

NORTH ATLANTIC LANDSCAPE CONSERVATION COOPERATIVE GRANT 2012 PROGRESS REPORT

Quarter: (circle one)

2013 1st

2013 2nd

2013 3rd

2013 4th

Grant Number and Title: NALCC 2011 (11) Mapping Marine Birds NW Atlantic: Phase 1

Grant Receipt/Organization: NCSU

Grant Project Leader: Gardner

Were planned goals/objectives achieved last quarter? Yes

NALCC Conservation Need Addressed:

Progress Achieved: (For each Goal/Objective, list Planned and Actual Accomplishments)

1. Develop models for estimation of sea bird distributions, particularly in regards to potential areas of aggregation
Planned Goal – Accommodate both the extreme counts and the zero-inflation in the data, expand the spatial domain, run the models for different species.
Accomplished – We expanded the study area from a restricted 8x6 4x4km Nantucket Sound grid to 15984 4x4km grid that covers most of the Atlantic coast. Long computation times in estimating so many spatial random effect parameters led us to use dimension-reduction methods on the spatial covariance matrix. The model we have chosen and are currently fitting to the data is explained below. This model is currently being tested on several species including the Common Eider, Common Loon, Long-tailed duck, and Northern Gannett.
2. Determine statistically appropriate models for assessing risk
Planned Goal – Determine the spatial model we wish to move forward with, and create variables for risk.
Accomplished – After testing and fitting several hierarchical random effects models, including the implementation of CAR priors in a Bayesian framework, we have determined that a three-component mixture model is appropriate for the data if we want to capture both the zero-inflation and the extreme counts. We define three parameters that will enable us to easily interpret risk. For each site, we model P_z = the probability of being a zero count, P_e = the probability of being an extreme count, and M = the estimated mean of the count distribution.

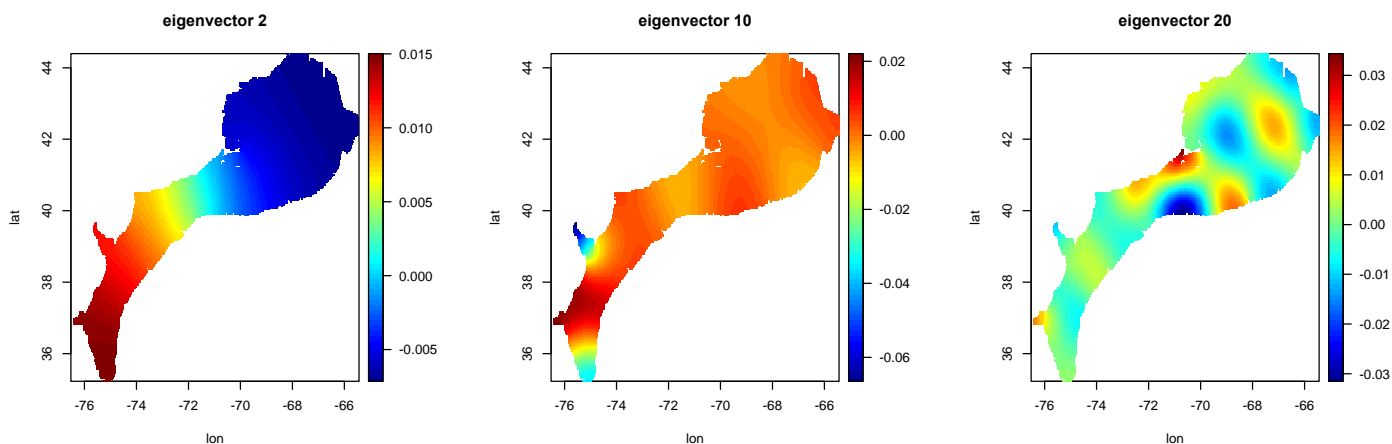
Summary of Progress: (Provide a paragraph describing progress, work to come, and timelines)

