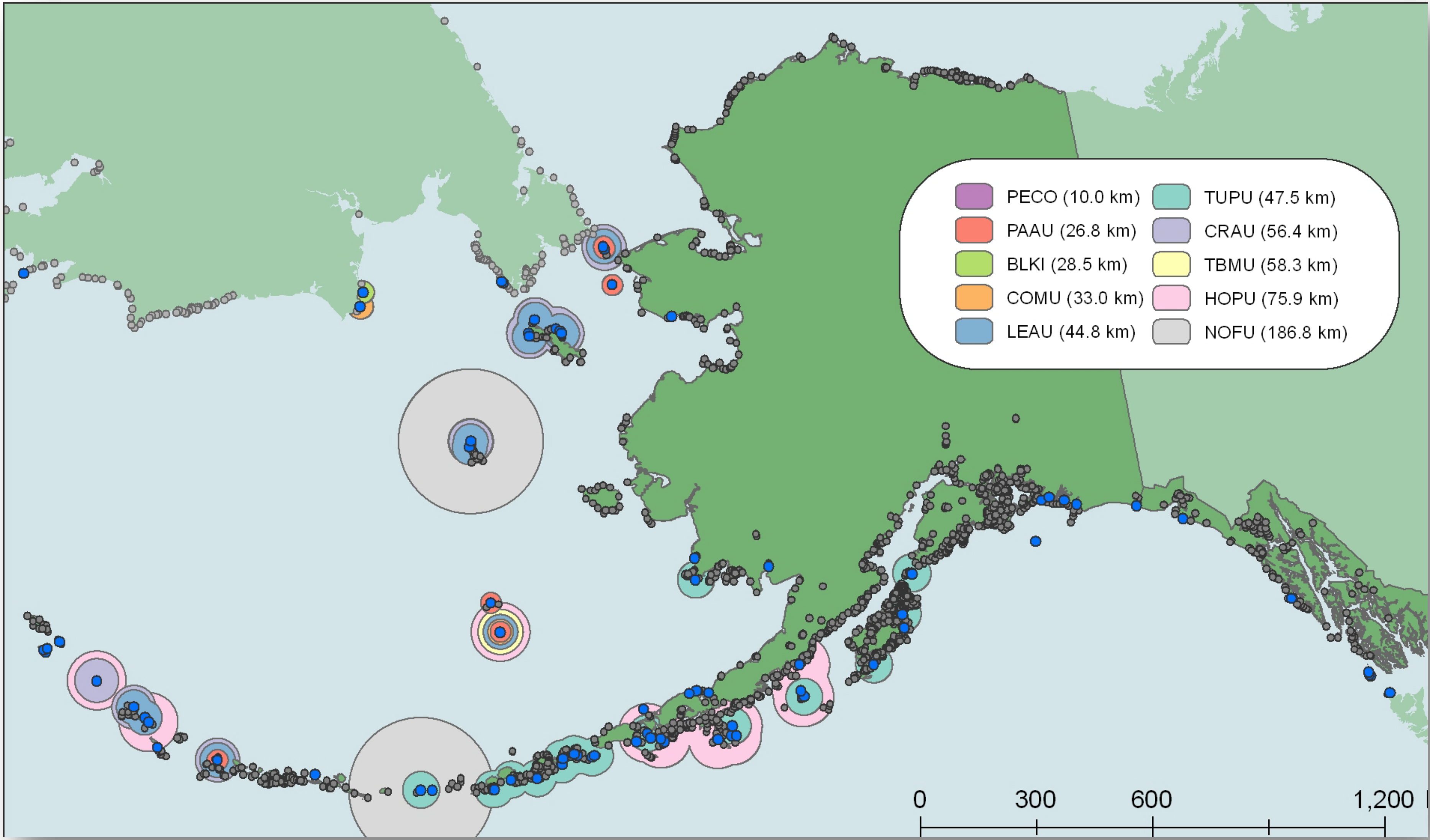
Audubon

Common Name	Country	Site Name	Observed Foraging Distance	Avg. Average	Avg. Maximum	Max. Maximum
....	....	....	....	....	....	....
....	....	....	....	....	....	....
Thick-Billed Murre	Iceland	Latrabjarg	max 168km		168	168
Thick-Billed Murre	Greenland	Hakluyt Island	max 50km, avg 20-25km	22.5	50	50
Thick-Billed Murre	Greenland	Hakluyt Island	within 50km		50	50
Thick-Billed Murre	Norway	Western Spitsbergen	approx 85km	85		
Thick-Billed Murre			30-50km, max 100km	40	100	100
Thick-Billed Murre	US	Alaska	8-104km	56	104	104
Thick-Billed Murre	US	Pribilof Islands, Alaska	up to 110km		110	110
Thick-Billed Murre	Canada	Prince Leopold Island	avg 80km, max 150-175km	80	162.5	175
Thick-Billed Murre	Canada	Coats Island	c100km	100		
Thick-Billed Murre	Atlantic		normal 2-25km, max 75km	13.5	75	75
....	....	....	....	....	....	....
....	....	....	....	....	....	....

Foraging Radius Approach

Soanes et al. 2016, *Biological Conservation*

Spatial Analysis



COLONY FORAGING DISTANCE BUFFERS

The average foraging radius for all seabird species listed in the BLI database

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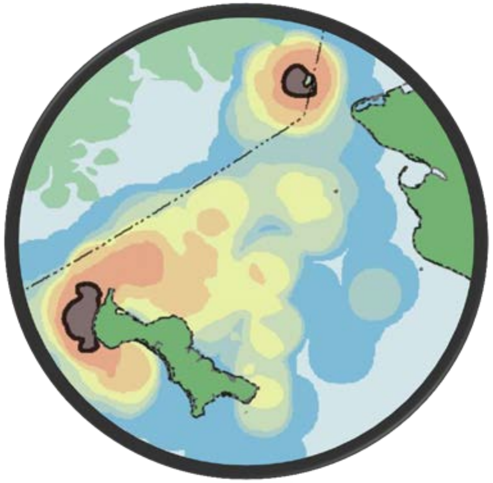

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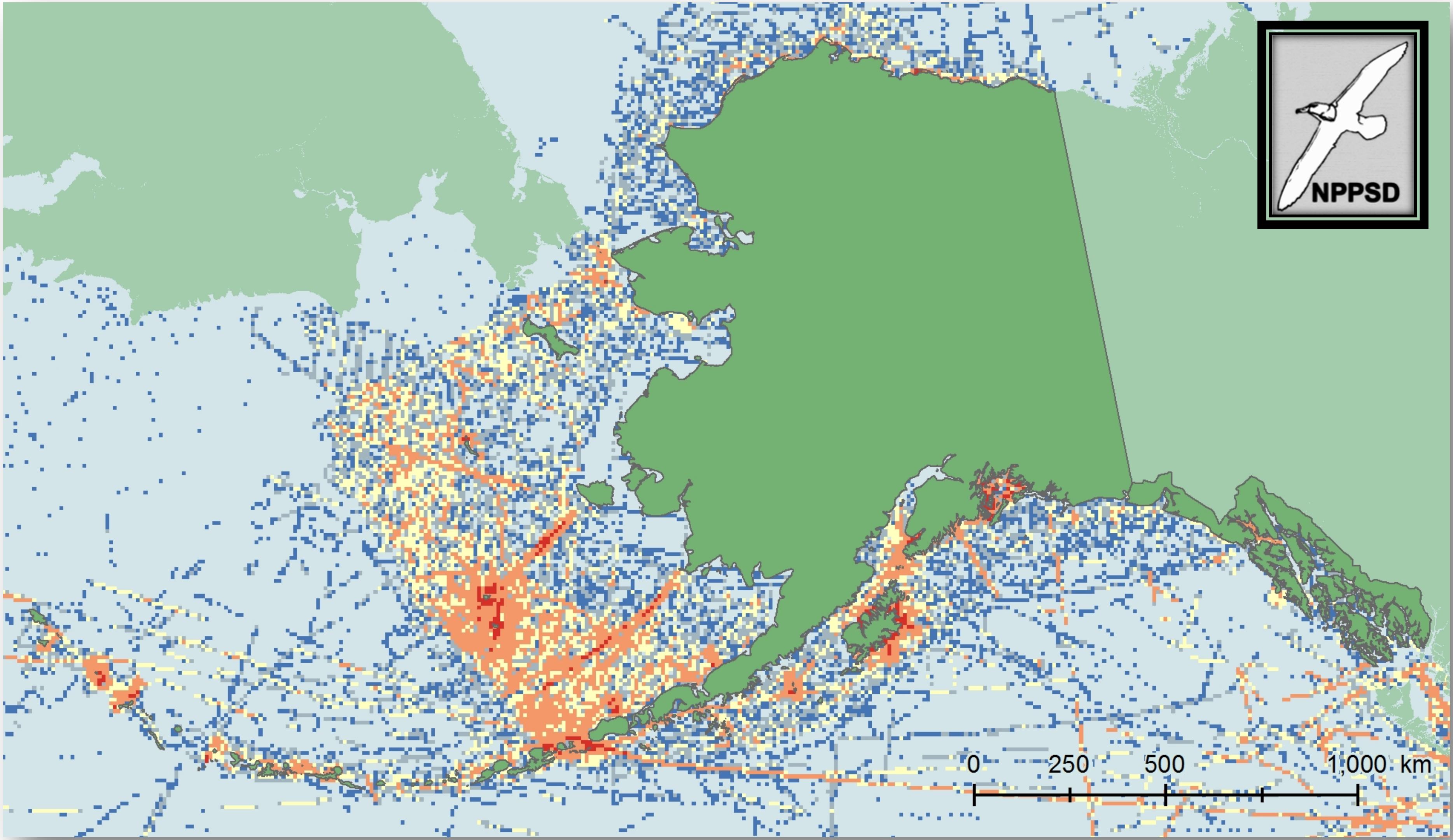
Spatial Analysis

