Analysis of the cooperative mark-recapture database

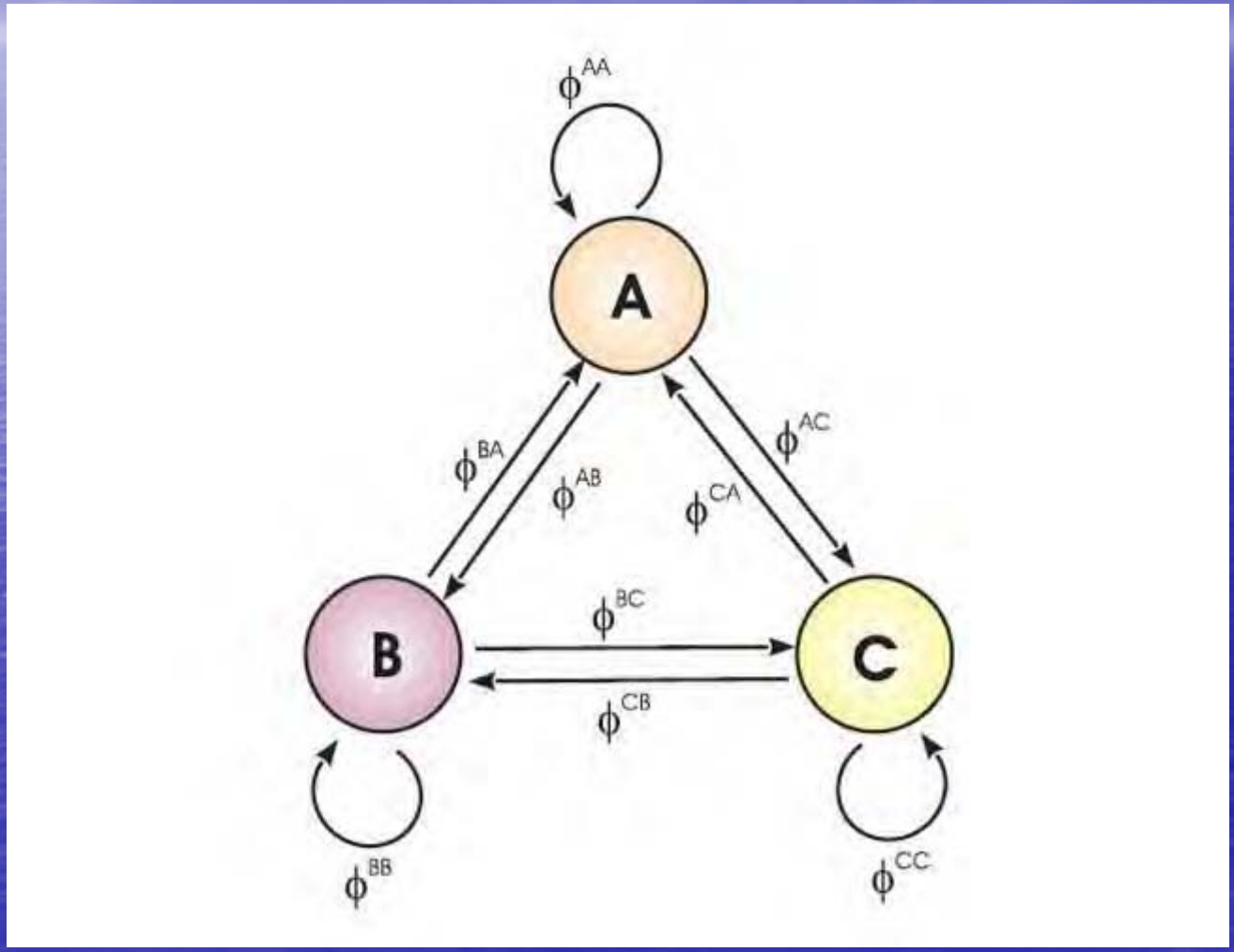
Outputs, limitations, and potential

Shiloh Schulte and Ted Simons
North Carolina State University
Raleigh, NC
27695

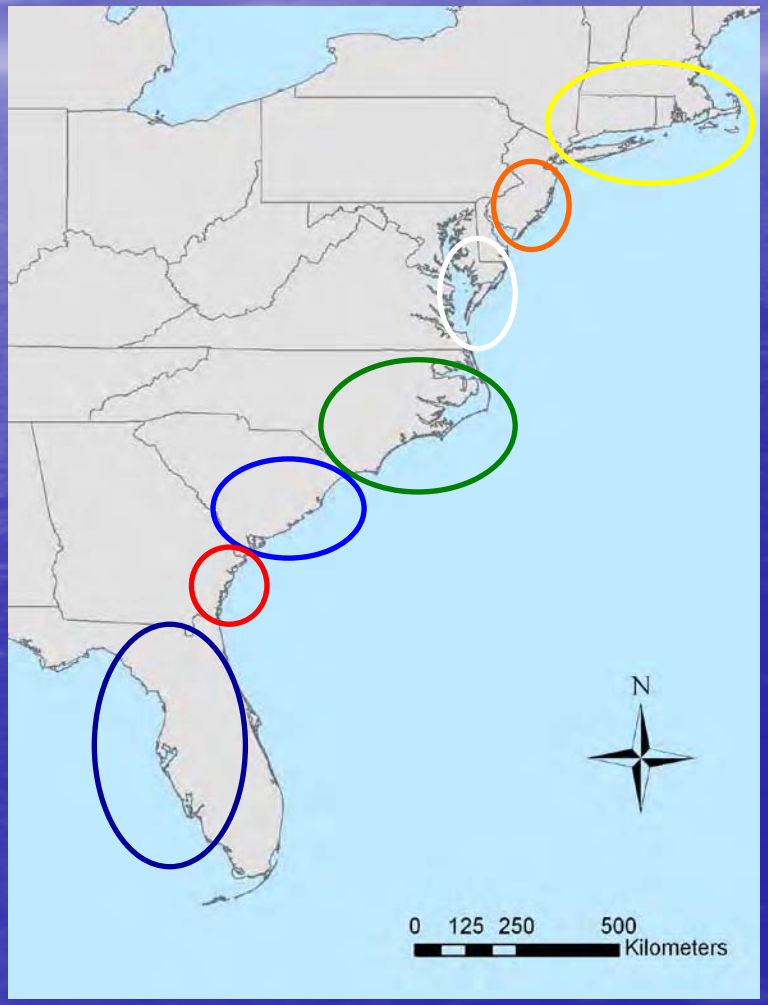
Initial concept

- Coordinate winter resight surveys from NJ to FL
- Construct a multi-state model to estimate survival, transition and detection rates across the range of the species
- Outputs would include a comprehensive assessment of migration patterns as well as initial estimates of subadult and juvenile survival

