

Appendix 6.C. Species and Group Seasonal Profiles

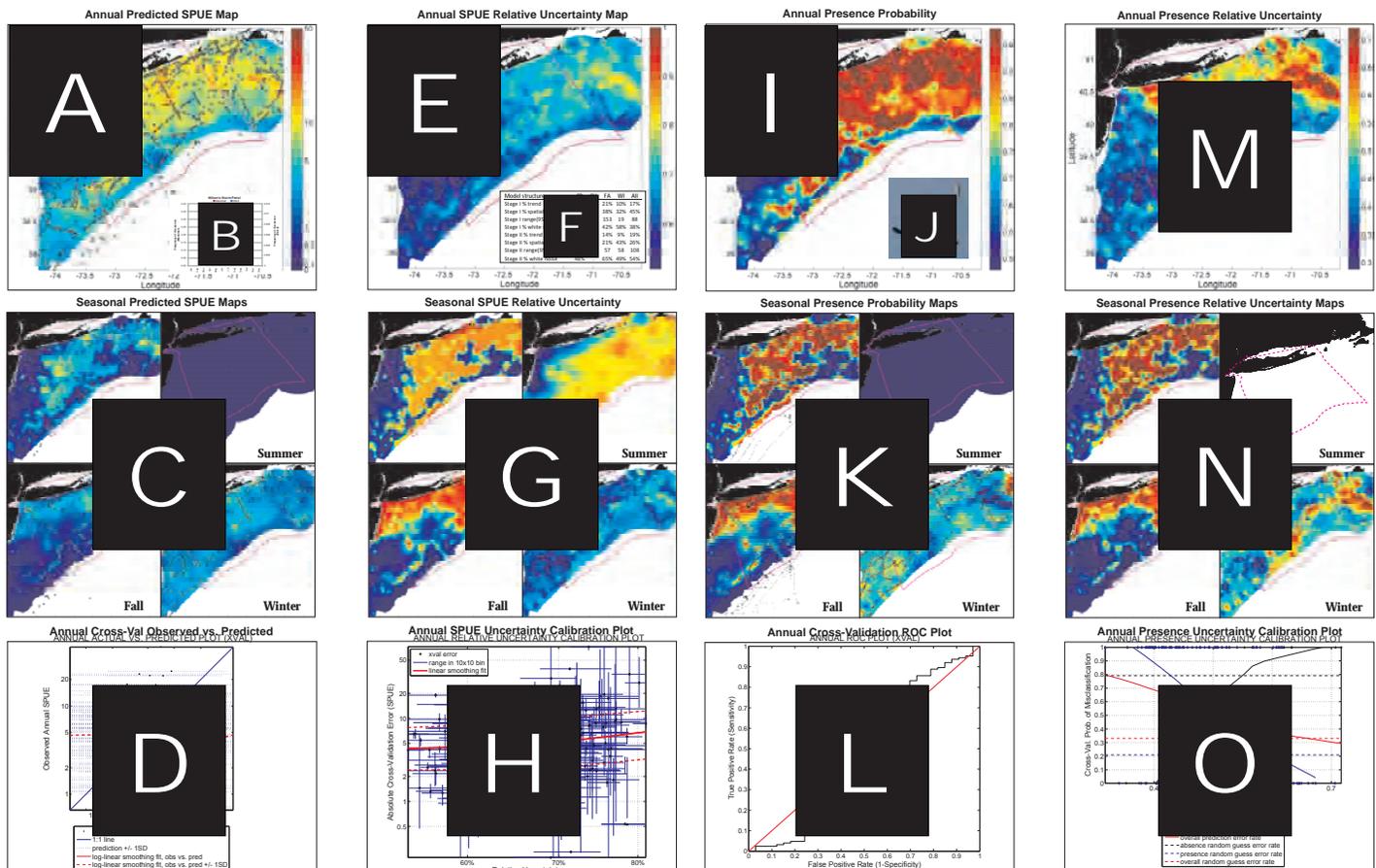


Figure 6.C.1. Guide to the elements presented in each species/group seasonal model profile. A shrunk-down image of an example two-page model profile spread is shown, with capital letters marking the different graphic elements as they are described in Section 6.C.1.

6.C.1. PROFILE INTERPRETATION GUIDE

This appendix presents two-page profiles for each modeled species and group giving more detailed results of predictive models of abundance and presence/absence. In each profile, the annual and seasonal predictive maps are shown with original data points overlaid for comparison, annual and seasonal maps of relative model uncertainty are given, separate maps are shown for abundance (sightings per unit effort, SPUE) and for occurrence (probability of presence), and model fit and model uncertainty plots based on cross-validation are provided to help assess model accuracy.

Rather than number and caption each figure and table in these profiles repetitively, we have developed this profile interpretation guide that explains each element of the 24 two-page profiles that follow. Figure 6.C.1 (above) is a schematic illustration of the layout of each profile. The large white letters in transparent black boxes indicate each element of the layout. Each element, lettered A through O, is explained below:

- A.** Annual climatological (long-term average) predictive map of relative abundance. SPUE is used as a proxy for abundance. Cool colors represent low and warm colors represent high SPUE. Land is represented by black, areas with insufficient data to make a prediction are white, and the offshore planning area identified by New York DOS is shown by a dotted magenta line. All non-zero SPUE data (training and validation datasets) are overlaid as colored dots on the same colorscale as the gridded SPUE predictions.
- B.** Monthly pattern of occurrence - Temporal histogram showing frequency of occurrence by month. Data is presented from two complementary sources to more fully capture pelagic and nearshore species. The Manomet dataset (red bars) was collected offshore by ship-based surveys and the eBird dataset (blue bars) consists mostly of onshore and nearshore surveys. Differences between histograms from the two datasets may represent an onshore-offshore distributional gradient.

- C. Seasonal climatological (long-term average) predictive maps of relative abundance (SPUE, No. indiv. / km² / 15-min). All non-zero SPUE data (training and validation datasets) for each season are overlaid as colored dots on the same colorscale as the gridded SPUE predictions.
- D. Cross-validation Observed vs. Predicted plot (mean observed vs. mean predicted SPUE in 10x10 cell bins [~9x9 km]). Binning was necessary because cross-validation data points did not exactly coincide across seasons.
- E. Distribution of mean relative uncertainty – Map showing relative uncertainty in the Stage IxII predictive model. Uncertainty is a function of distance from survey locations, spatial autocorrelation and accuracy of the trend regressions. Relative uncertainty values closer to 0 represent predictions that are expected, on average, to have lower error; values closer to 1 represent predictions that are expected, on average, to have greater error.
- F. Model structure table, showing percentages of variance attributable to each component of the model and the length scales of spatial autocorrelation, for each season and averaged over all seasons.
- G. Seasonal relative uncertainty maps. See Appendix 6.A., Section 6.A.11.
- H. Cross-validation relative uncertainty calibration plot for annual SPUE (using mean predicted abundance and the mean value of the annual Stage IxII relative uncertainty for each 10x10 cell [~9x9 km] bin). See Appendix 6.A., Section 6.A.12. for details.
- I. Annual integrated predicted probability of presence. Probability of species being present in at least one of the modeled seasons. See Appendix 6.A., Section 6.A.13. for details. Seasons modeled for each species are shown in Table 6.6.
- J. Representative photo of species or one species in a species group.
- K. Seasonal predicted probability of presence (Stage I final model prediction). Absence data are indicated by small black dots, and presence data are indicated by larger open black circles.
- L. Annual cross-validation ROC plot for presence/absence prediction, using maximum probability in 10x10 cell bins [~9x9 km] as the predictor of whether at least one presence was observed in that bin. Red line indicates 1:1, black line is ROC curve. Small blue dot indicates the optimal operating point on the ROC curve, used to determine the threshold that optimizes the tradeoff between sensitivity and specificity.
- M. Relative uncertainty of annual presence probability prediction.
- N. Seasonal maps of relative uncertainty of presence probability prediction.
- O. Cross-validation relative uncertainty calibration plot for annual integrated presence probability (using maximum predicted probability and the mean value of the Stage I relative uncertainty for each 10x10 cell [~9x9 km] bin). Note that presence, absence, and overall error rates reflect the tradeoff between sensitivity and specificity; some error rates may go up even as relative uncertainty goes down. The relative uncertainty is based on the overall odds of the model prediction being correct compared to a null model; see Appendix 6.A. for details.

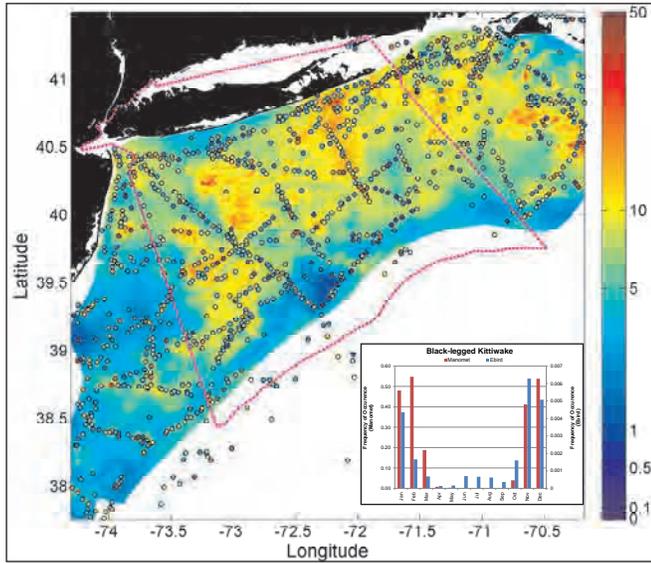
6.C.2. A NOTE ON ERROR MASKING

Throughout all sections of this chapter, white space on maps is used to indicate places where predictions either were not made (due to insufficient seabird survey data or insufficient information on environmental predictors), or were considered too unreliable to display. For some species and groups, we developed two versions of the “error masks” used to hide unreliable predictions: a more conservative mask that is used in the main body of this report, and a less conservative mask that is used here in Appendix 6.C. The affected species/groups are: Great Shearwater, Sooty Shearwater, Wilson’s Storm-Petrel, Pomarine Jaeger, Northern Fulmar, Less Common Storm-Petrels, Less Common Shearwaters, and Jaegers. We use the less conservative masks here in Appendix 6.C. in order to show the maximum extent of model predictions, and allow the user to judge for themselves whether predictions are well-supported by data (original data points are overlaid on maps and uncertainty maps are presented alongside each prediction map). The user is cautioned to closely examine the distribution of data and the uncertainty maps, as well as diagnostic plots such as the cross-validation uncertainty calibration, to determine the degree of confidence appropriate for any particular prediction. Users should be especially careful when drawing inferences about “hotspots” or “coldspots” that are not supported by any nearby data points; these result solely from extrapolation from environmental conditions, and should be considered only potential hot or cold spots until those areas are actually surveyed. For example, predictions made in Long Island Sound for species with no presence data points in the Sound are unreliable. Such predictions have been masked out in the maps presented in the main body of this report, but may not always be masked out by the less conservative masks in this Appendix or Online Supplement 6.2.