To accomplish goals 1 and 2, we combined a zero-inflated negative-binomial distribution with a generalized-Pareto distribution that models the extreme counts above a certain threshold. A nonspatial version with covariates was fitted first to assess convergence and stability. A spatial version requires the modeling of a spatial random effects parameter, which entails the modeling of a covariance matrix. Here, we give the random

effects a CAR prior because we are dealing with discrete grid cells and want to use the neighborhood information to account for spatial heterogeneity. Because we have expanded the study area to 15984 sites, the spatial covariance matrix has too many parameters to estimate within a reasonable amount of time. Thus, we employed a dimension-reduction technique by taking the eigen-decomposition of the CAR inverse-covariance matrix. We then choose the first several eigenvectors that account for much of the variability in the data, and use them as additional predictors in our linear models that already contain site-level covariate information. If θ is the parameter of interest and Φ is a canonical link function, then

$$\Phi(\theta) = \mathbf{X}\beta + \mathbf{V}\alpha + \mathbf{e}$$

where \mathbf{X} is the matrix of covariates and \mathbf{V} is the matrix containing the eigenvectors we wish to use to account for spatial correlation. We use these linear regressions to model $\text{logit}(P_z)$, $\text{logit}(P_e)$, and $\text{log}(M)$. For illustration, the plots below of the second, tenth, and twentieth eigenvectors show how each captures spatial variability. The second eigenvector captures more large-scale variability while the twentieth eigenvector captures more small-scale variability.



Difficulties Encountered:

- The choice of threshold value for extreme counts is difficult to determine and may differ between species.
- Capturing the most extreme counts of the distribution.
- How many eigenvectors is needed to capture enough spatial variability.
- Convergence and model selection for different species.

Activities Anticipated Next Quarter:

- Present research at an Institute of Mathematical Statistics conference, the Joint Statistical Meetings conference, and the NALCC webinar.
- Draft a paper for journal publication.
- Model diagnostics.
- Determine new ideas for modeling.
- Predictive maps for different species.

Expected End Date: 12/31/2013

Costs:

Funds Expended to Previous to this Report: 46458.61

Amount of NALCC Funds Requested within this Report: 19597.91

Total Approved Budgeted NALCC Funds: 115,000.00

Are you within the approved budget plan? yes

Are you within approved budget categories? yes

Signature: 

Date: 07/08/2013

NORTH ATLANTIC LANDSCAPE CONSERVATION COOPERATIVE GRANT 2013 PROGRESS REPORT

Quarter: (circle one) 2013 1st **2013 2nd** 2013 3rd 2013 4th

Grant Program, Number and Title: North Atlantic LCC, Grant 2011-12

Organization:

Project Leader: Richard R. Veit

Abstract: Please provide a short (1-2 paragraphs) abstract that addresses EACH of the following: the objectives of your project, accomplishments to date, future plans and timelines with an estimate for when the project will be completed.

We scanned the entire 270,000 record USGS database on marine birds to search for inconsistencies in the use of four-letter species codes for birds. On the whole, we found the database to be clean, and species codes were generally consistent. There were some exceptions. Potentially the most influential confusion was in the use of codes for Roseate and Royal Terns. Unambiguous and correct codes for these species are "ROST" and "ROYT" respectively, but it is quite certain that the ambiguous code "ROTE" was used for both of these species on the order of a few hundred times in the past. We have made corrections or suggestions within a separate column in the database about how to interpret these ambiguous codes. Another general observation based on our scan of the database is the interpretation of large numbers of birds unidentified to species, for example "UNTE" for unidentified tern, "UNAL" for unidentified alcid or "UNSH" for unidentified shearwater. It is possible, for example, that the majority of Roseate Terns observed during the entire 35 year period covered by the database were entered originally in the field as "UNTE", because the Roseates were in mixed flocks with Common Terns and perhaps some Arctics. In one sense there is no way we can know how many of these were Roseates, but there are many ways to estimate this quantity based on other data sources. We recommend this be done so that distributional models accurately reflect the entire content of the data on these birds collected at sea.

Were planned goals/objectives achieved last quarter?

Yes.