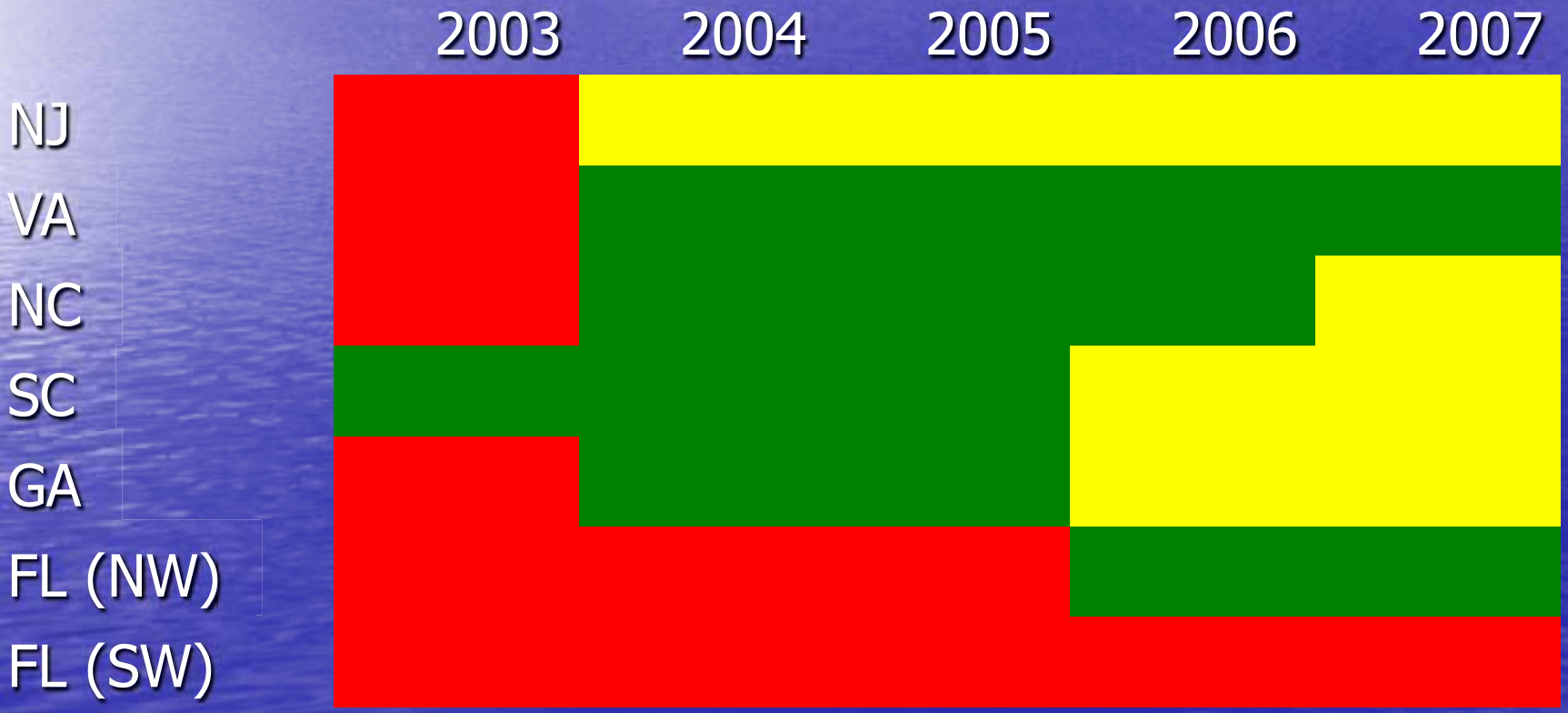
Multi-state Model



Multi-state Model



Winter survey coverage



Outputs from the current database

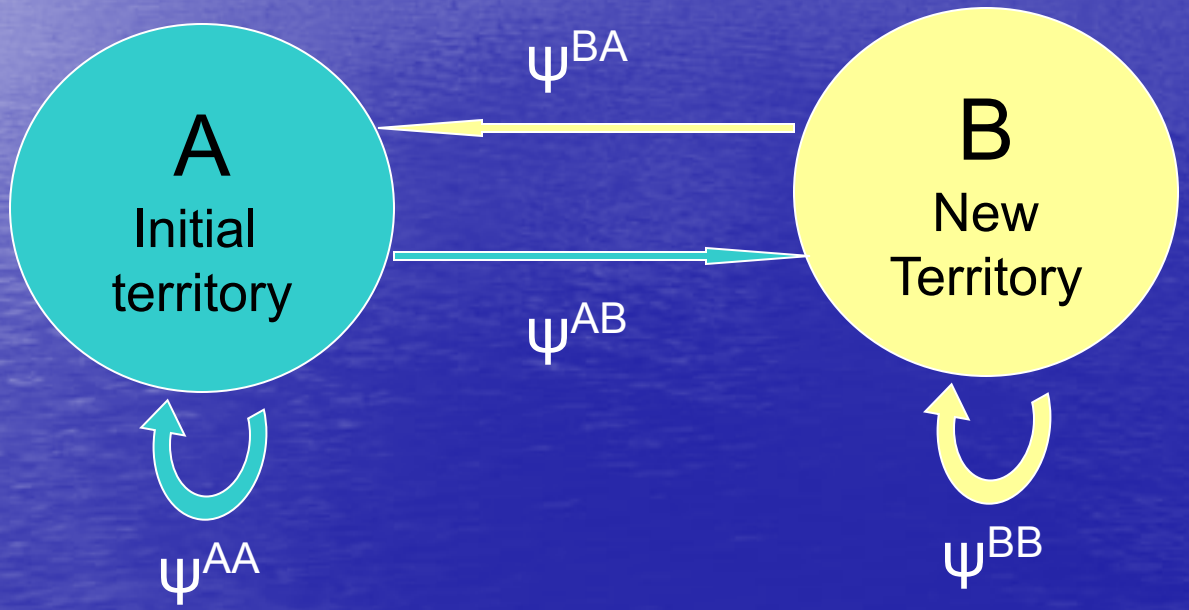
- Local estimates of annual survival
- Distribution/dispersal maps
- Approximation of breeding-wintering transition rates for selected locations and years
- Rate of fidelity to breeding territories
- Winter home range estimation

Fidelity to breeding territories