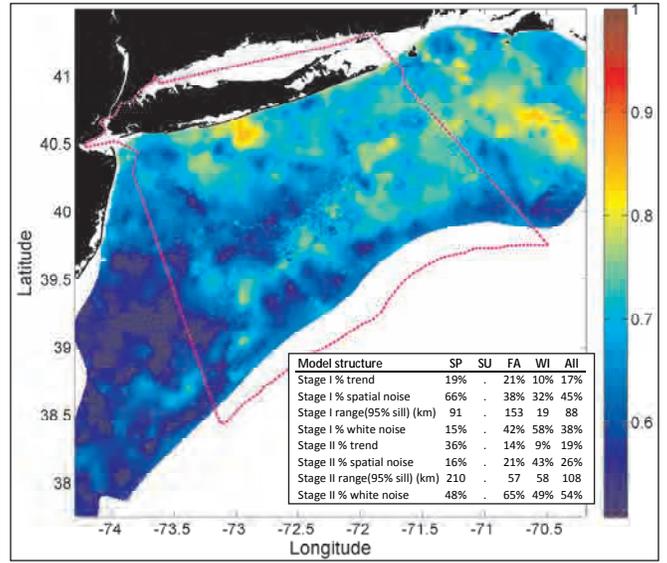
Black-legged Kittiwake

Stage I x II: Relative Abundance Predictive Model

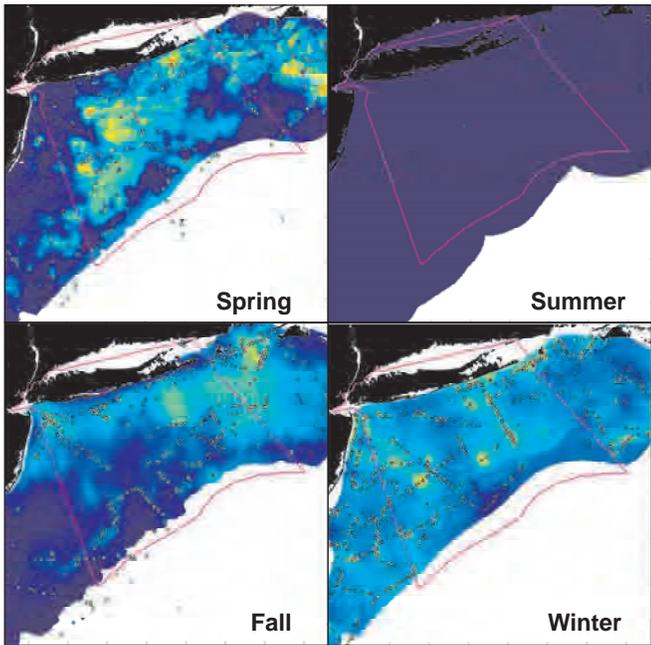
Annual Predicted SPUE Map



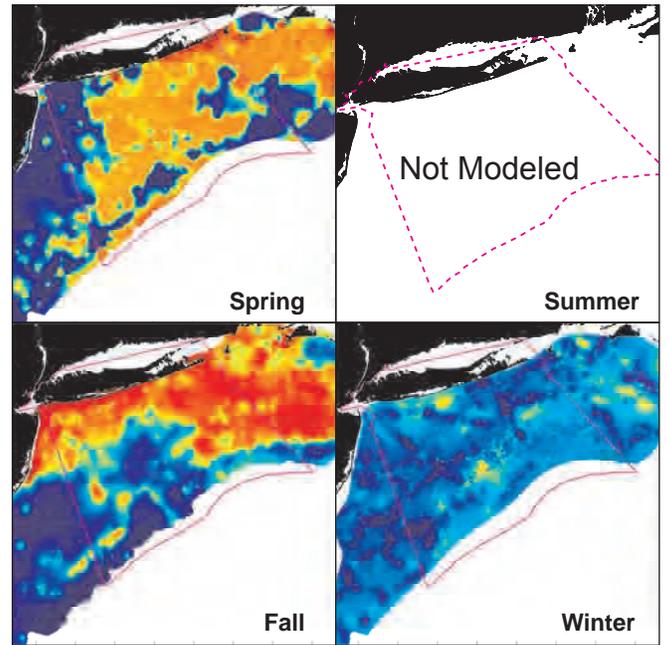
Annual SPUE Relative Uncertainty Map



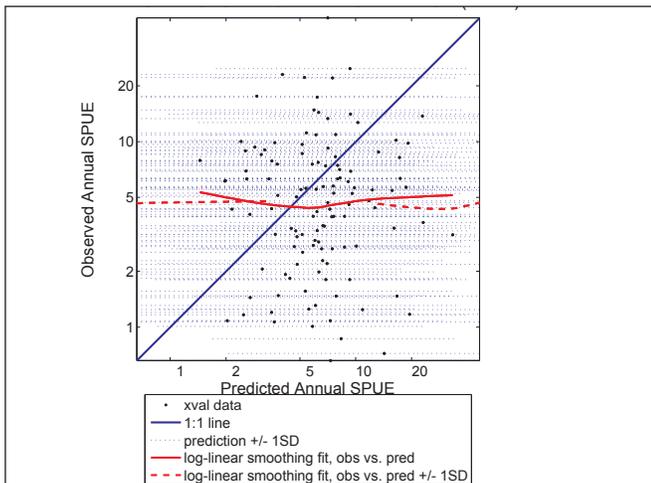
Seasonal Predicted SPUE Maps



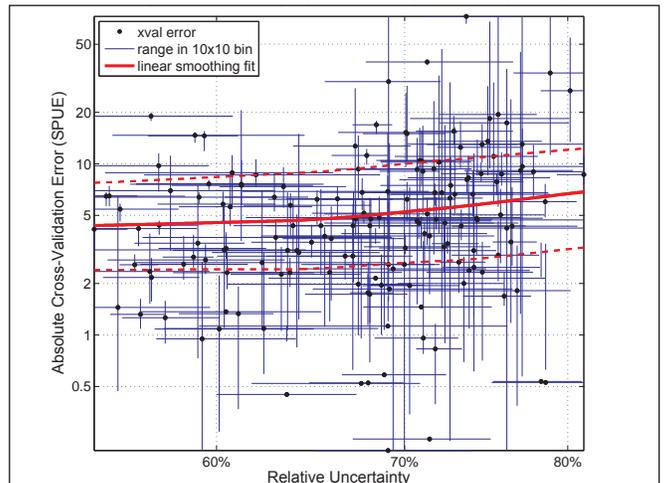
Seasonal SPUE Relative Uncertainty



Annual Cross-Val Observed vs. Predicted



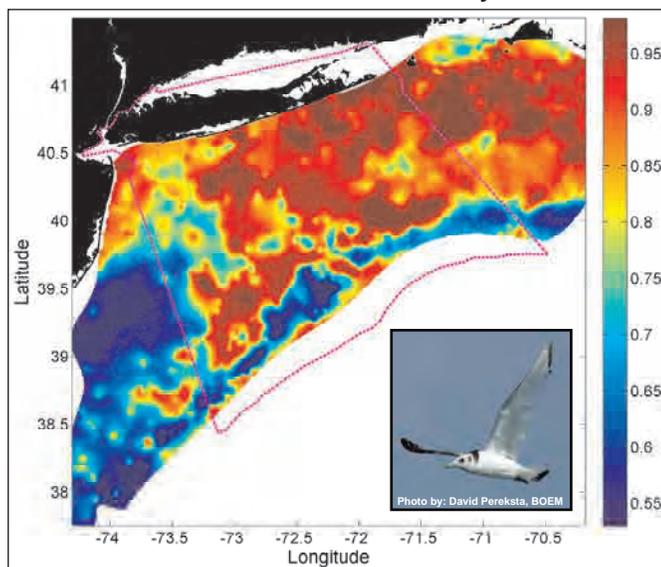
Annual SPUE Uncertainty Calibration Plot



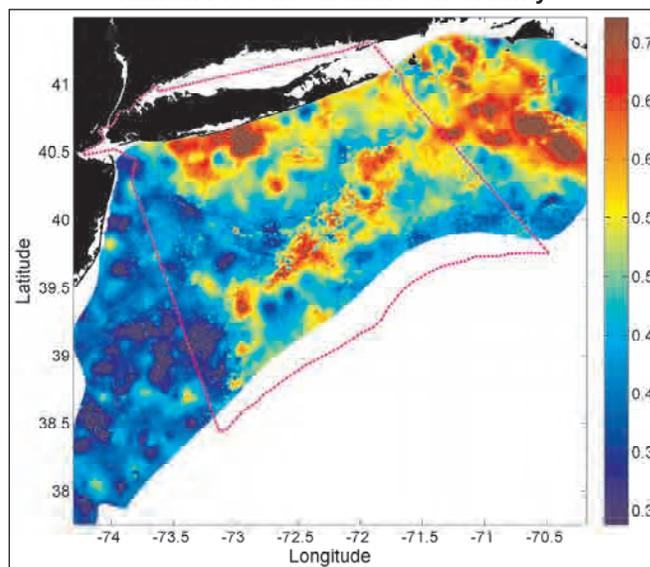
Black-legged Kittiwake

Stage I: Presence Probability Predictive Model

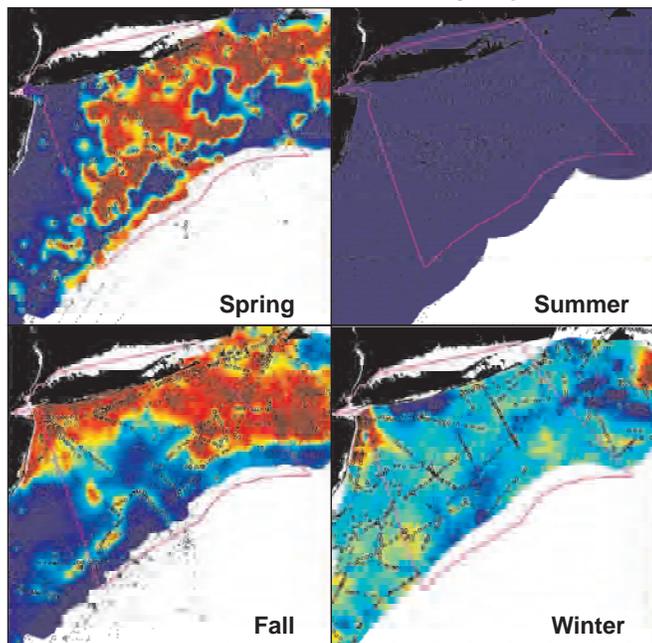
Annual Presence Probability



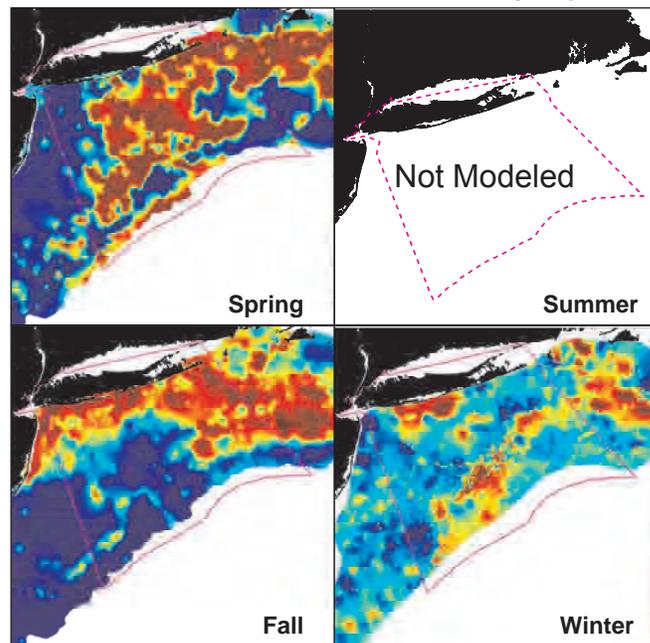
Annual Presence Relative Uncertainty



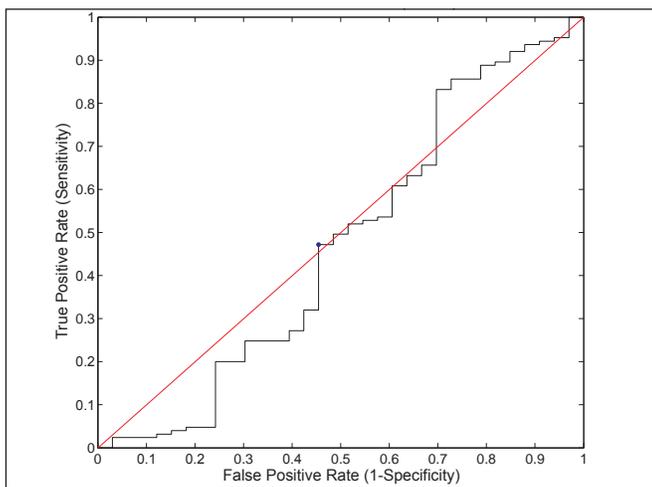
Seasonal Presence Probability Maps



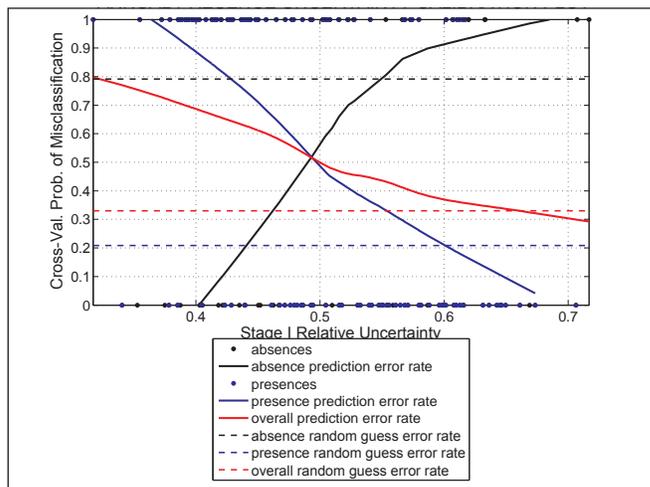
Seasonal Presence Relative Uncertainty Maps