Progress Achieved: (For each Goal/Objective, list Planned and Actual Accomplishments)

We scanned through the entire database manually, looking for mistaken species codes

within the species fields. Such would jump out fairly clearly as the database is sorted alphabetically. We selected what we thought would be the most likely sources of confusion to begin with – the terns mentioned above, Razorbills (for which we expected confusion in the pre-1990 data, which we did not find) and some unidentified groups (“UNTE”, “UNSH”, “UNAL”). For the unidentified groups, we did not make a suggestion in the database, because interpretation will have to be done in collaboration with modelers later, but it is our plan to consult on this issue. For other ambiguities, especially the Royal/Roseate Tern pair, we have made suggested changes with the column allocated for this purpose and returned the annotated database to Andrew Gilbert, Mark Wimer and Allison Sussman.

We reviewed the entire database and made suggested changes in a file sent to USGS personnel. We feel that the database is “clean” and free of errors. We recommend that all analyses be checked with knowledgeable seabird ecologist for inclusion of unidentified birds and for checking of potential “hotspots” that appear in modeled data.

The USGS database is a remarkable achievement, especially considering the disparate sources of information contained in it. There are still some issues of interpretation of the data, but we believe there are no further mistakes within the four letter species codes.

We recommend that models of abundance make use of the birds listed as “unidentified” to species, with perhaps 2-3 different versions of output, with, respectively, all unidentifieds included, all excluded, and some fraction included. The fraction to include can be determined through examination of other sources of data (e.g. Nisbet et al. 2013, state bird books, the journal *North American Birds*).

Difficulties Encountered:

None.

Activities Anticipated Next Quarter:

Project is completed

Expected End Date:

Costs:

Total life to date expenses (include this quarter): \$10,000.00

Total Approved Budgeted Funds: \$10,000.00

Are you within the approved budget plan and categories? Yes.

Signature: 

Date: 1 October 2013

NORTH ATLANTIC LANDSCAPE CONSERVATION COOPERATIVE GRANT 2013 PROGRESS REPORT

Quarter: (circle one) 2013 1st 2013 2nd 2013 3rd 2013 4th

Grant Program, Number and Title: Sub-award Number 2011-13: MAPPING THE DISTRIBUTION, ABUNDANCE AND RISK ASSESSMENT OF MARINE BIRDS IN THE NORTHWEST ATLANTIC: PHASE 1: SUBPROJECT – SEABIRD PREDICTIVE MONITORING INTEGRATION

Organization: CONSOLIDATED SAFETY SERVICES, INC.

Project Leader: Brian Kinlan, Ph.D.

Abstract: Please provide a short (1-2 paragraphs) abstract that addresses EACH of the following: the objectives of your project, accomplishments to date, future plans and timelines with an estimate for when the project will be completed.

Objectives: The goal of this project is to demonstrate an improved framework for marine bird risk assessment in the U.S. North Atlantic that integrates spatial patterns in seabird occurrence and abundance with information on species-specific vulnerability and sensitivity to potential impacts from marine offshore wind development. This sub-award supports a small amount of Dr. Kinlan's time and his travel expenses to participate in relevant workshops and meetings, and to coordinate with other sub-award PIs, to make his marine bird predictive modeling results for the New York Bight and Mid-Atlantic available to demonstrate approaches for marine bird risk assessment.

Previous work: Initial discussions among sub-award PI's took place via email and phone in the 2nd quarter of 2012. In the 3rd quarter of 2012, sub-award PI's Brian Kinlan and Beth Gardner (NC State) met in Silver Spring on July 24. They discussed recent seabird modeling results and approaches and made plans for coordinated work once the NC State Postdoc is hired this Fall. These discussions continued in the 4th quarter of 2012. On December 21, 2012, a day was spent on data analysis, data processing and project-related communication. In the 1st quarter of 2013, Dr. Kinlan traveled to attend two face-to-face project-related meetings/workshops, where he presented and discussed marine bird spatial risk assessment modeling in the mid-Atlantic. These meetings included time spent in discussions with other sub-award PI's and collaborators. In February, Kinlan participated and presented in a special session on marine spatial planning and seabirds at the Pacific Seabird Group annual meeting in Portland, OR. In March, Kinlan attended and presented at the Atlantic Marine Bird Conservation Cooperative meeting in Charleston, SC.