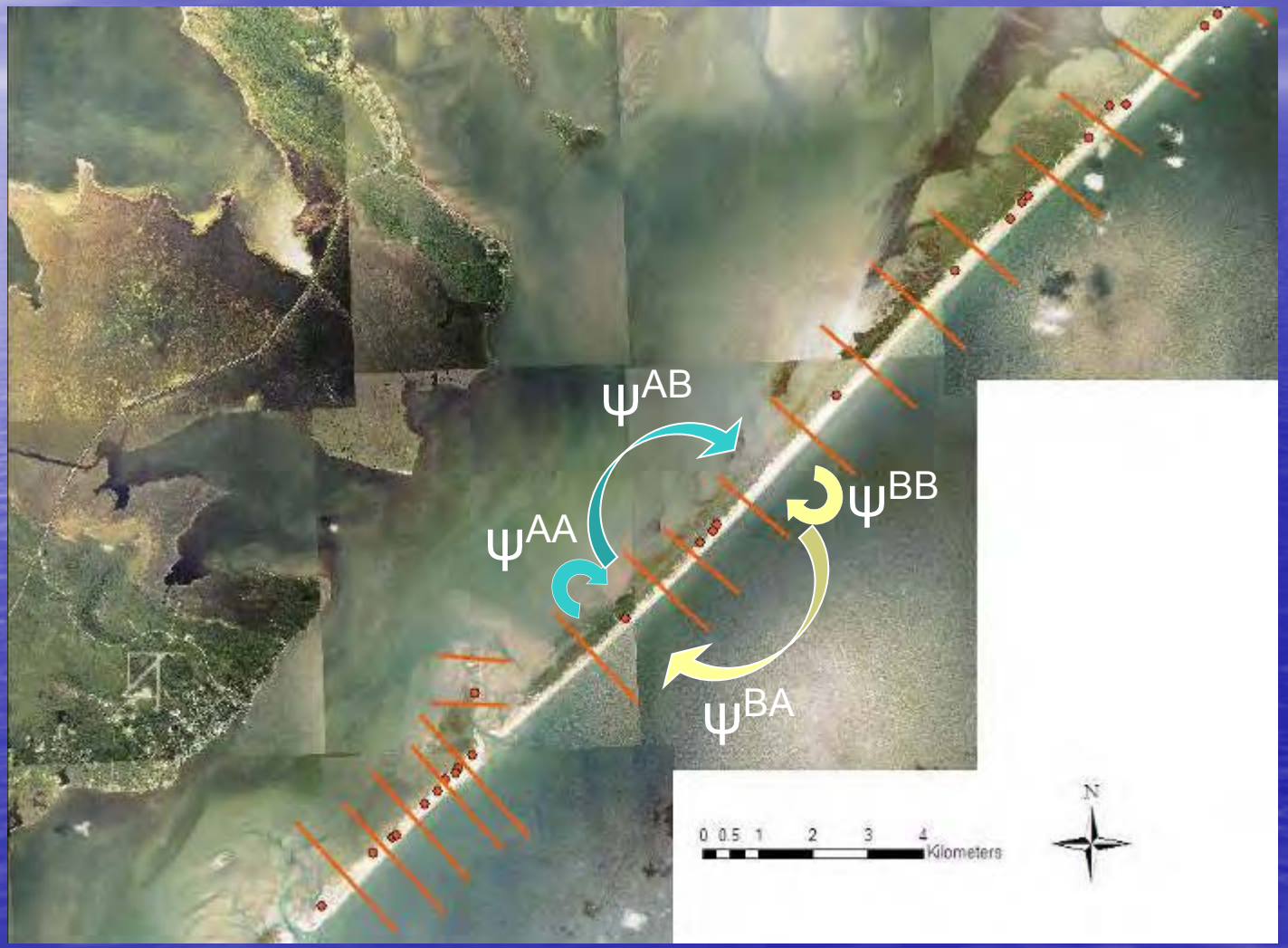
- Breeding oystercatchers are believed to have very high fidelity to breeding territories
- Territory-specific fidelity rates for breeding European Oystercatchers were estimated at ~0.95
- Territory fidelity for American Oystercatchers on the Outer Banks of North Carolina was estimated from a sample of 89 AMOY over a period of eight years
- We used a simple two-state model to estimate fidelity rates