Annual Cross-Validation ROC Plot



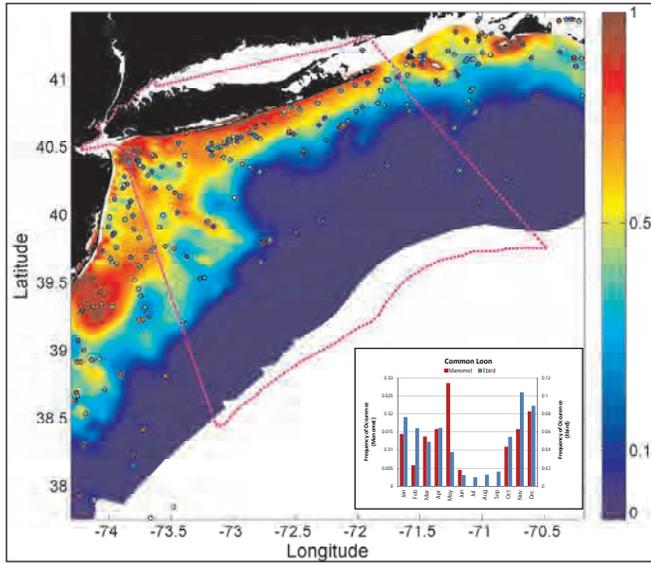
Annual Presence Uncertainty Calibration Plot



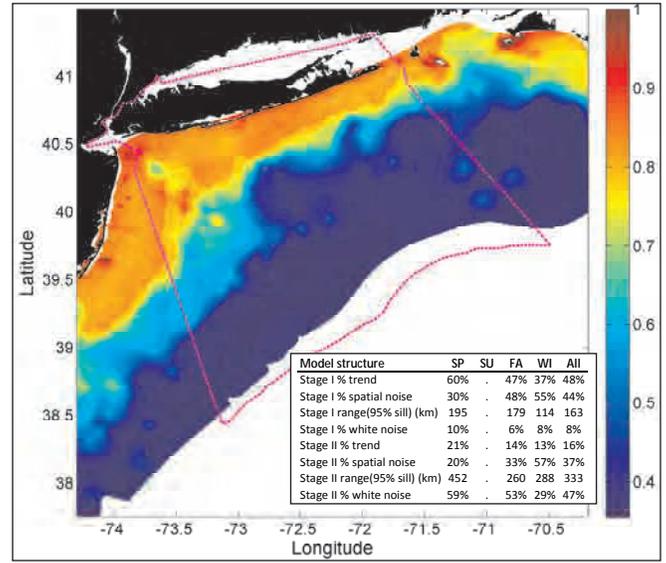
Common Loon

Stage I x II: Relative Abundance Predictive Model

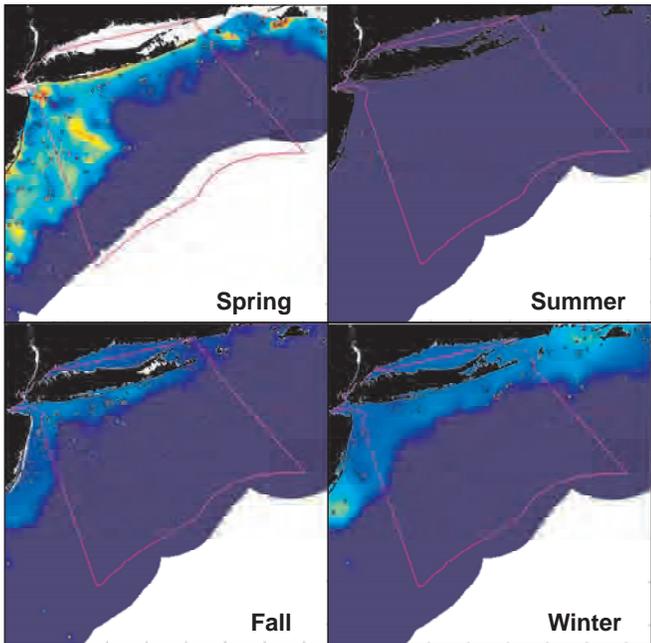
Annual Predicted SPUE Map



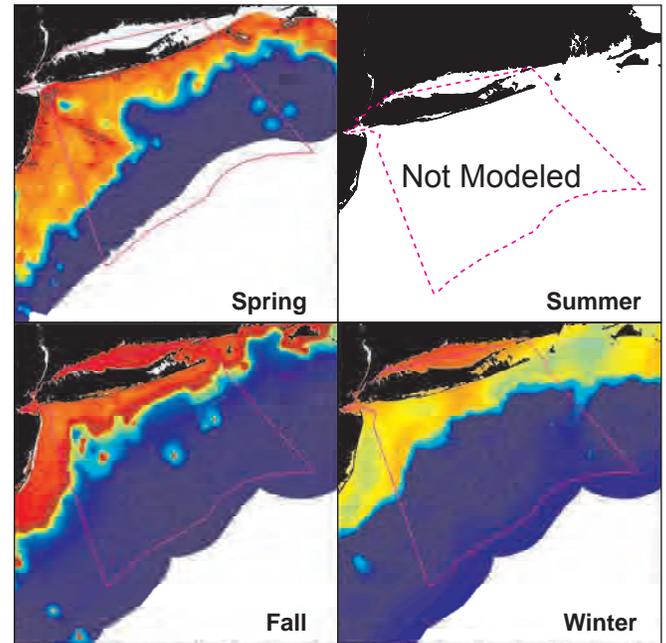
Annual SPUE Relative Uncertainty Map



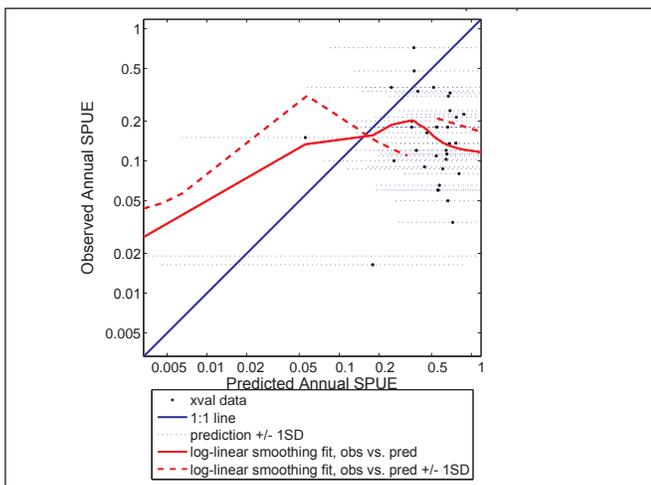
Seasonal Predicted SPUE Maps



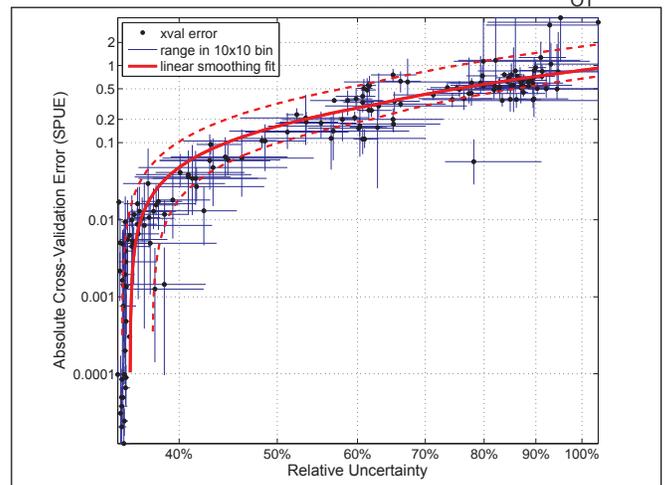
Seasonal SPUE Relative Uncertainty



Annual Cross-Val Observed vs. Predicted



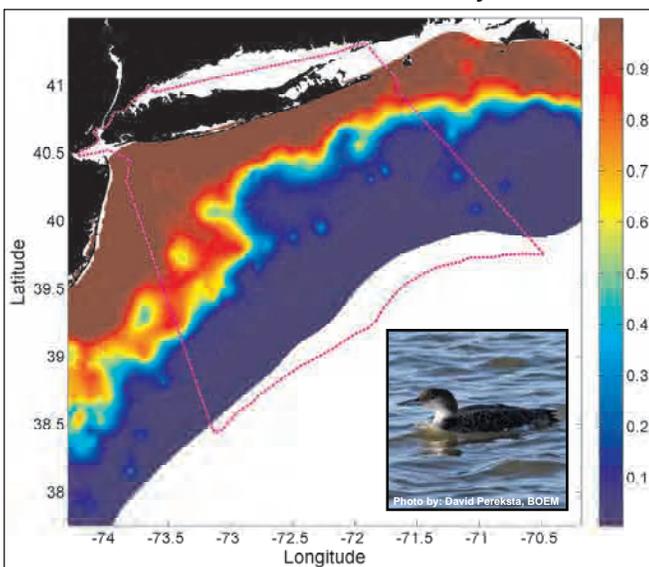
Annual SPUE Uncertainty Calibration Plot