Audubon

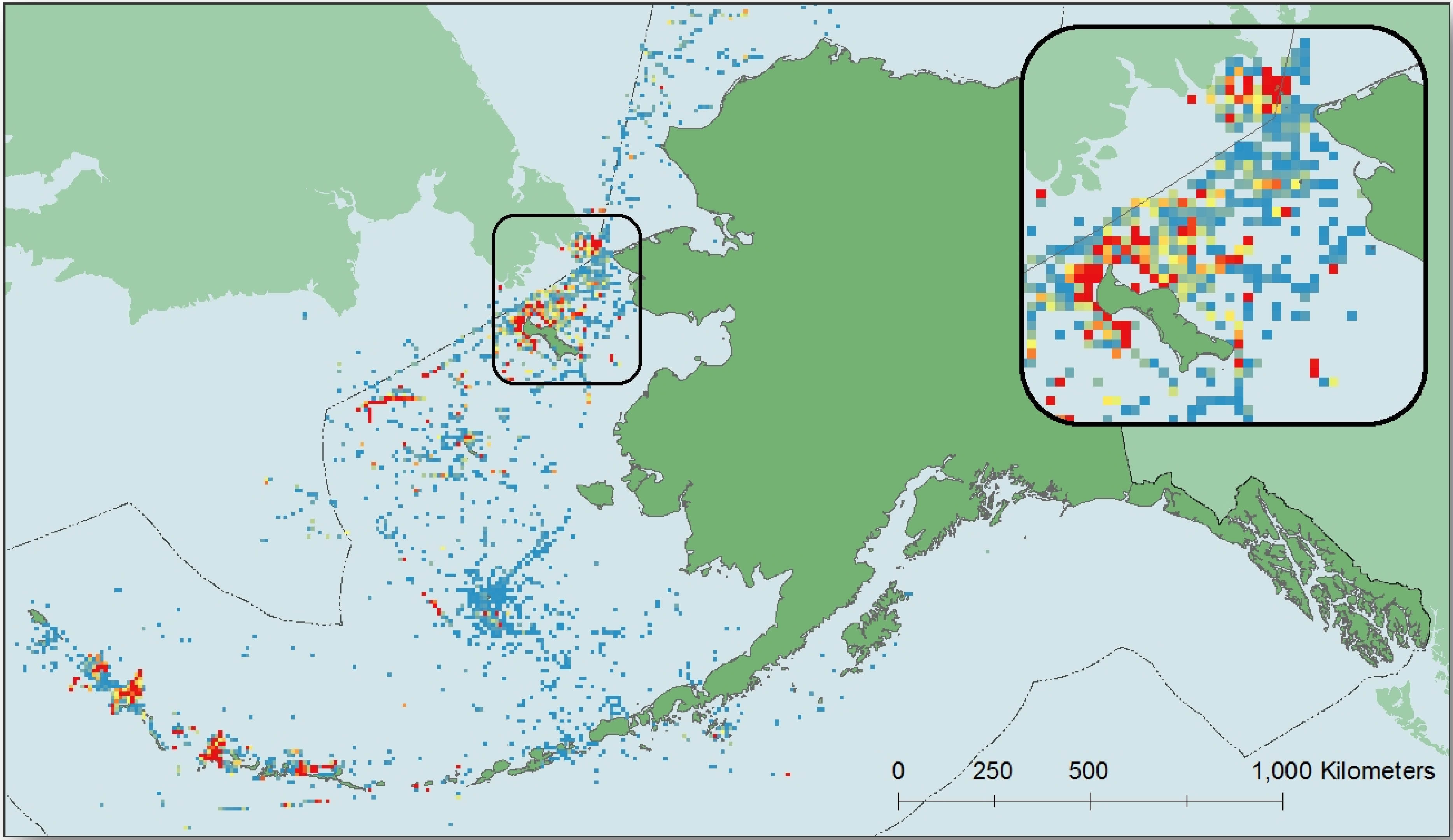


Survey Data Approach

Smith et al. 2014, *Biological Conservation*

Spatial Analysis

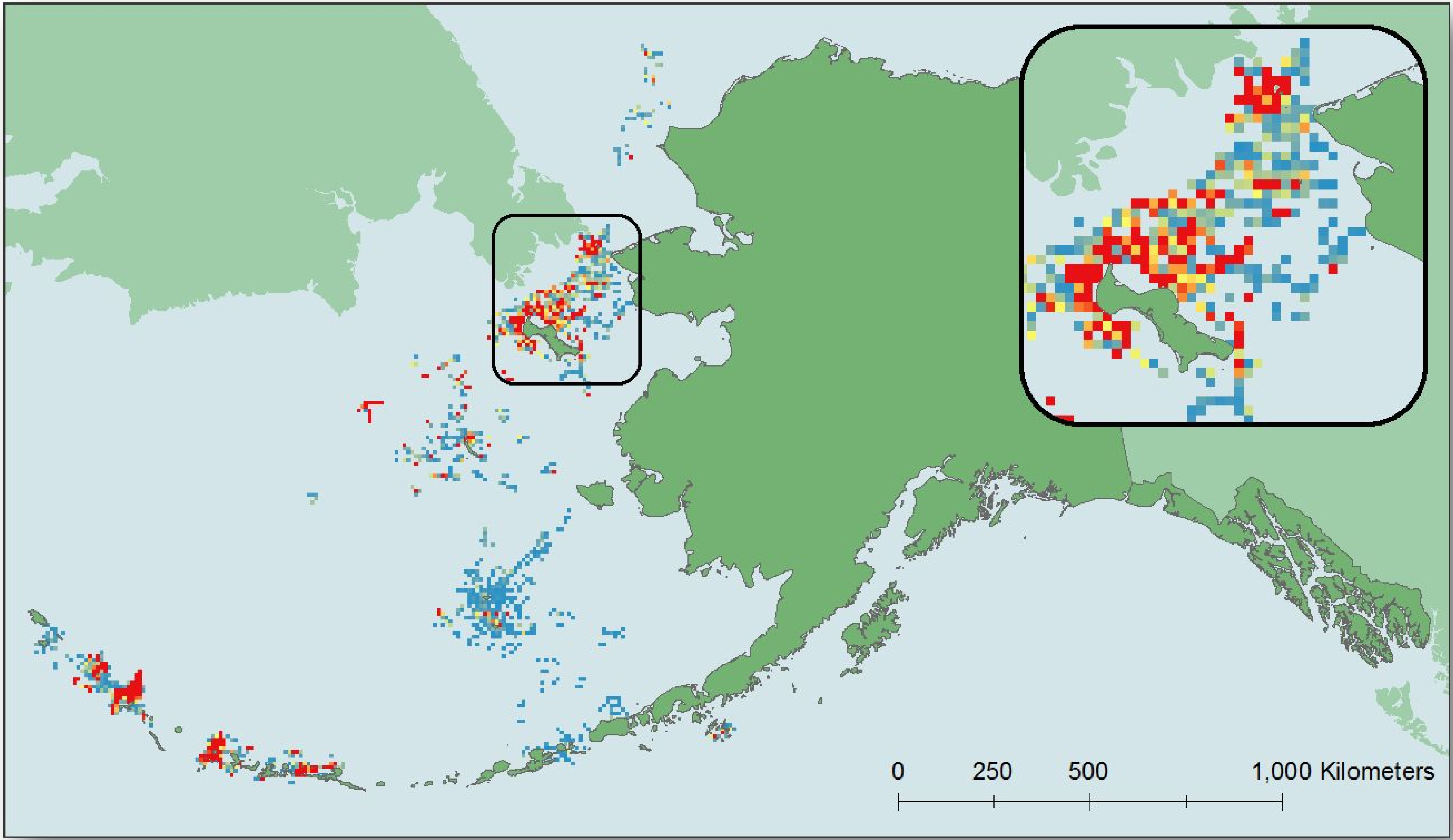
Audubon



PRESENCE
The distribution of Crested Auklet data

Spatial Analysis

Audubon

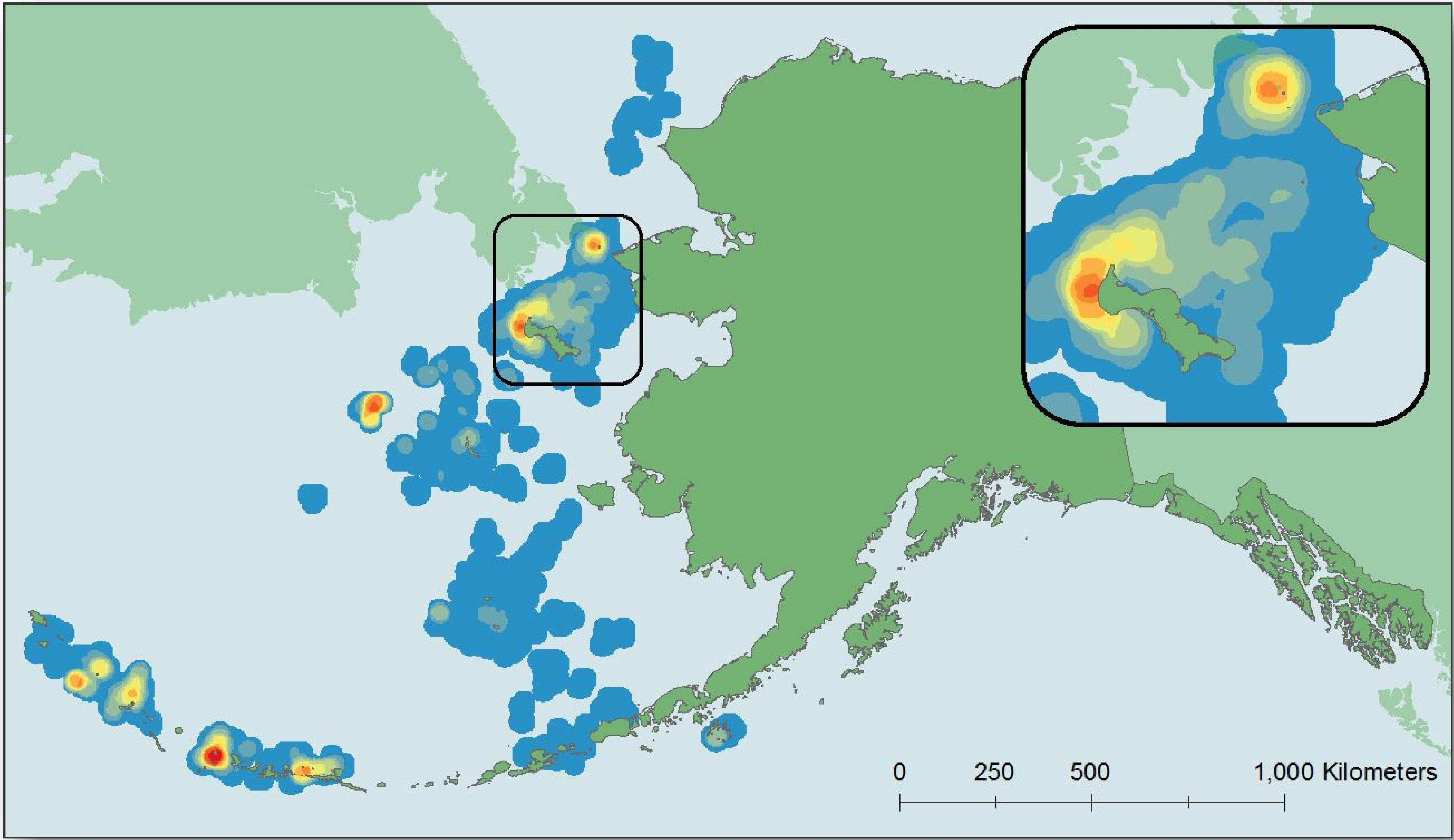


PERSISTENT, ADJACENT

Data that will be used for hotspot analysis of Crested Auklets

Spatial Analysis

Audubon