Breeding fidelity model

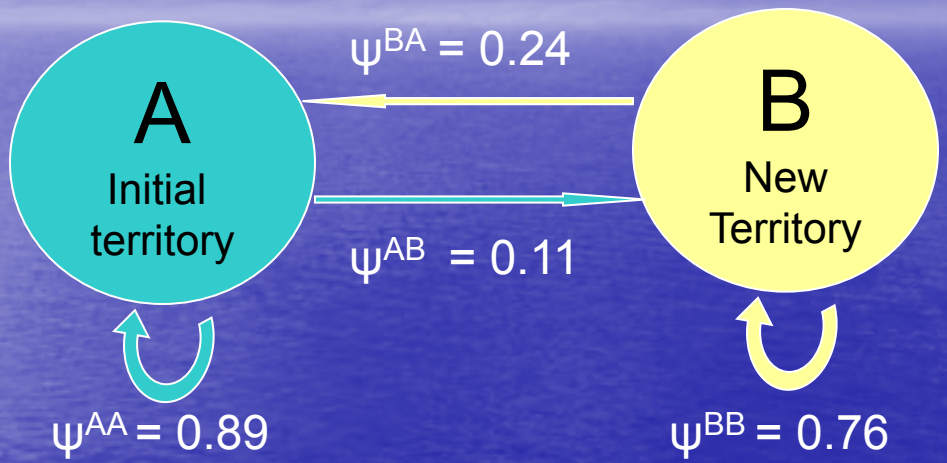
Ψ = probability of transition given survival



Fidelity to breeding territories



Fidelity to breeding territories



- Territory fidelity ranged from 0.76 to 0.89
- AMOY had lower fidelity to new territories than they did to their original territory
- Average distance moved = 8.03km (SE 1.05)