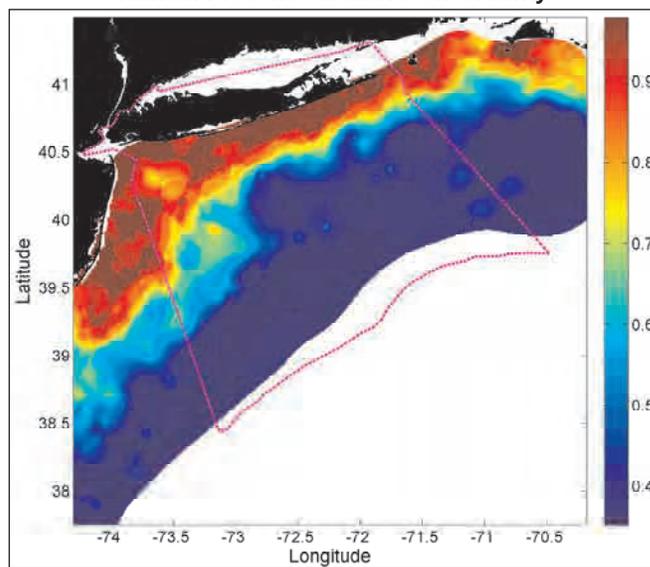
Common Loon

Stage I: Presence Probability Predictive Model

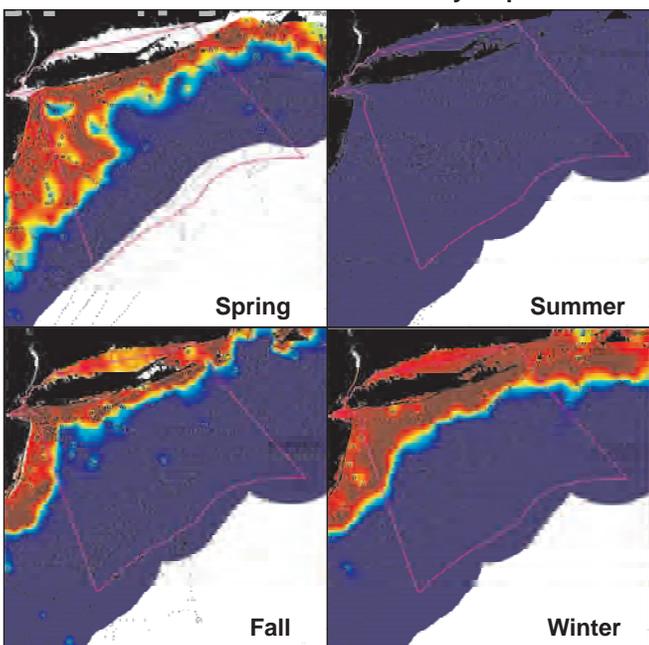
Annual Presence Probability



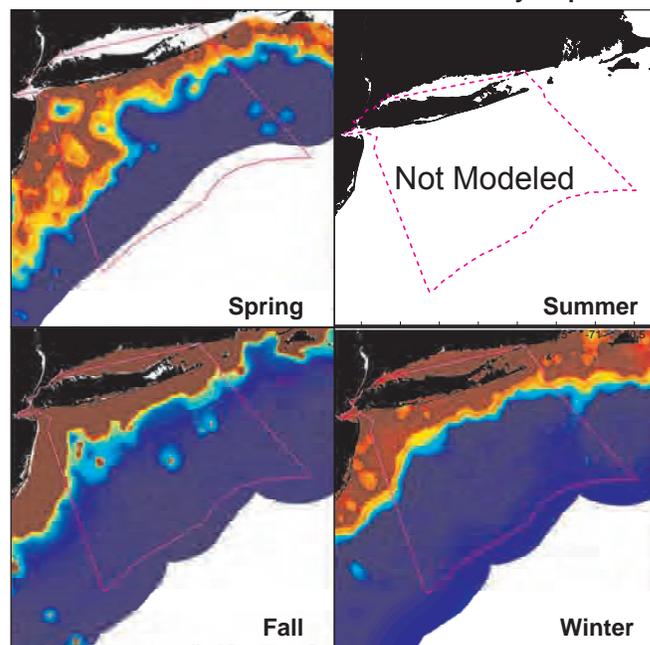
Annual Presence Relative Uncertainty



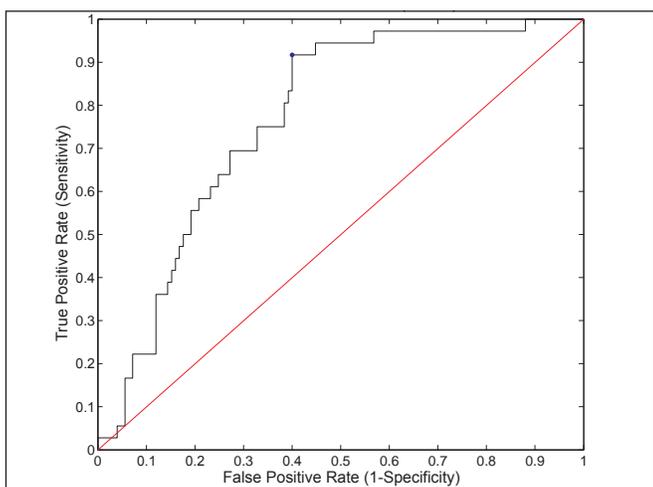
Seasonal Presence Probability Maps



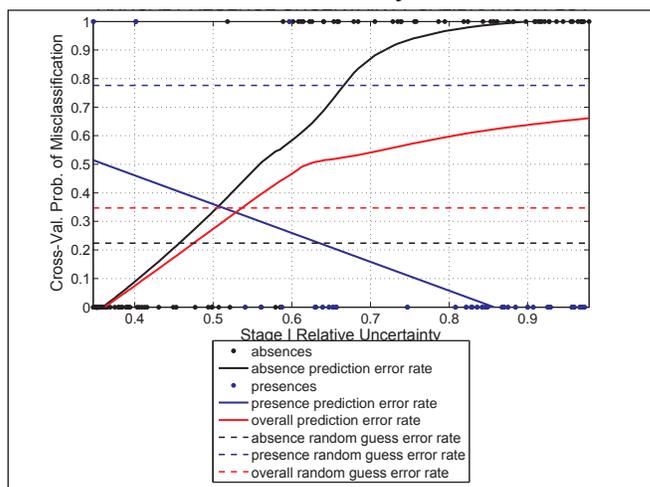
Seasonal Presence Relative Uncertainty Maps



Annual Cross-Validation ROC Plot



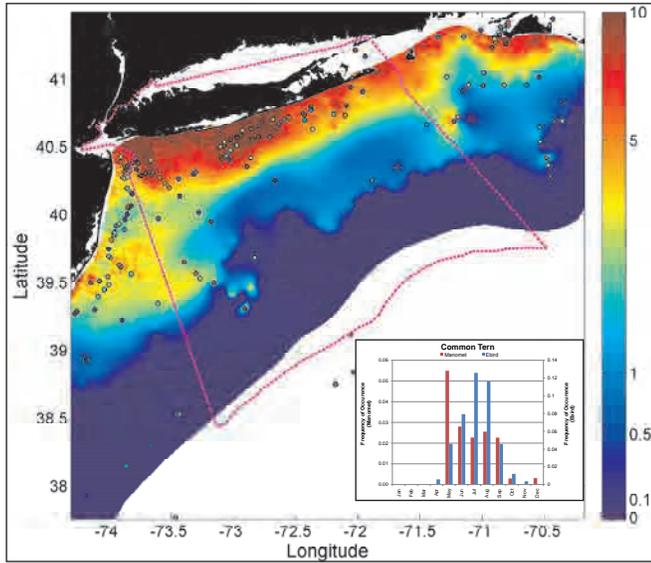
Annual Presence Uncertainty Calibration Plot



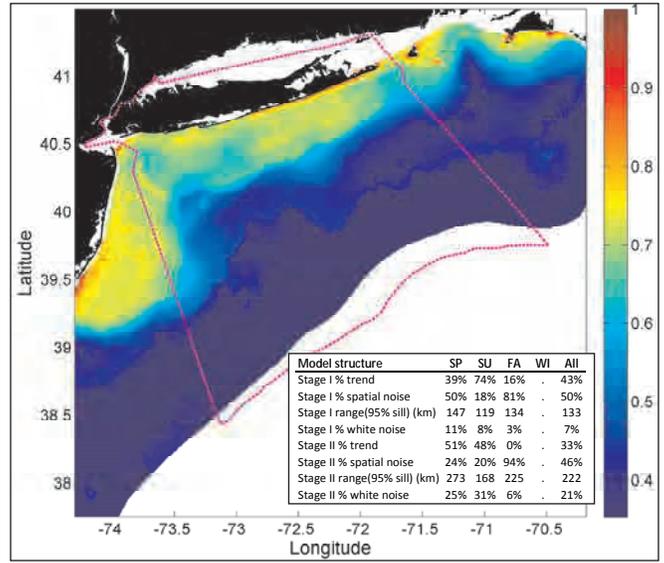
Common Tern

Stage I x II: Relative Abundance Predictive Model

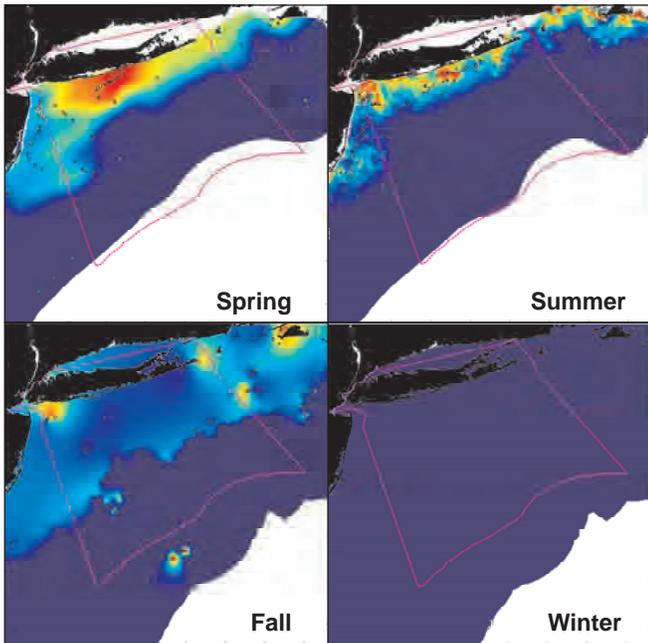
Annual Predicted SPUE Map



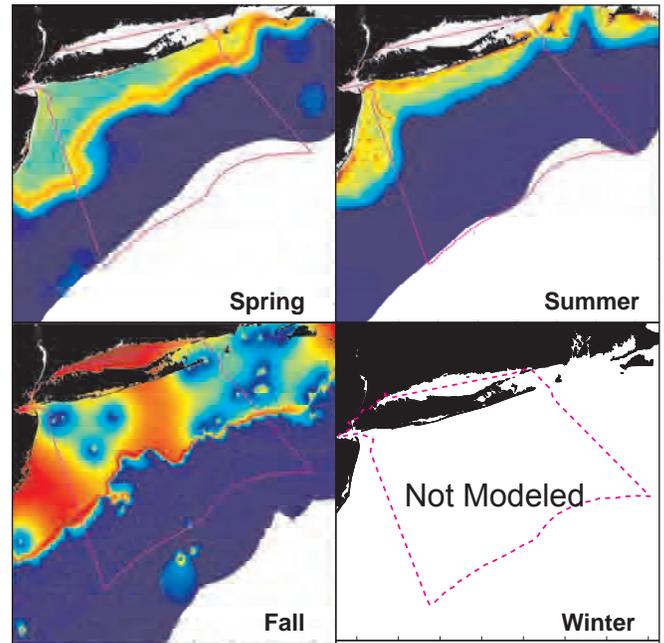
Annual SPUE Relative Uncertainty Map



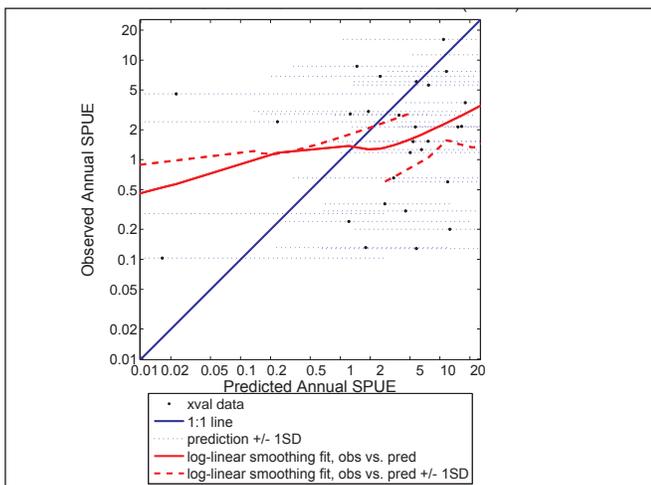
Seasonal Predicted SPUE Maps



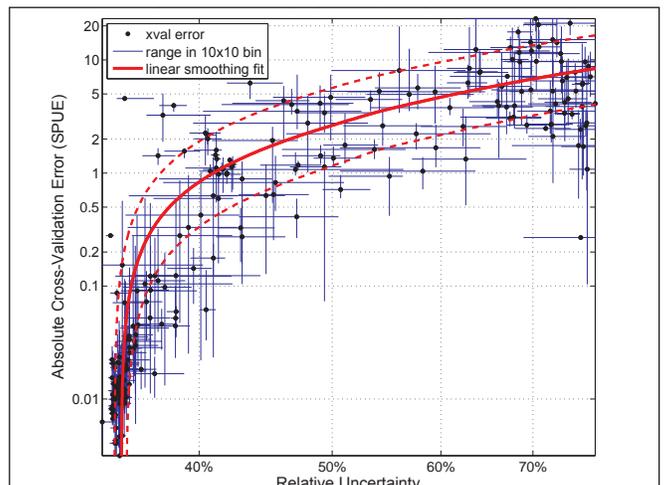
Seasonal SPUE Relative Uncertainty



Annual Cross-Val Observed vs. Predicted



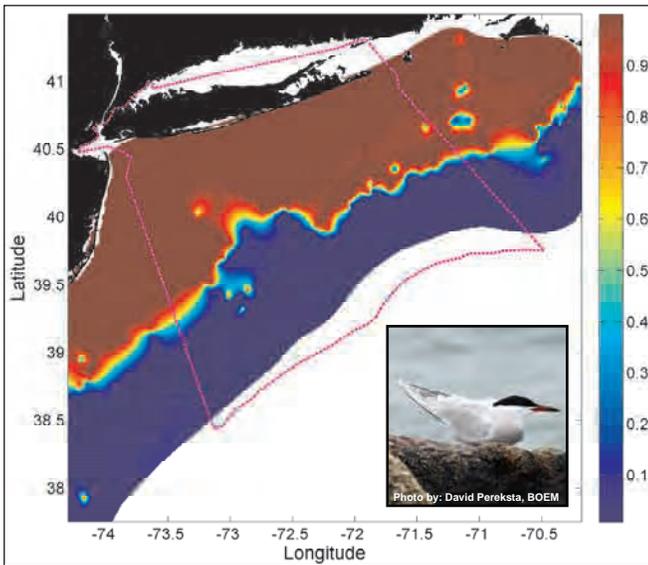
Annual SPUE Uncertainty Calibration Plot