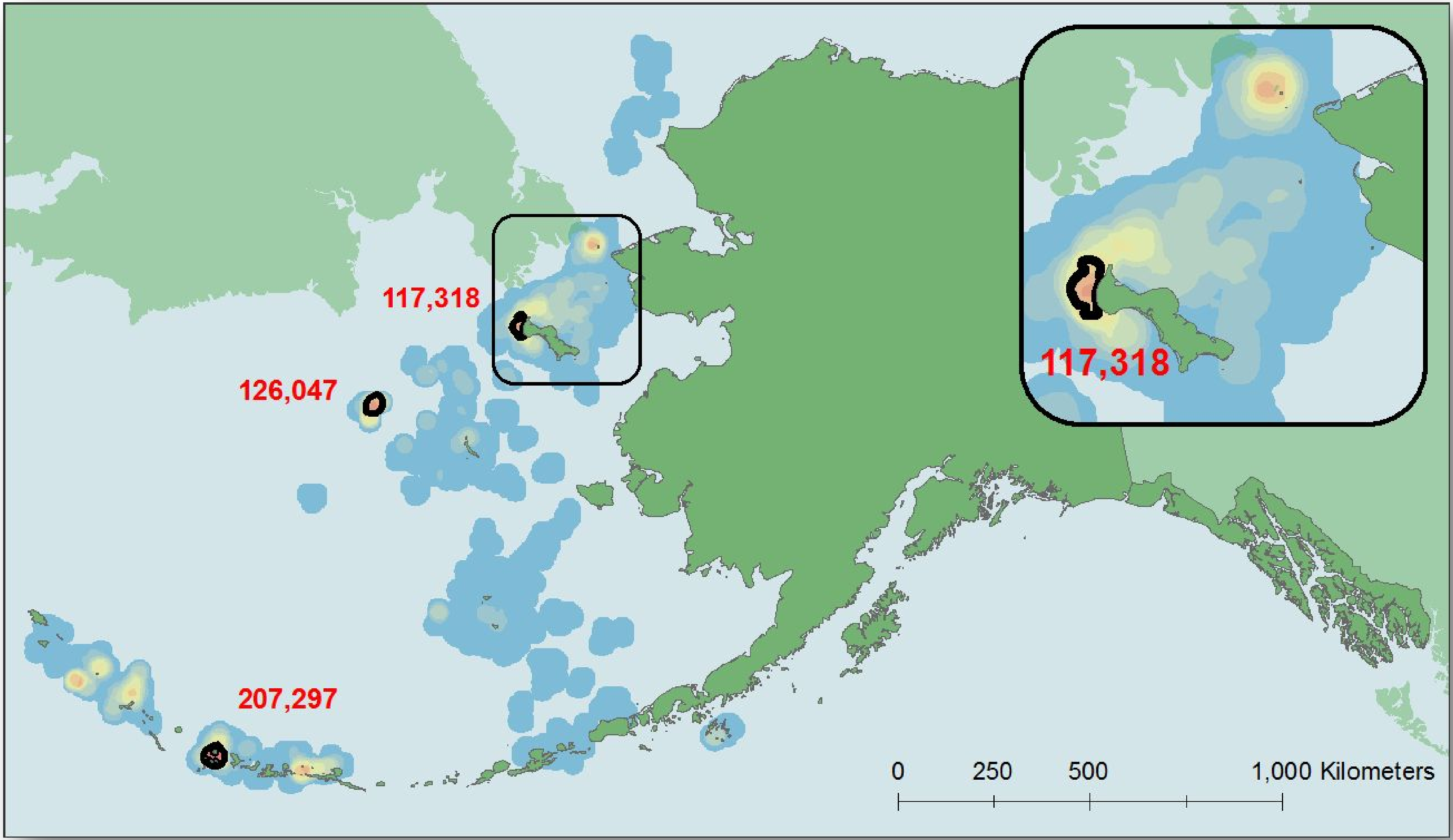


ANALYZE LOCAL ABUNDANCE

Results of the hotspot analysis for Crested Auklet

Spatial Analysis

Audubon



VALIDATE IBAs

Adequate abundance, repeated high use, multi-year persistence

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Data Gathering
Identify available data
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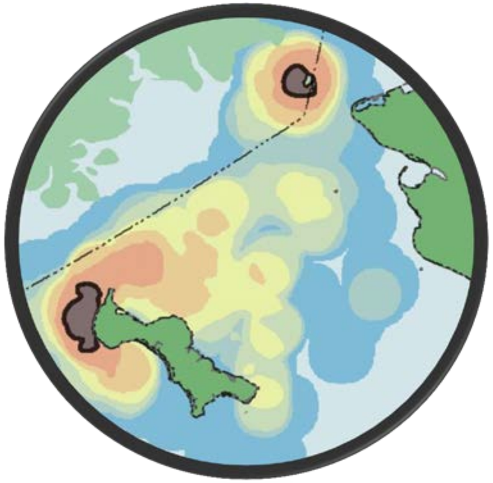
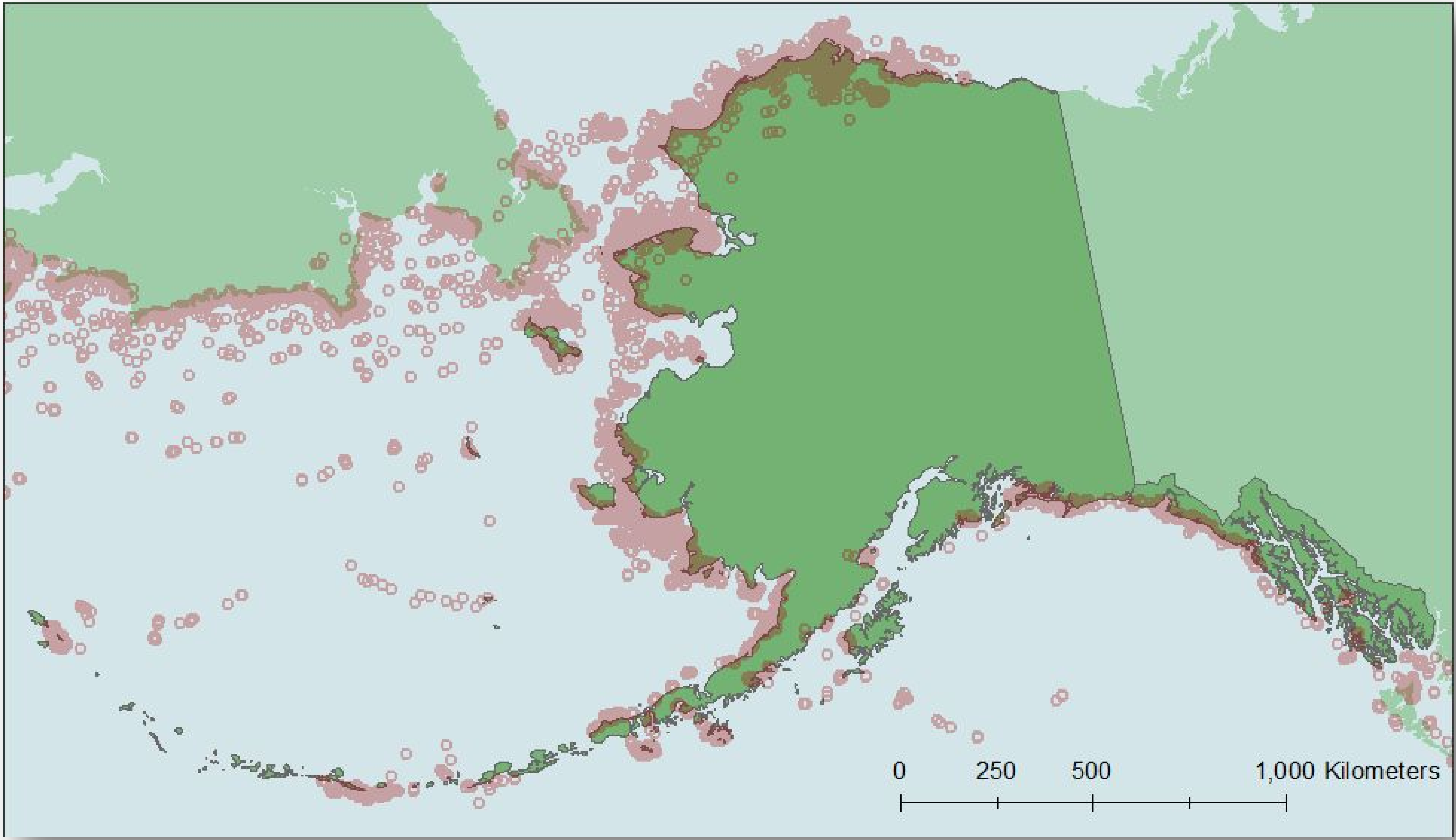