Work that took place this quarter (2nd quarter of 2013): In the 2nd quarter of 2013, Dr. Kinlan conducted project related coordination and communication via an All-Hands conference call on 5/17/2013 and one-on-one emails and phone calls with NALCC project manager Scott Schwenk, PI Dick Veit, PI Bath Gardner, PI Andrew Gilbert, and other project personnel. Kinlan also wrote an abstract for the webinar and worked with other PI's to synthesize project results to date and begin assembling webinar presentation.

Future plans and timelines: Next webinar planning call 7/1/2013. Prepare Webinar for NALCC August 8, 2013. Coordination and communication with PI's pre- and post-webinar. Final wrap-up of project, linking to other ongoing efforts. No additional travel is planned. This project is expected to be completed by December 31, 2013, but funding will likely be expended by the end of 2013 Q3.

Were planned goals/objectives achieved last quarter?

YES

Progress Achieved: (For each Goal/Objective, list Planned and Actual Accomplishments)

This project has one deliverable: "Participation in project-related meetings, workshops, phone calls, and email communication". This goal was met this quarter through Kinlan's participation in project coordination calls and emails with PI's and with NALCC management (Scott Schwenk), as well as preparation for a synthesis webinar for the NALCC.

Difficulties Encountered:

NONE

Activities Anticipated Next Quarter: NALCC Webinar will be given on August 8. No additional travel is anticipated. Funding for approximately 10-11 hours of Dr. Kinlan's time remains, and this will be used for the Webinar, and then to strategically to wrap up this project and connect to other ongoing projects. Funding will likely be expended by the end of 2013 Q3.

Expected End Date: December 31, 2013 or sooner.

Costs:

Total life to date expenses (include this quarter): \$8,793.11

Total Approved Budgeted Funds: \$10,000.00

Are you within the approved budget plan and categories? YES

Signature:

A handwritten signature in black ink that reads "Brian P. Kinlan". The signature is written in a cursive style with a long horizontal flourish at the end.

Date: 7/15/2013

NORTH ATLANTIC LANDSCAPE CONSERVATION COOPERATIVE GRANT 2013 PROGRESS REPORT

Quarter: (circle one)

2013 1st

2013 2nd

2013 3rd

2013 4th

Grant Program, Number and Title: 2011-14 Best Darn Bird Map

Organization: Biodiversity Research Institute

Project Leader: Andrew Gilbert

Abstract: Please provide a short (1-2 paragraphs) abstract that addresses EACH of the following: the objectives of your project, accomplishments to date, future plans and timelines with an estimate for when the project will be completed.

The Best Darn Bird Map project will pull together existing information on marine bird distribution and abundance, including modeled distributions, vessel and aerial survey information, and data from individually marked birds, and create mapping products useful for planning uses of the marine environment, including sighting alternative energy projects.

The objectives of our contribution to the BDBM are to 1) produce model data appropriate for BDBM and 2) deliver seabird model input for BDBM.

We have continued to compile the latest seabird data to date and are working with modelers at NC State and USGS database personnel to provide the latest and highest quality data for modeling. We will continue to work at least through summer 2013 so that the latest model runs can use the most up to date data.

Were planned goals/objectives achieved last quarter? Yes.

Progress Achieved: (For each Goal/Objective, list Planned and Actual Accomplishments)

1. Consult with project PI and USGS to produce model data appropriate for BDBM.

Actual - We have continued to work to update seabird database with the latest survey data. We have discussed current and future needs with Beth Gardner to insure highest quality data as well as modeler Brian Kinlan from NOAA to plan for his future needs as well as discuss the upcoming webinar for the project in August.

2. Deliver seabird model input for BDBM

Actual – in progress with USGS help.

Difficulties Encountered:

None. We consulted with Beth Gardner, modeler and worked out a plan to get data into the Atlantic Seabird Compendium.

Activities Anticipated Next Quarter:

Continue compiling and adding data to the Atlantic Seabird Compendium to update the database with the latest seabird data for the Atlantic.

Expected End Date: September 2013

Costs:

Total life to date expenses (include this quarter): \$3048.72

Total Approved Budgeted Funds: \$9967

Are you within the approved budget plan and categories? YES

Signature:

A handwritten signature in black ink, appearing to read 'Andrew T. Gilbert', with a long horizontal line extending to the right.

Andrew T. Gilbert

Date:

7/10/2013