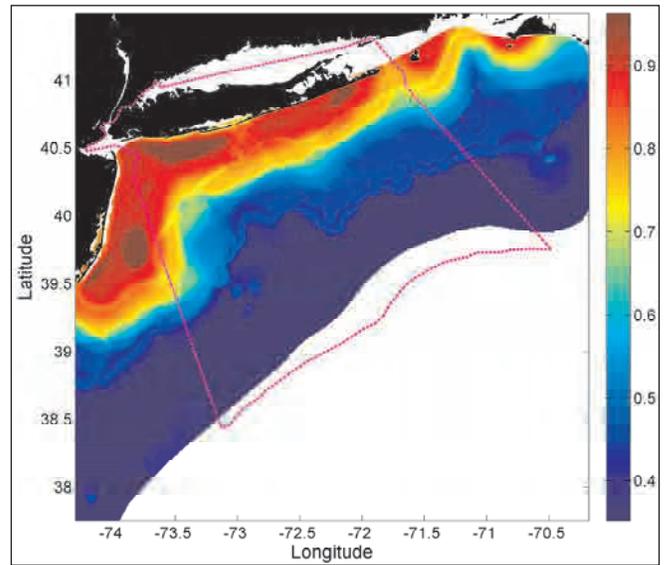
Common Tern

Stage I: Presence Probability Predictive Model

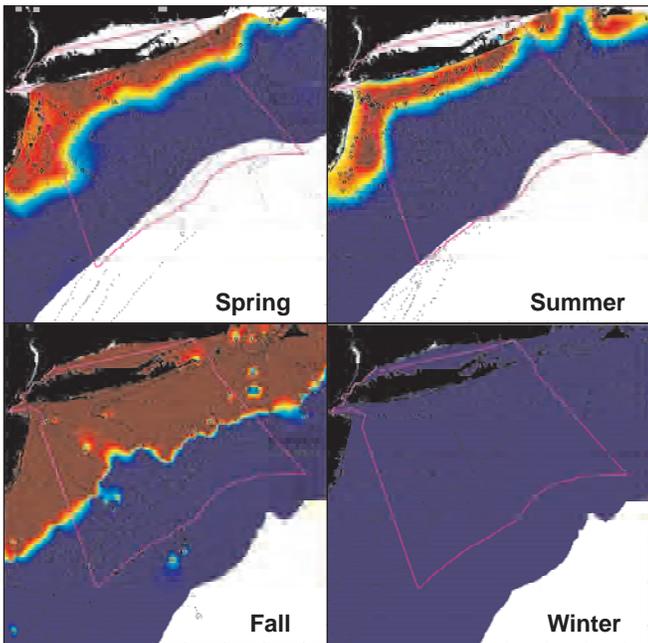
Annual Presence Probability



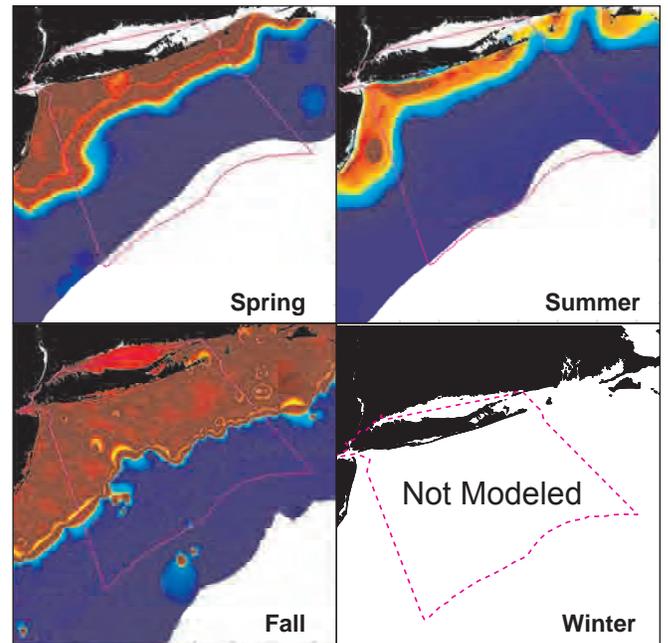
Annual Presence Relative Uncertainty



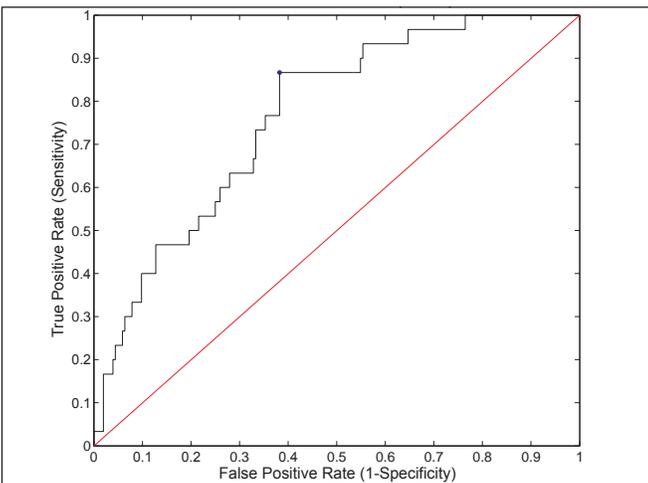
Seasonal Presence Probability Maps



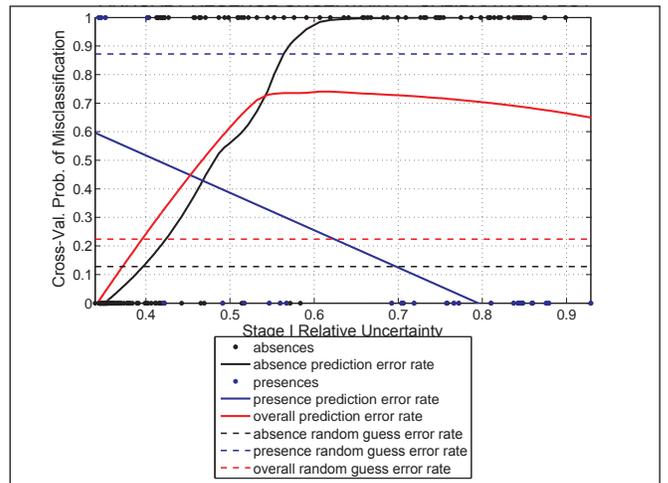
Seasonal Presence Relative Uncertainty Maps



Annual Cross-Validation ROC Plot



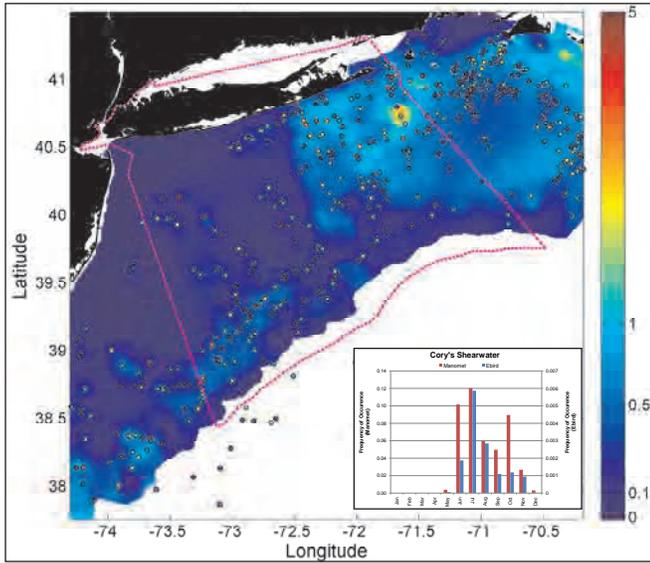
Annual Presence Uncertainty Calibration Plot



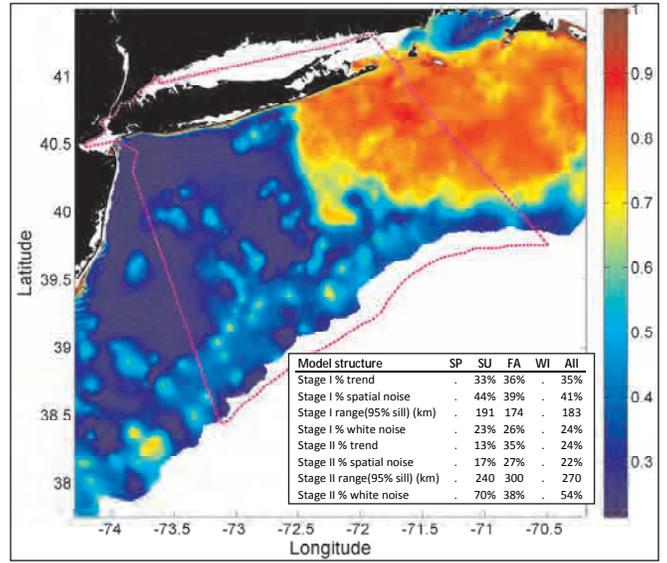
Cory's Shearwater

Stage I x II: Relative Abundance Predictive Model

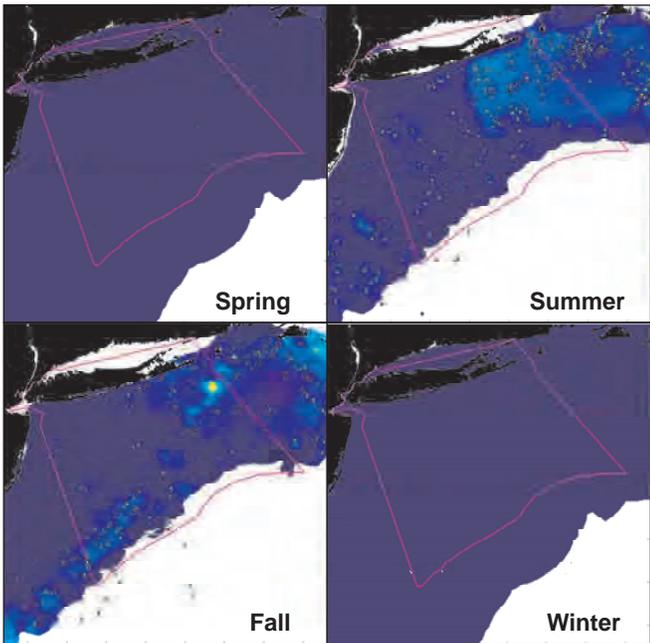
Annual Predicted SPUE Map



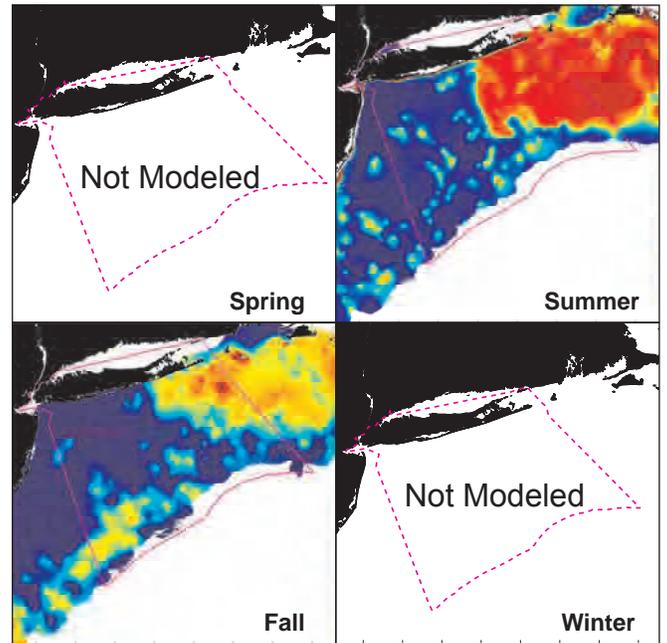
Annual SPUE Relative Uncertainty Map



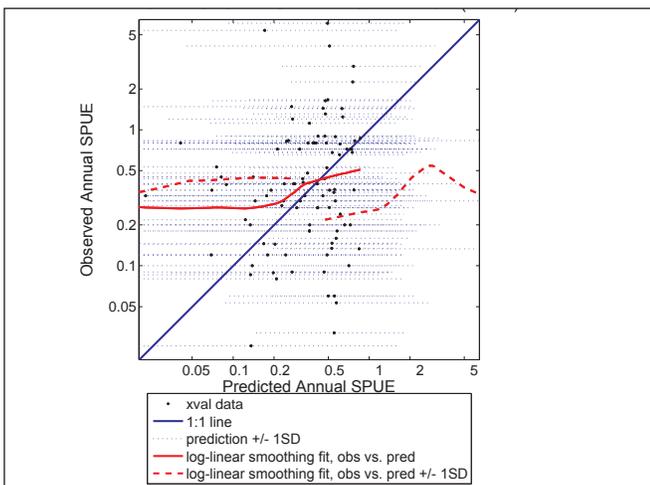
Seasonal Predicted SPUE Maps



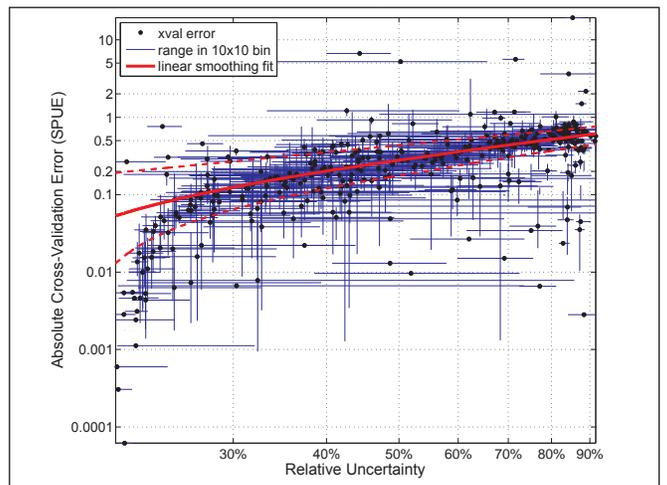
Seasonal SPUE Relative Uncertainty



Annual Cross-Val Observed vs. Predicted



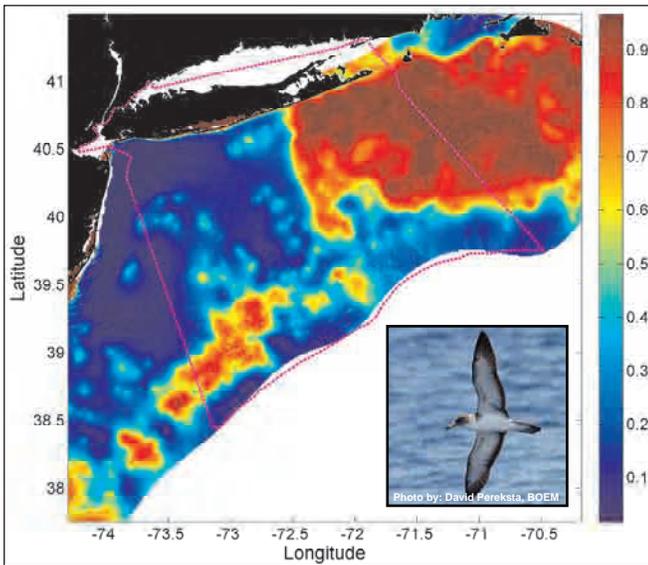
Annual SPUE Uncertainty Calibration Plot