Data Synthesis
Spatial analysis
Draw area boundaries

Analytical approaches

- Foraging radius
- Survey data
- Tracking data

Spatial Analysis

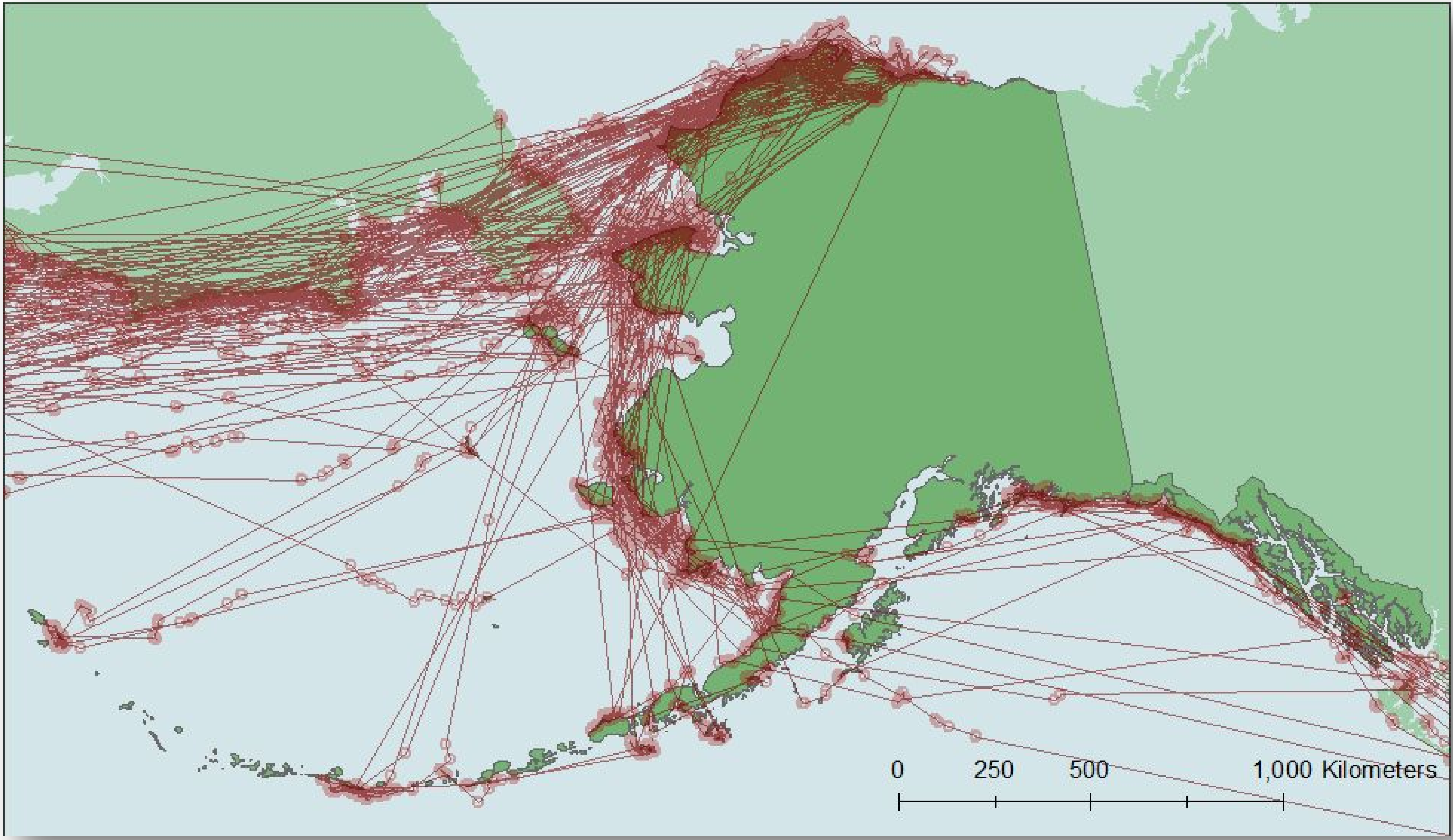


Tracking Data Approach

Lascelles et al. 2016, *Diversity and Distributions*

Spatial Analysis

Audubon

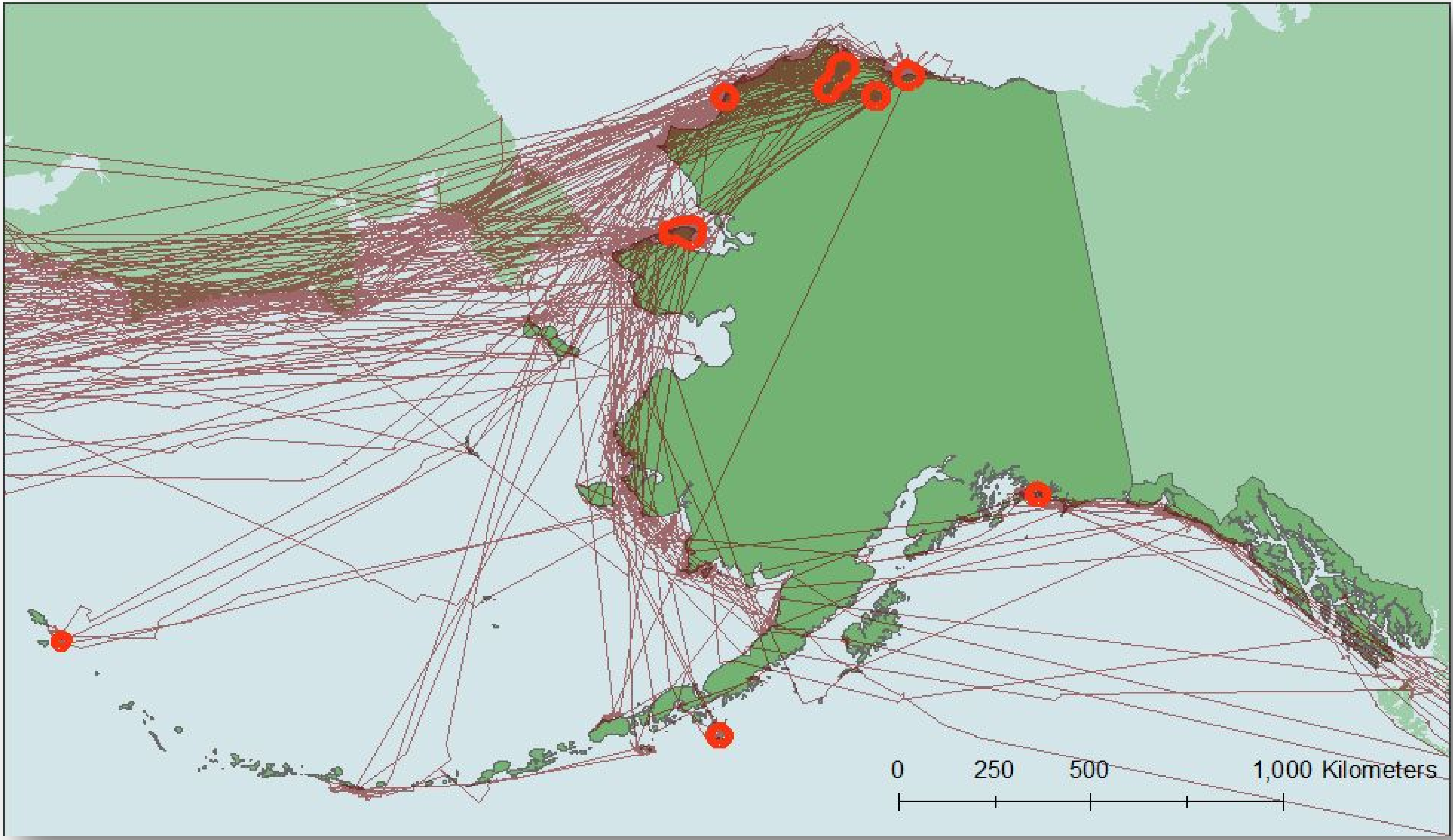


CONNECT TRIPS