Winter movements

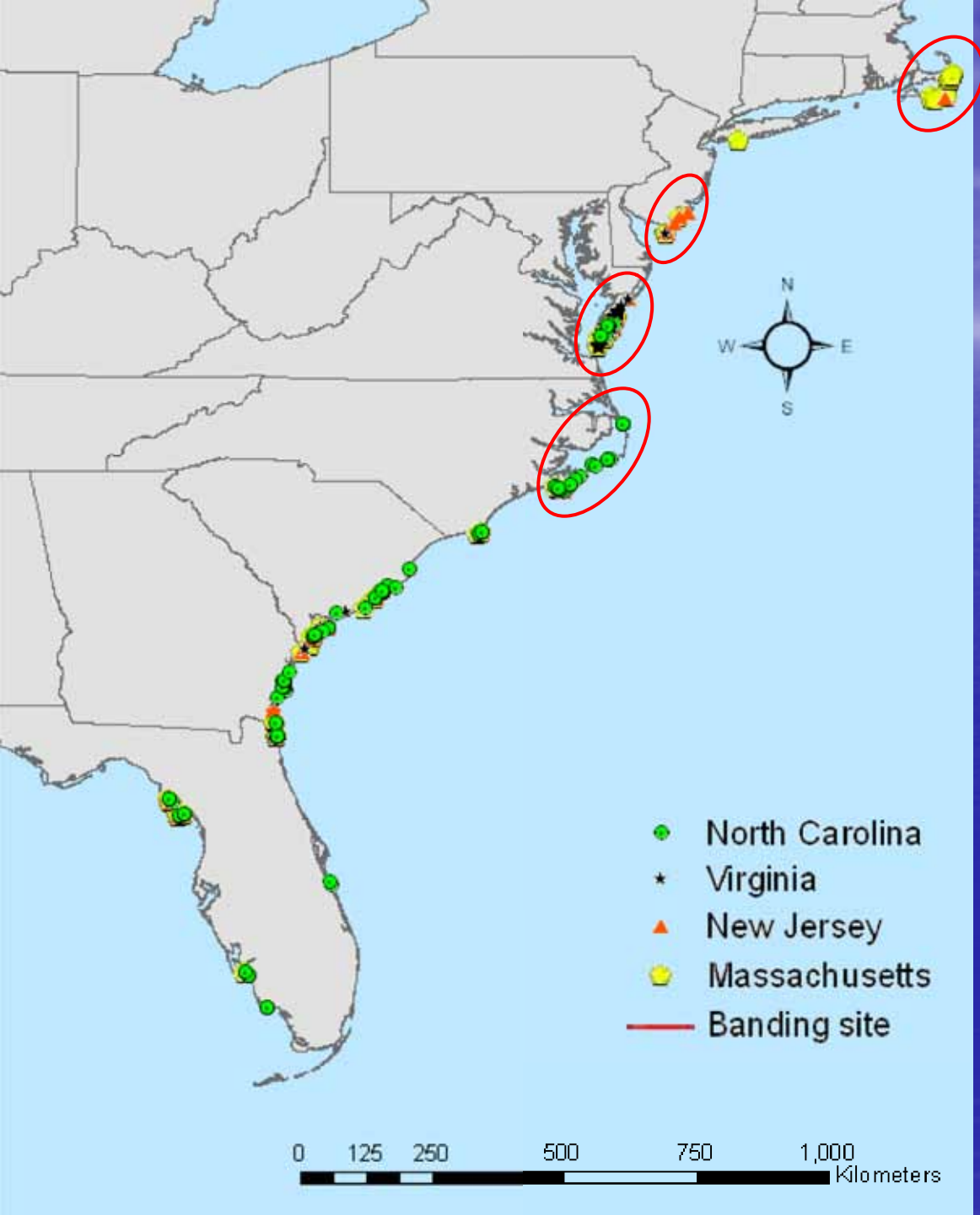
- AMOY winter home ranges include multiple roost sites
- Variation in home range size has implications for conservation
- Selected wintering areas where multiple winter surveys were conducted over several years
- Beaufort, NC; Bull's Bay, SC; Altamaha river delta, GA; Cedar Key, FL
- Measured average distance between resight locations for individual birds in each wintering area