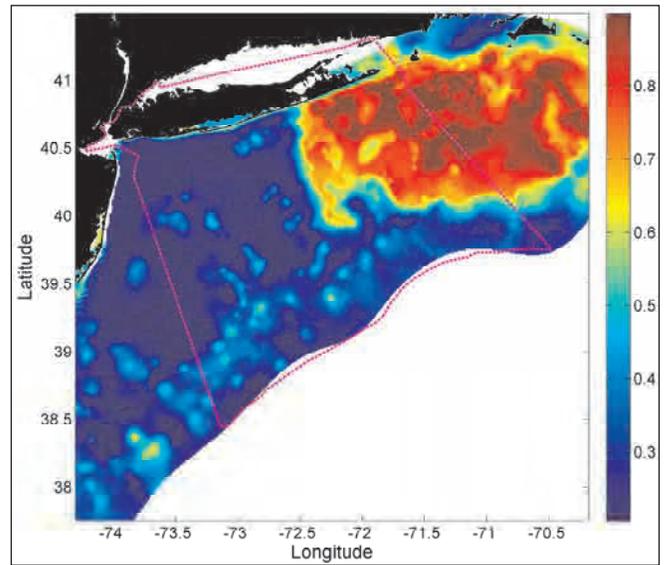
Cory's Shearwater

Stage I: Presence Probability Predictive Model

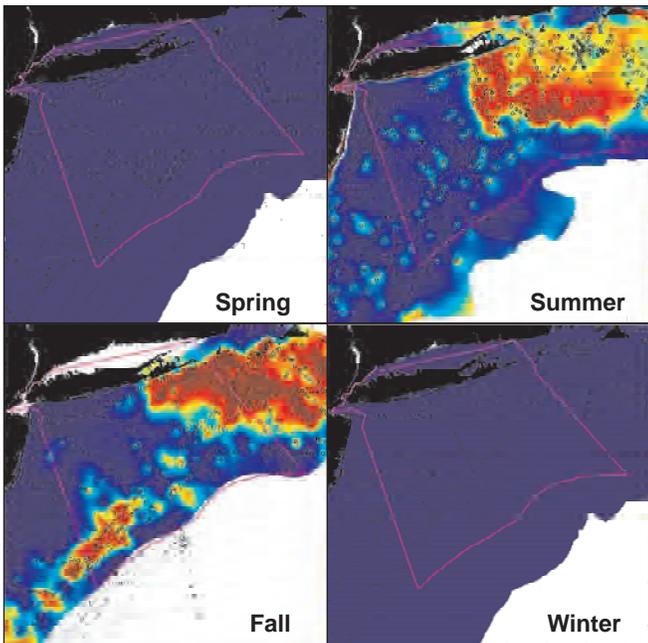
Annual Presence Probability



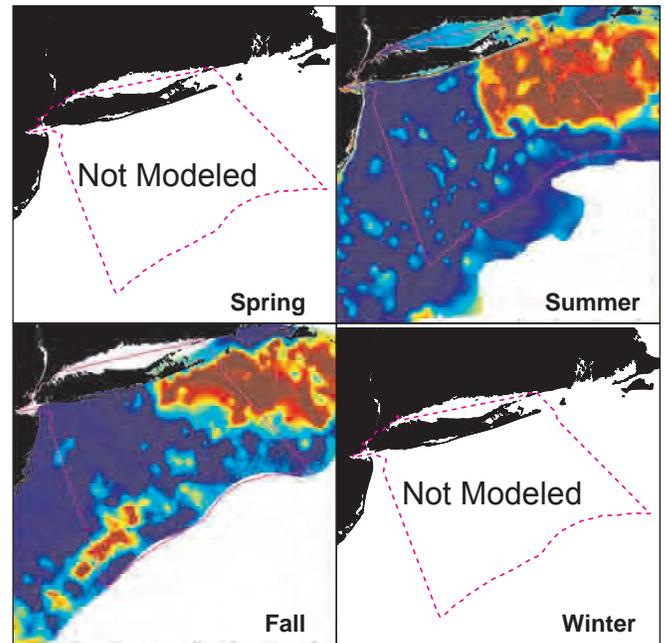
Annual Presence Relative Uncertainty



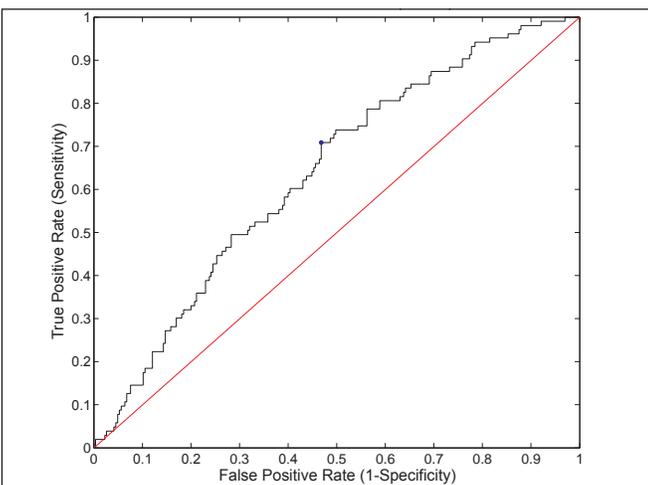
Seasonal Presence Probability Maps



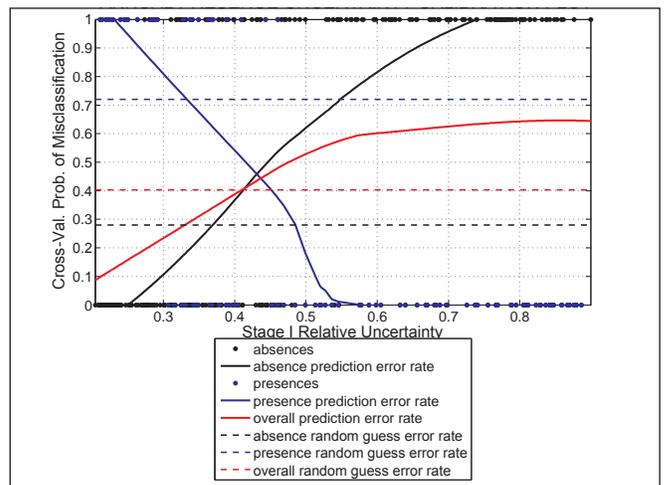
Seasonal Presence Relative Uncertainty Maps



Annual Cross-Validation ROC Plot



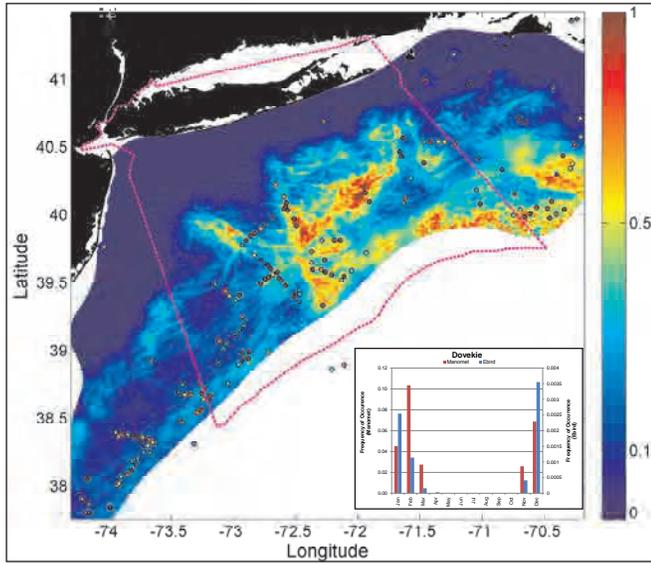
Annual Presence Uncertainty Calibration Plot