Map trips by individual, combine for population-level overview

Spatial Analysis

Audubon



IDENTIFY IBAs

Validation steps to ensure representation of population patterns

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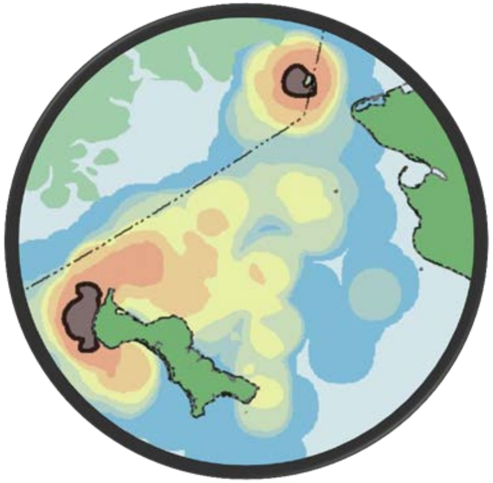
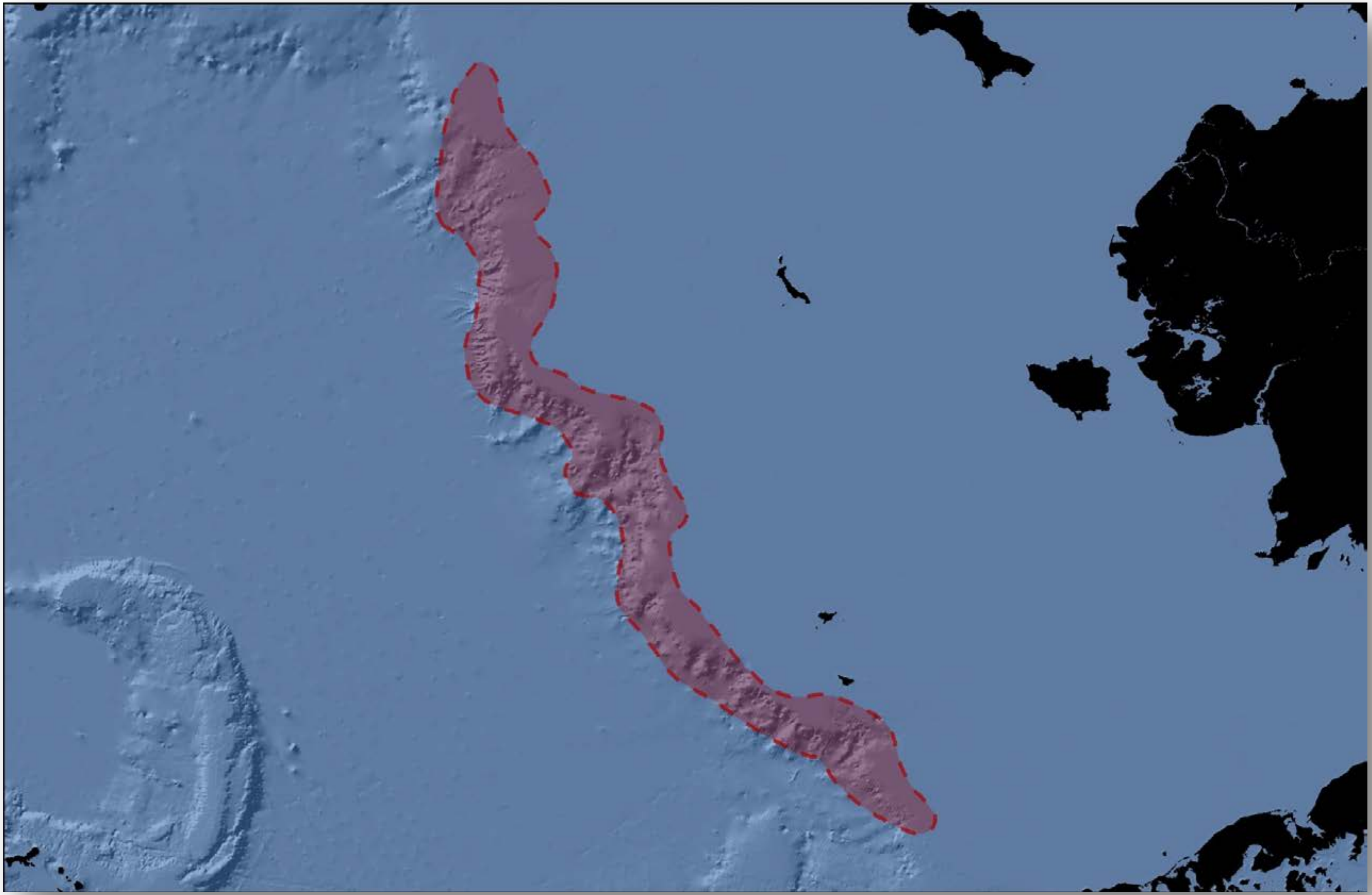


Drawing Area Boundaries :)