Winter movements

- Average movement distance varied by wintering area
- Oystercatchers in Bull's Bay averaged three kilometers, while birds in the Cedar Key area averaged seven kilometers
- Maximum distance moved within a season was 129 km
- Maximum distance moved between seasons was 410km

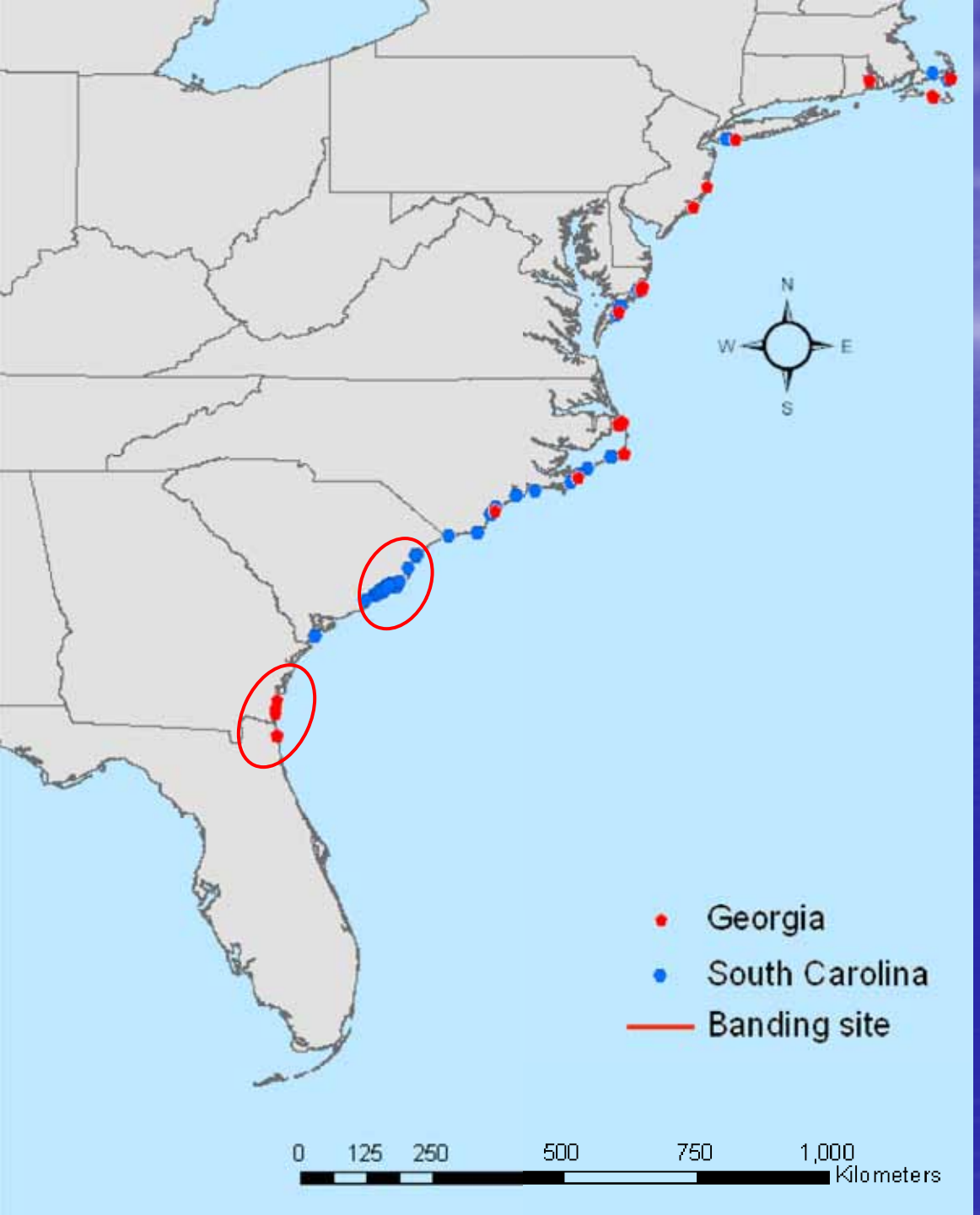
Breeding/wintering connectivity

- Qualitative assessments
  - Mapping winter resights of AMOY banded at breeding sites
  - Mapping nesting locations of AMOY banded at wintering sites
- Quantitative assessments
  - Existing database does not support a formal multi-state modeling approach
  - We can estimate the relative importance of wintering areas where complete surveys were conducted



Winter re-sights:

Winter re-sights of American Oystercatchers banded during the breeding season



Breeding Season re-sights:

Breeding season re-sights of American Oystercatchers banded during the winter

Breeding/wintering connectivity

- Qualitative assessments
  - Mapping winter resights of AMOY banded at breeding sites
  - Mapping nesting locations of AMOY banded at wintering sites
- Quantitative assessments
  - Existing database does not support a formal multi-state modeling approach
  - We can estimate the relative importance of wintering areas where complete surveys were conducted

Breeding/wintering connectivity

- 87 AMOY banded in North Carolina in 2004
- A complete winter survey of South Carolina in the winter of 2004/2005 found 13 banded AMOY from North Carolina
- Detection probability was estimated at 0.80

- Six-month survival rate was estimated at 0.96
- Migration rate from NC to SC in 2004 was estimated at 0.19 after adjusting for survival and detection probability
- Rate of non-migration (staying in state) for NC for the same period was 0.29

Where do we go from here?

- Review and revision by collaborators
- Publication possibilities
  - Birds of North America update
  - Joint WG paper in Waterbirds
- Coordination and direction of future resight surveys
  - Winter surveys