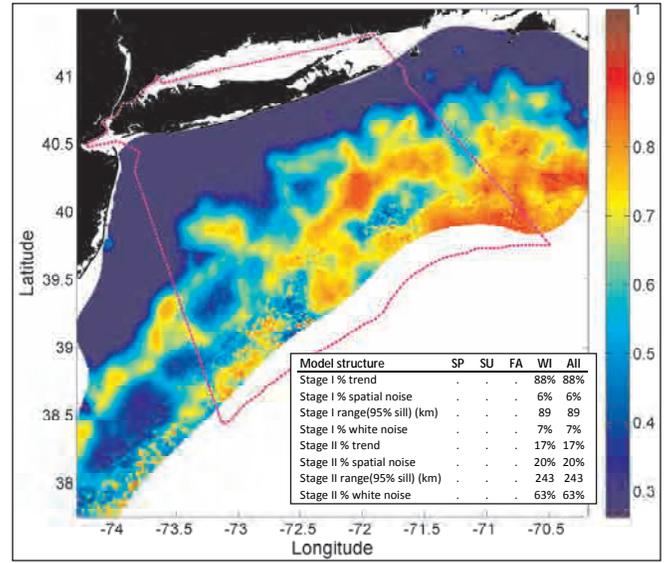
Dovekie

Stage I x II: Relative Abundance Predictive Model

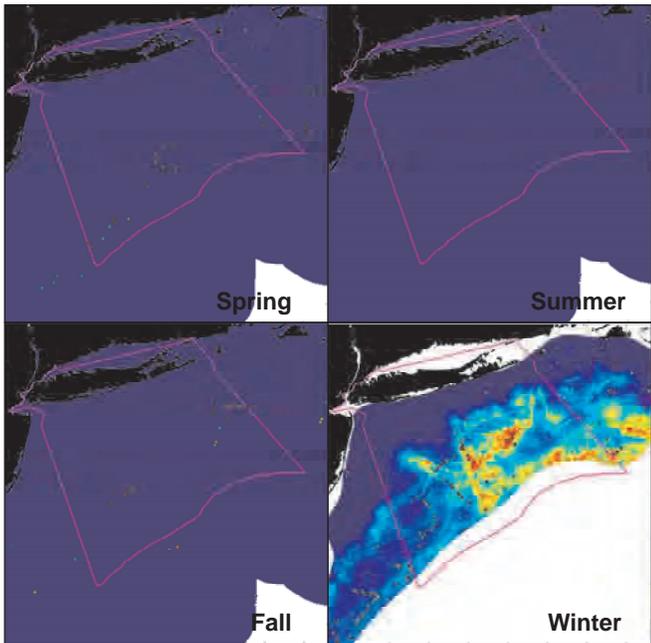
Annual Predicted SPUE Map



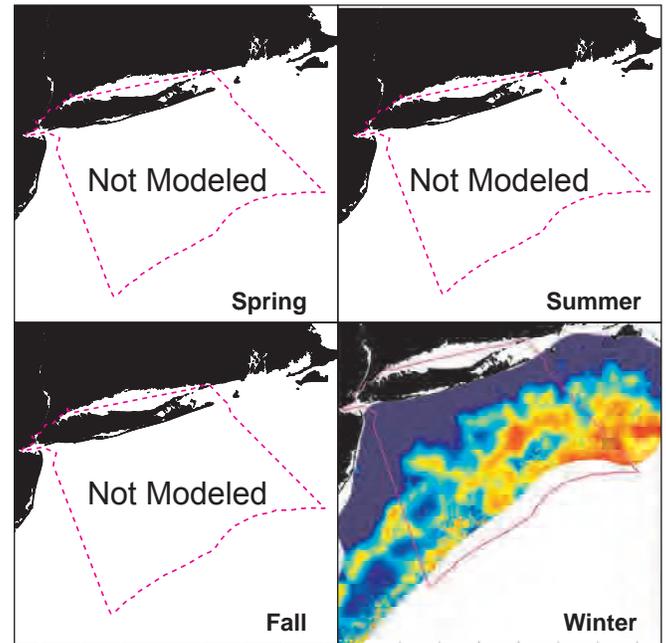
Annual SPUE Relative Uncertainty Map



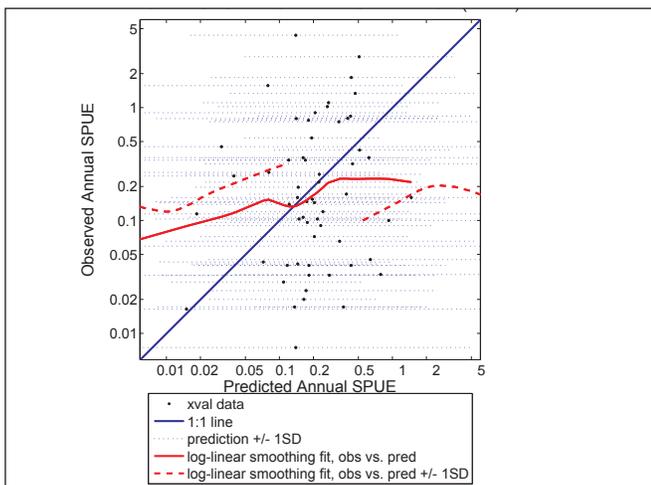
Seasonal Predicted SPUE Maps



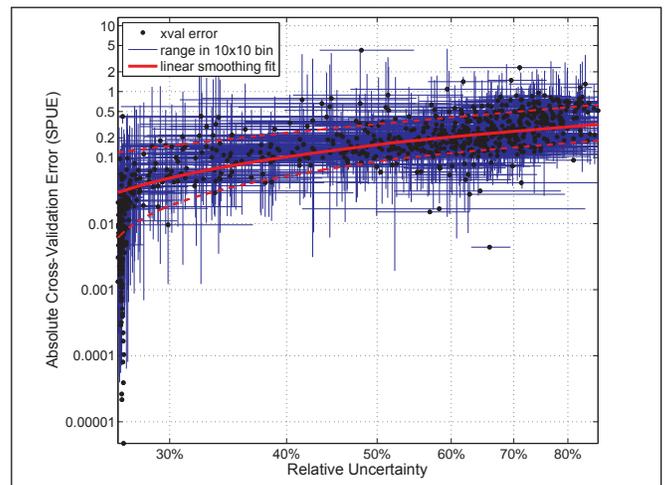
Seasonal SPUE Relative Uncertainty



Annual Cross-Val Observed vs. Predicted



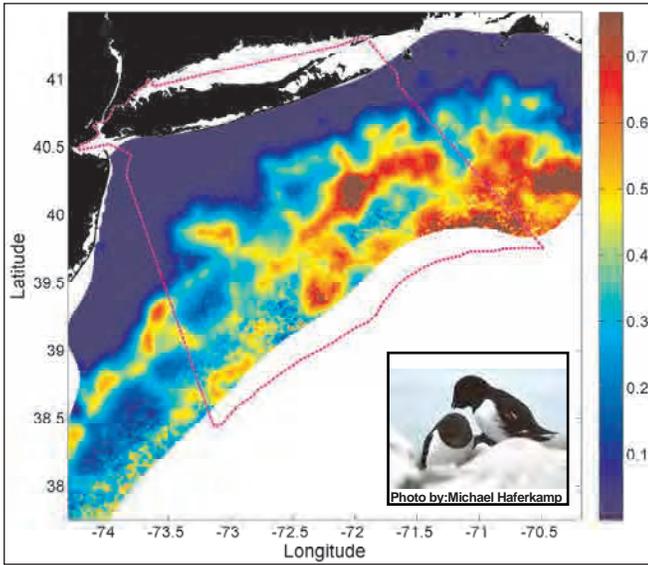
Annual SPUE Uncertainty Calibration Plot



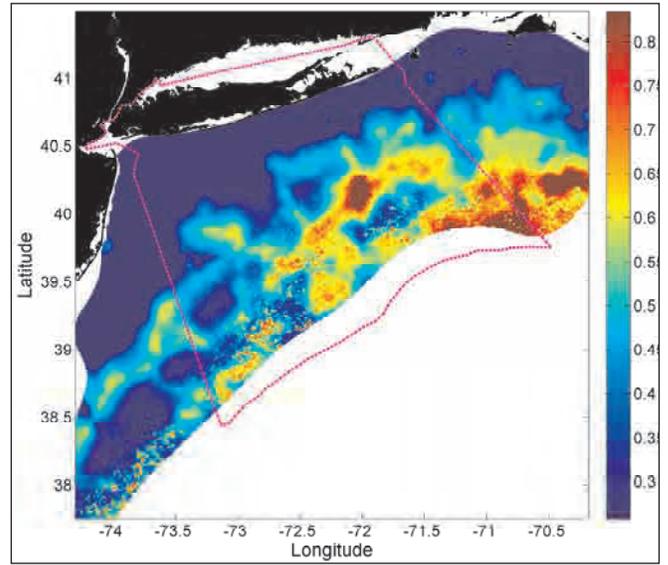
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Stage I: Presence Probability Predictive Model

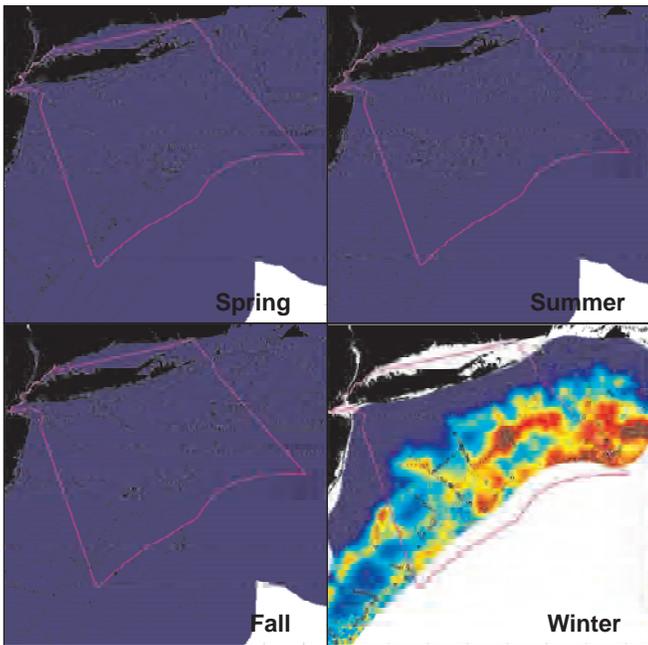
Annual Presence Probability



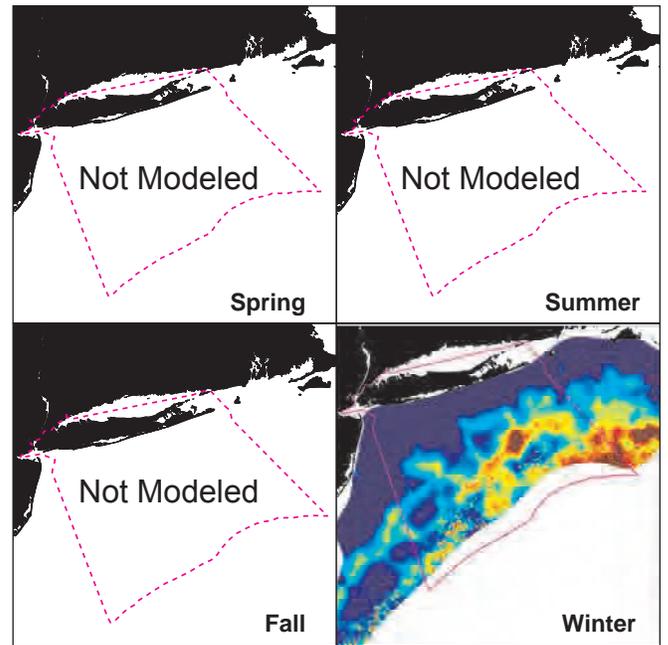
Annual Presence Relative Uncertainty



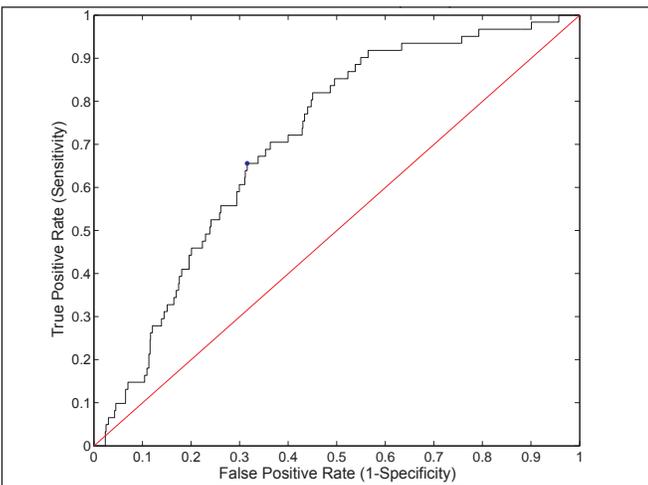
Seasonal Presence Probability Maps



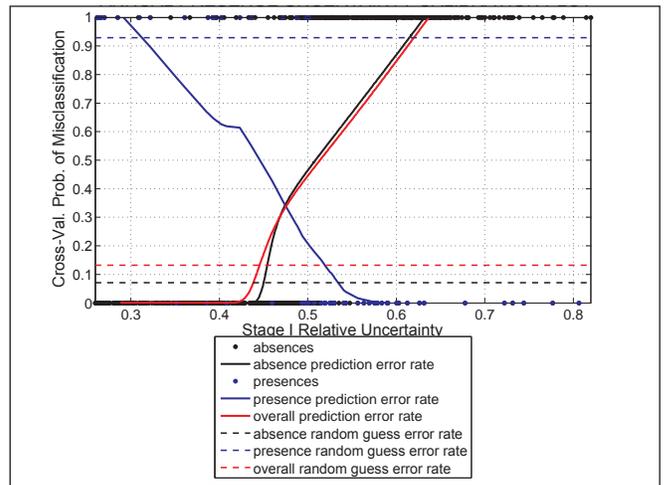
Seasonal Presence Relative Uncertainty Maps



Annual Cross-Validation ROC Plot



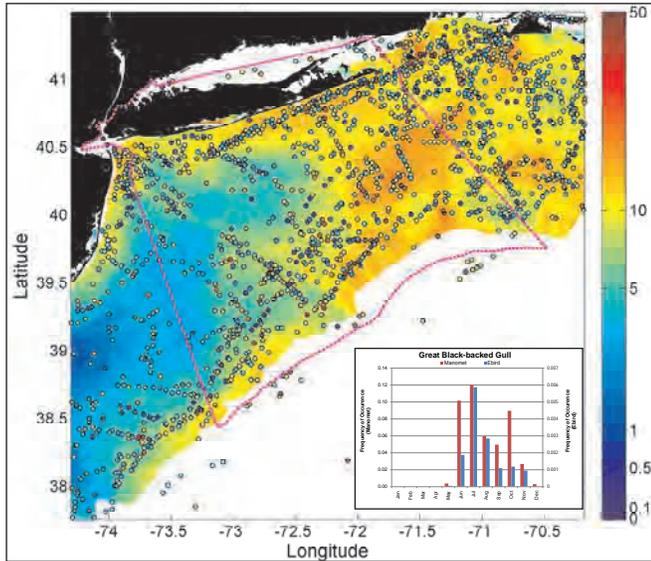
Annual Presence Uncertainty Calibration Plot