Audubon

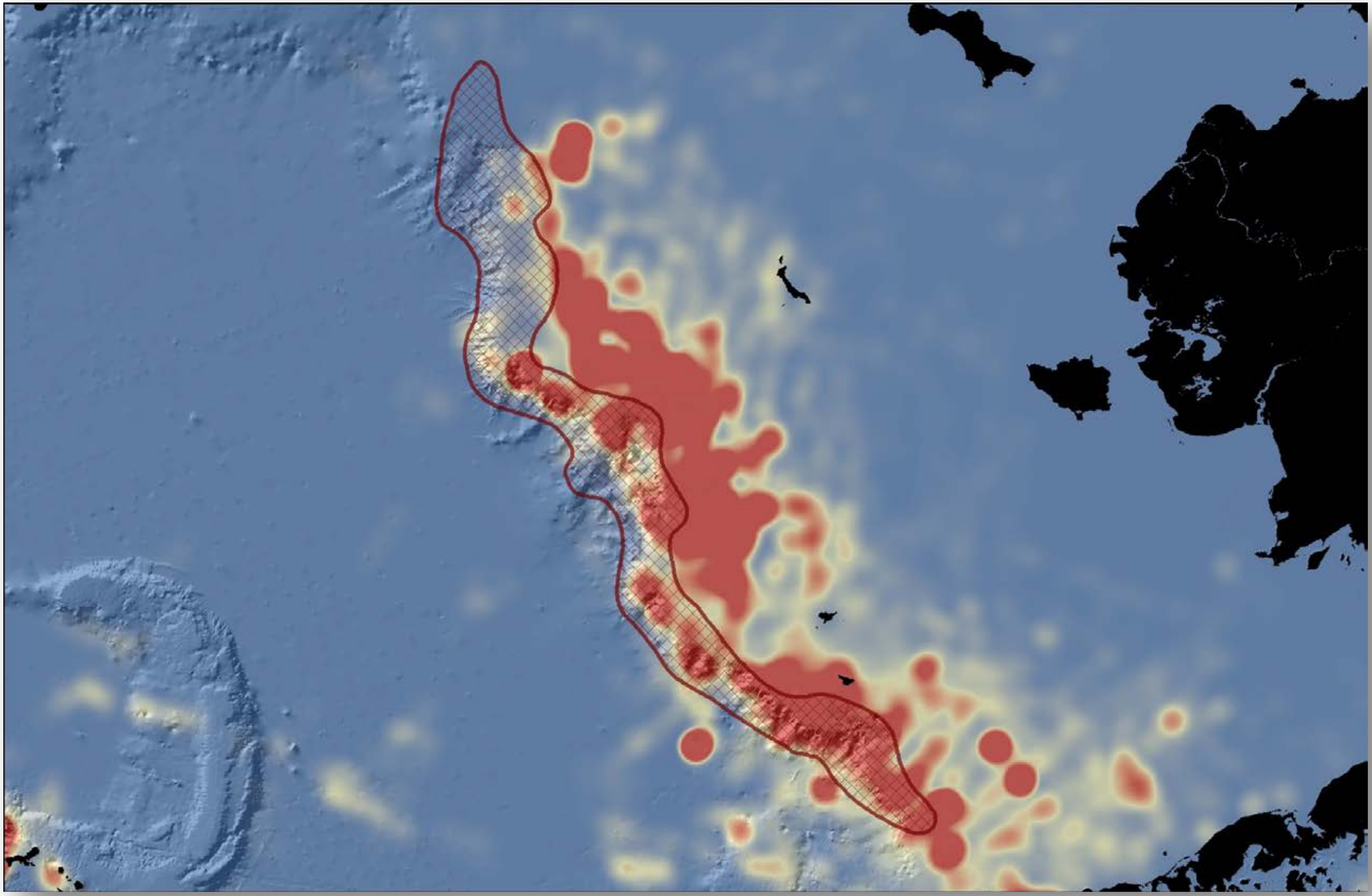


Bering Sea Shelf Break

Expert Drawn

Drawing Area Boundaries

Audubon

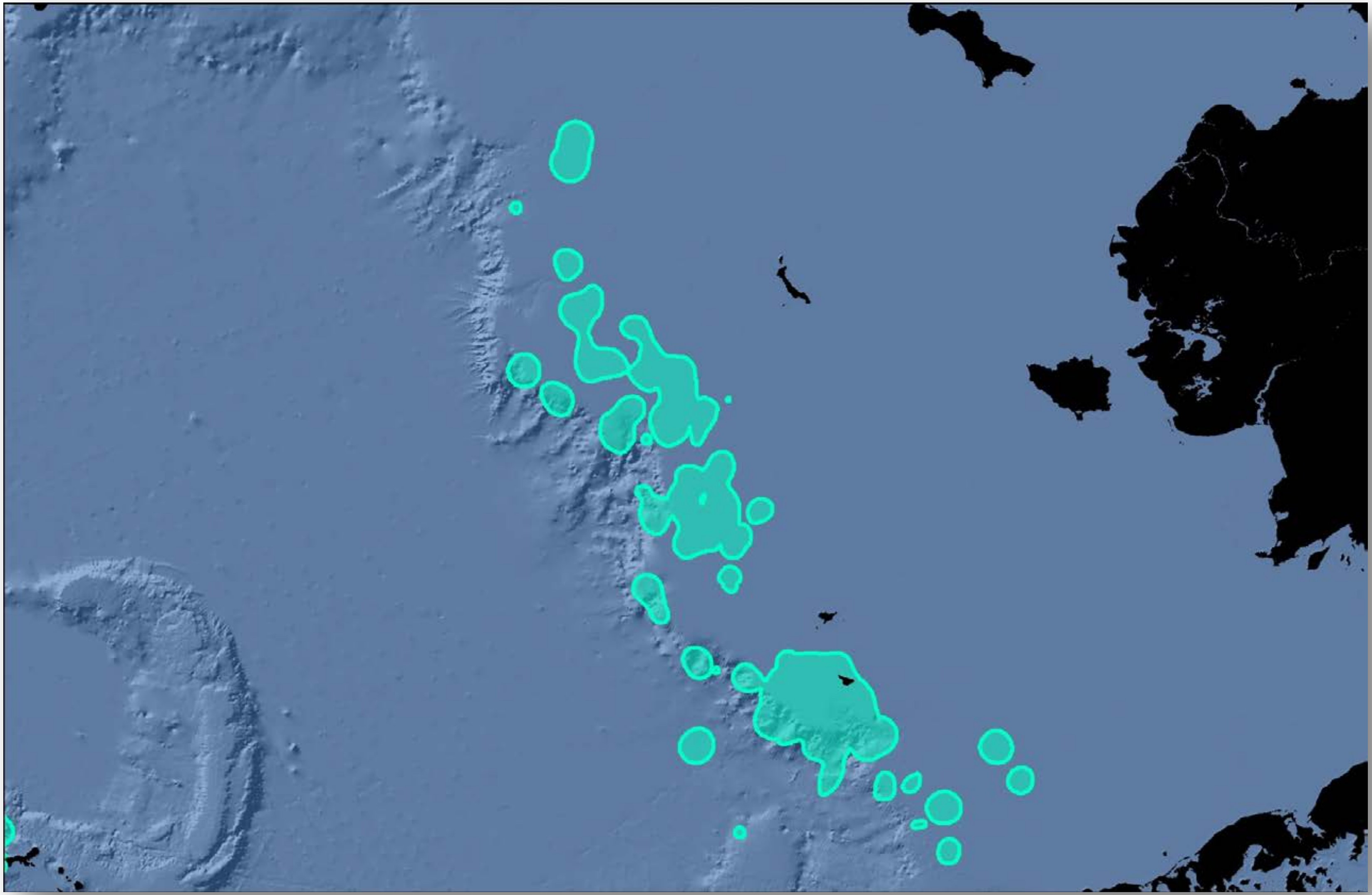


Bering Sea Shelf Break

Expert Drawn (survey data comparison)