  - Breeding season surveys

Coordinated winter surveys

- Design
  - Surveys conducted over a short window in the middle of winter
  - Annual coverage of all wintering areas
  - Comparable effort across the winter range
- Outputs
  - Estimates of movement rates between breeding and wintering sites
  - Estimate of population size
  - Estimates of survival for different age classes
  - Age ratios

Coordinated breeding surveys

- Design
  - All nesting AMOY have a chance of being resighted
  - Survey areas large enough to detect dispersal and territory shifting
  - Surveys conducted during the first half of the breeding season
- Outputs:
  - Direct comparison of survival across the breeding range
  - Estimates of recruitment and breeding dispersal
  - Assessment of source/sink dynamics with paired rates of survival and reproductive success
  - Feedback for conservation and management goals

Collaborators

- Clemson University
- College of William and Mary
- City University of New York
- Clemson University
- Delaware Division of Fish and Wildlife
- Florida Game and Freshwater Fish Commission
- Georgia Department of Natural Resources
- Manomet Center for Conservation Sciences
- Maryland Department of Natural Resources
- National Audubon Society
- National Park Service
- New Jersey Audubon
- New Jersey Division of Fish and Wildlife
- North Carolina Audubon
- North Carolina State University
- North Carolina Wildlife Resources Commission
- Rutgers University
- South Carolina DNR
- The Nature Conservancy
- Trent University
- University of Georgia
- US Fish and Wildlife Service
- Virginia Department of Game and Inland Fisheries
- Wildlife Conservation Society

David Allen, Jon Altman, Ruth Boettcher, Stephen Brown, Sue Cameron, Jeff Cordes, Pam Denmon, Nancy Douglas, Chrisy Hand, Ann Hodgson, Pat Leary, Doris Leary, Marcia Lyons, Sean Murphy, Erica Nol, Terry Norton, Kim Peters, Todd Pover, John Sabine, Felicia Sanders, Karen Sayles, Shiloh Schulte, Sara Schweitzer, Ted Simons, Janet Thibault, Barry Truitt, Tom Virzi, Brad Winn, Alex Wilke