Drawing Area Boundaries

Audubon

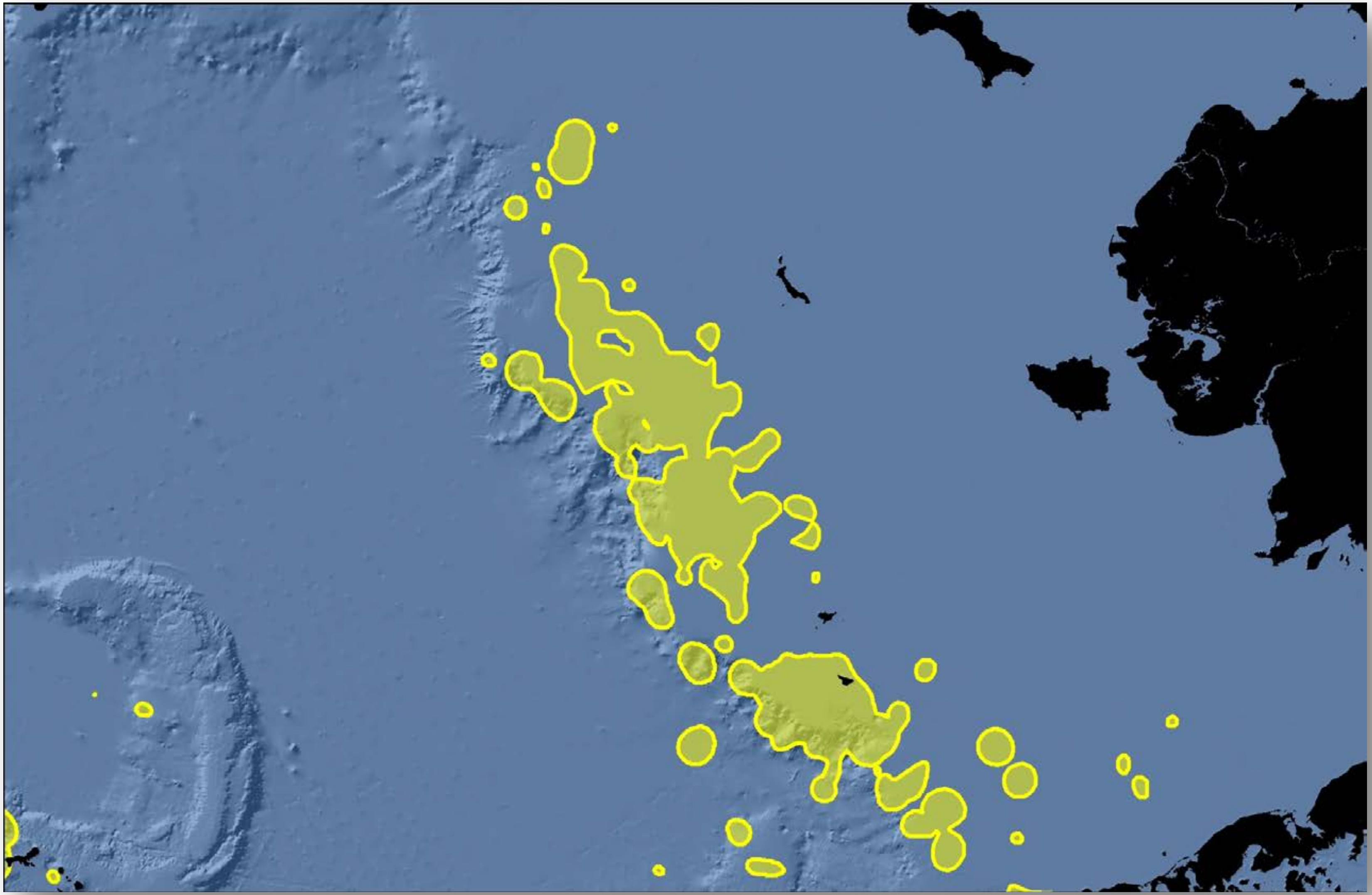


Bering Sea Shelf Break

Top Quantile

Drawing Area Boundaries

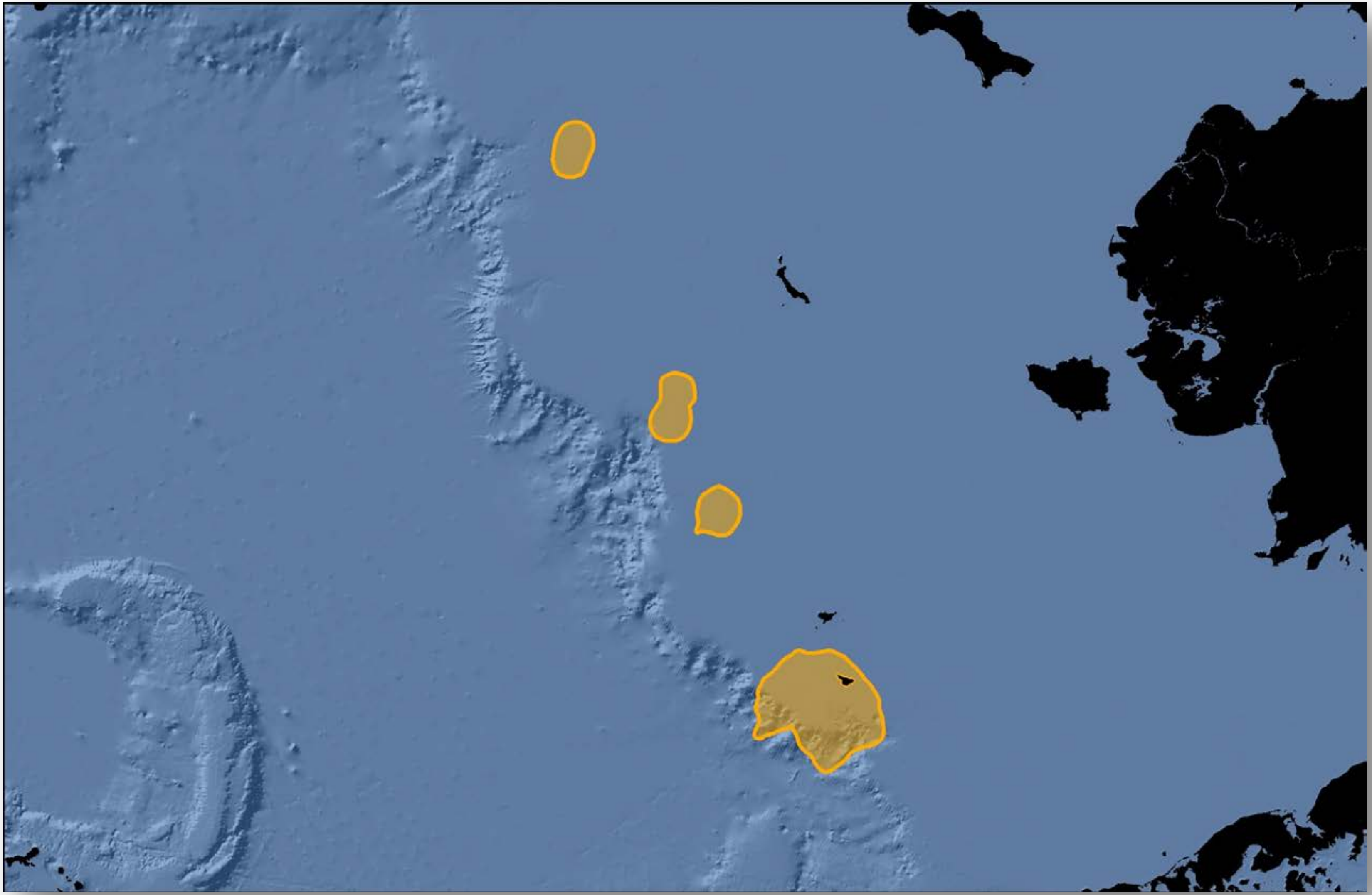
Audubon



Bering Sea Shelf Break

4x Average Density

Drawing Area Boundaries

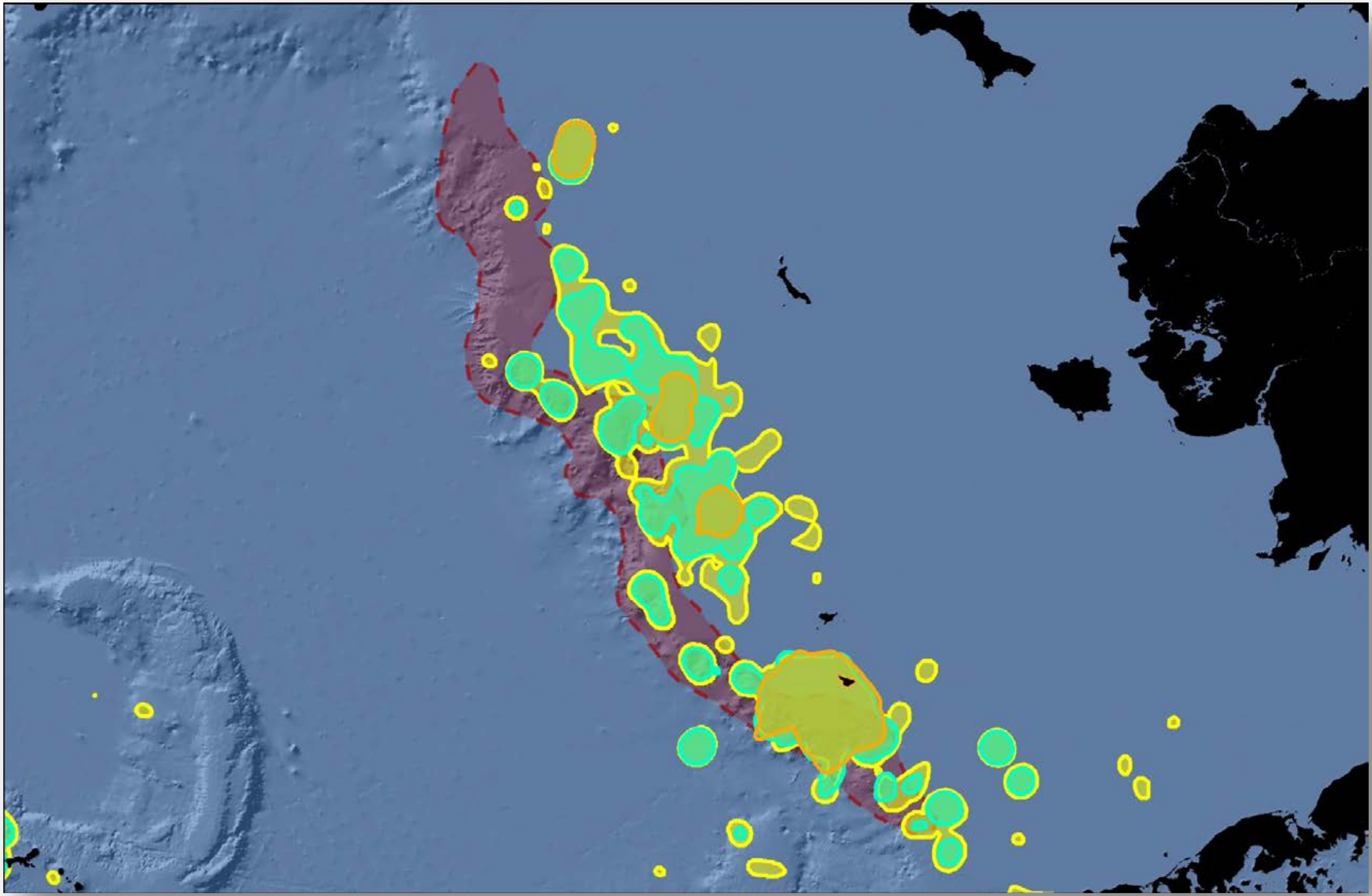


Bering Sea Shelf Break

Moving Window

Drawing Area Boundaries

:)



Bering Sea Shelf Break

Moving Window

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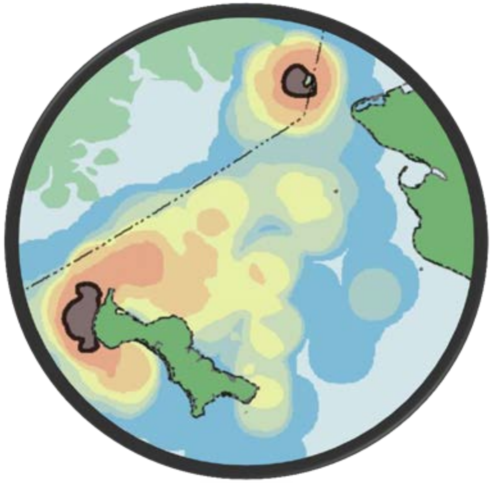
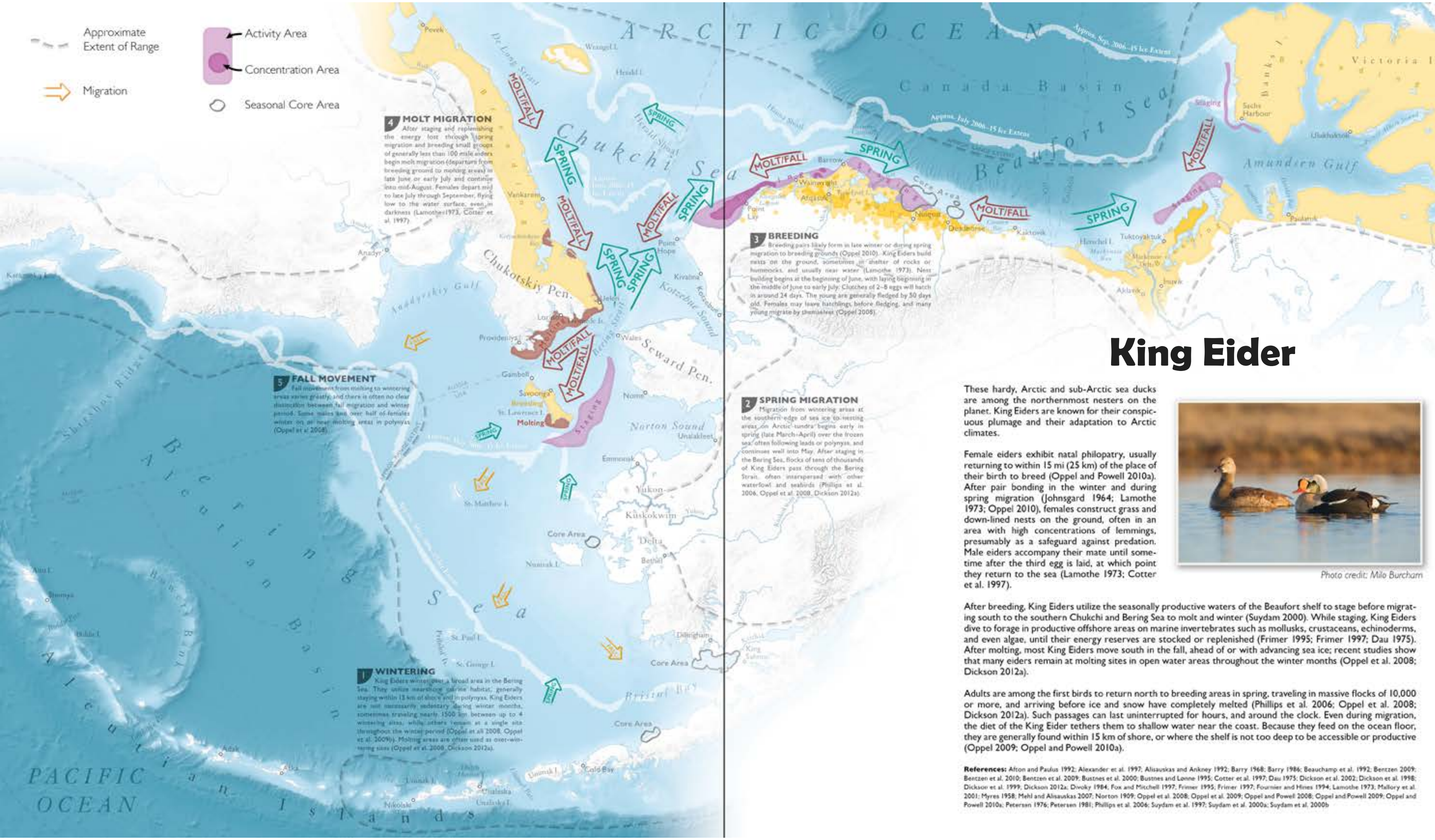


Composite Maps

Audubon



Composite Mapping Approach

Smith et al. 2017, *Ecological Atlas of the Bering, Chukchi, and Beaufort Seas*

Audubon

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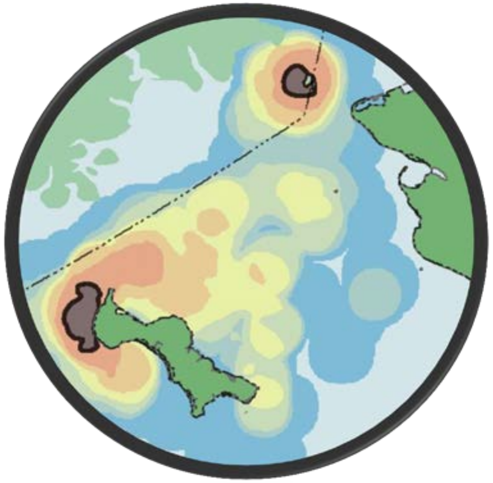


Audubon

CONNECTIVITY CHALLENGES

Connectivity is difficult to define

- Dynamic conditions
    - Daily to decadal variability
    - Shifting ice, productivity
- Focus on the most predictably occupied areas

image: Melanie Smith/USFWS

Connectivity is difficult to define

- Drawing boundaries
  - Marine environment lacks clear boundaries
  - Methods produce different lines
- <u>Experiment with methods and be aware of their implications for conservation area design</u>

CONNECTIVITY CHALLENGES

image: Melanie Smith/USFWS

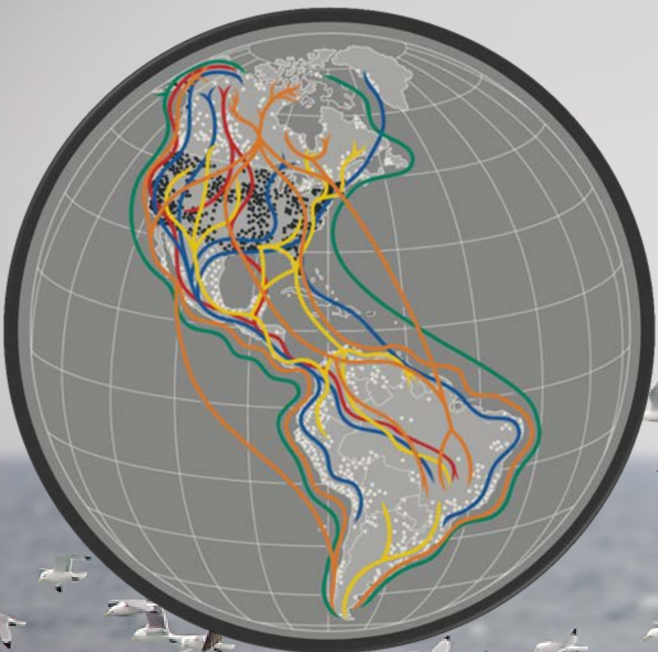
CONNECTIVITY CHALLENGES

Connectivity is difficult to define

- Species behave differently
  - Colonial seabirds tied to breeding colonies
  - Destination-oriented migrants with predictable stopovers
  - Pelagic wanderers following food
- Blend multiple data types and methods
- Look at the annual cycle holistically to identify connections

image: Melanie Smith/USFWS

Audubon



???

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image: Milo Burcham