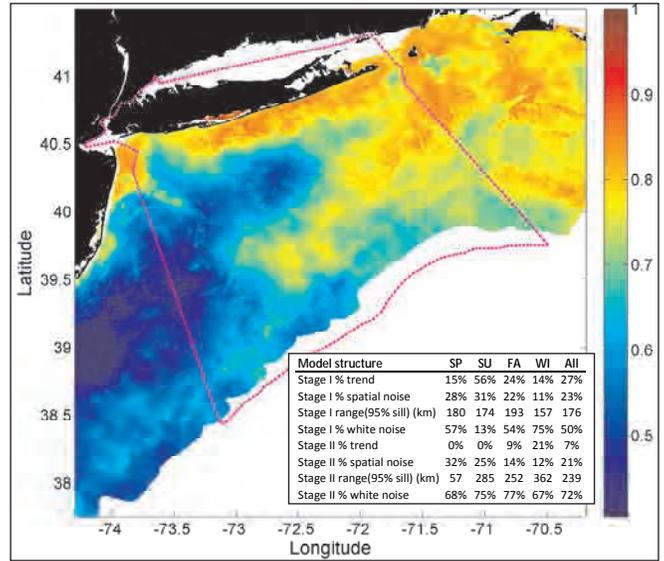
Great Black-backed Gull

Stage I x II: Relative Abundance Predictive Model

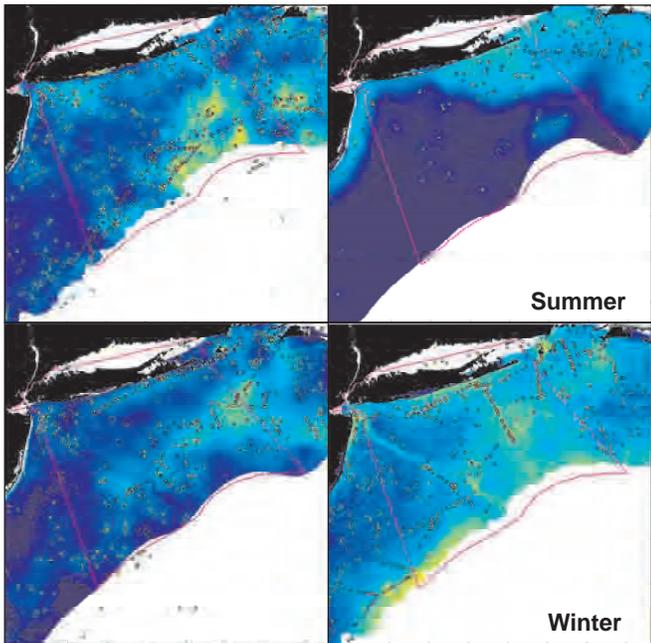
Annual Predicted SPUE Map



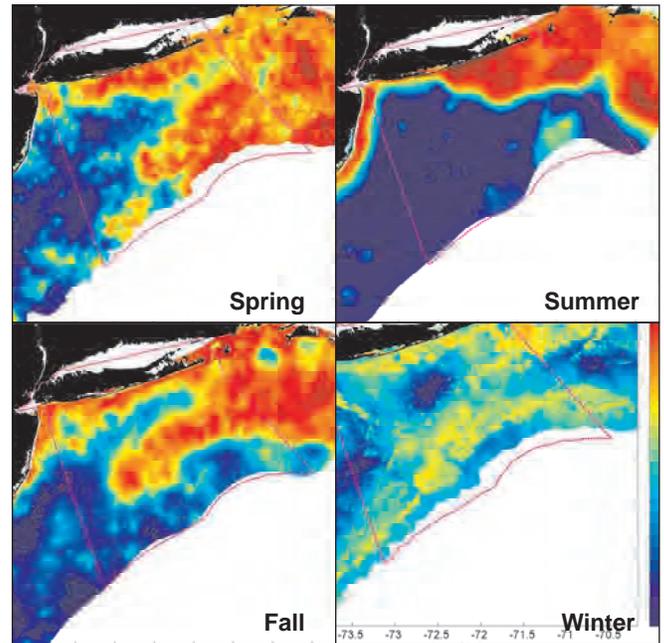
Annual SPUE Relative Uncertainty Map



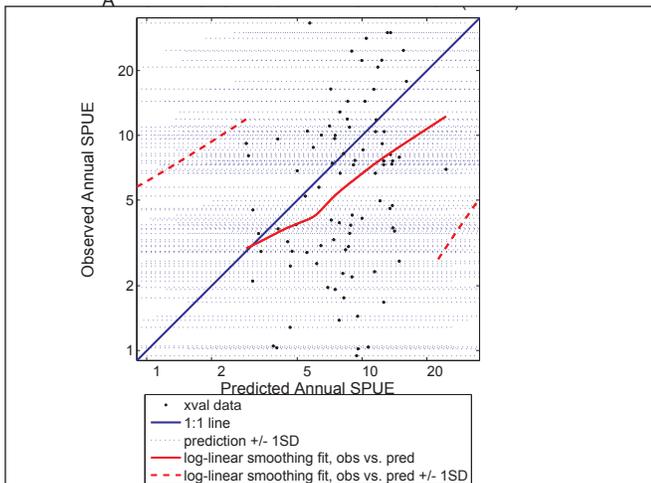
Seasonal Predicted SPUE Maps



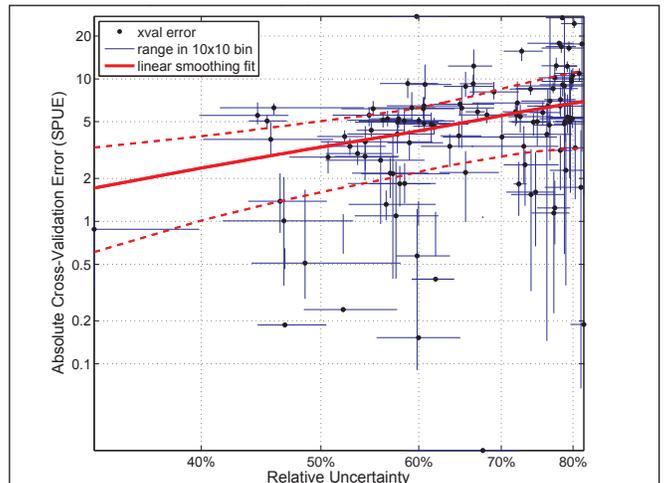
Seasonal SPUE Relative Uncertainty



Annual Cross-Val Observed vs. Predicted



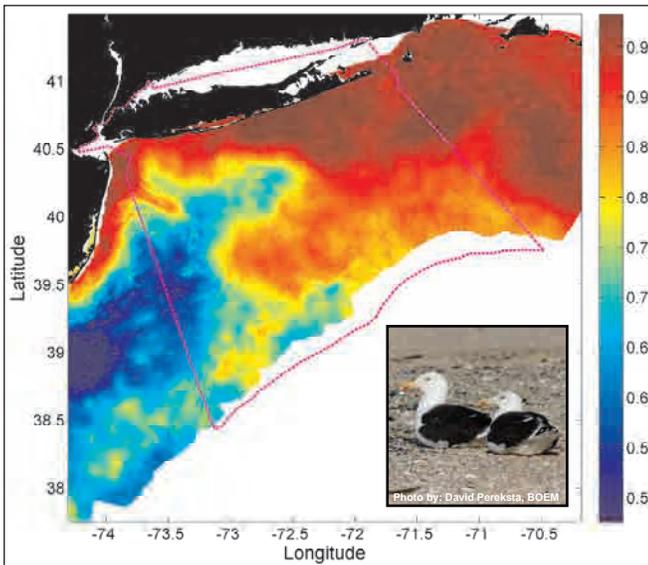
Annual SPUE Uncertainty Calibration Plot



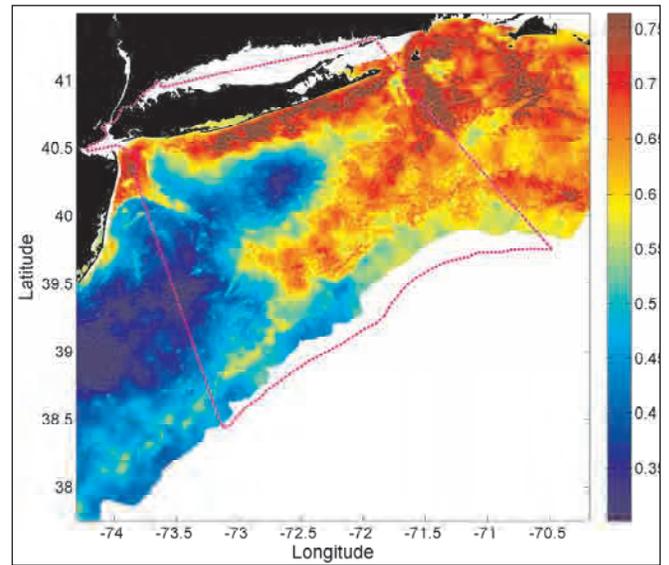
Great Black-backed Gull

Stage I: Presence Probability Predictive Model

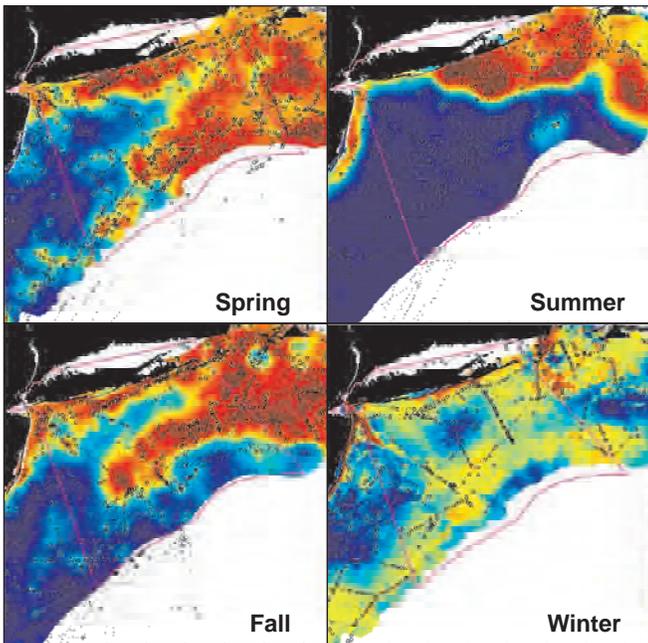
Annual Presence Probability



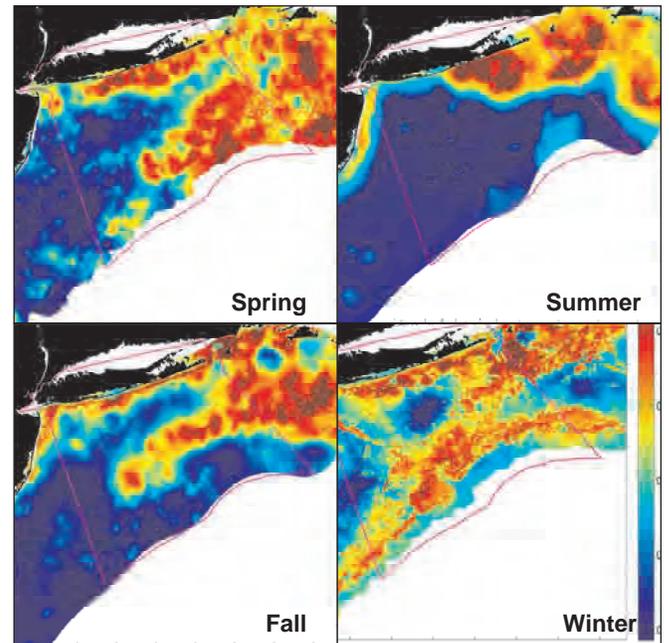
Annual Presence Relative Uncertainty



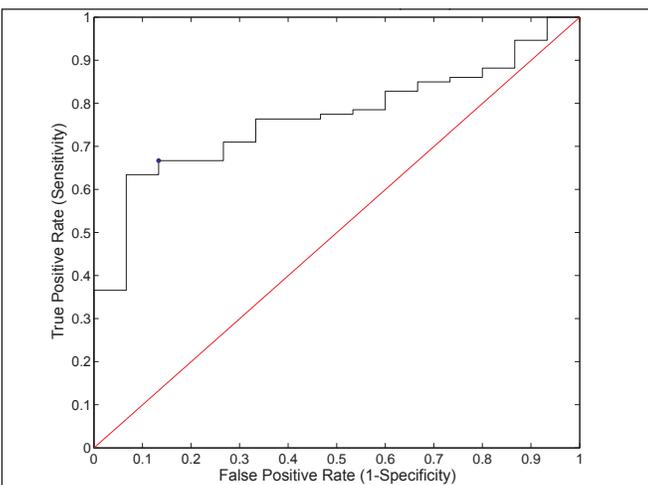
Seasonal Presence Probability Maps



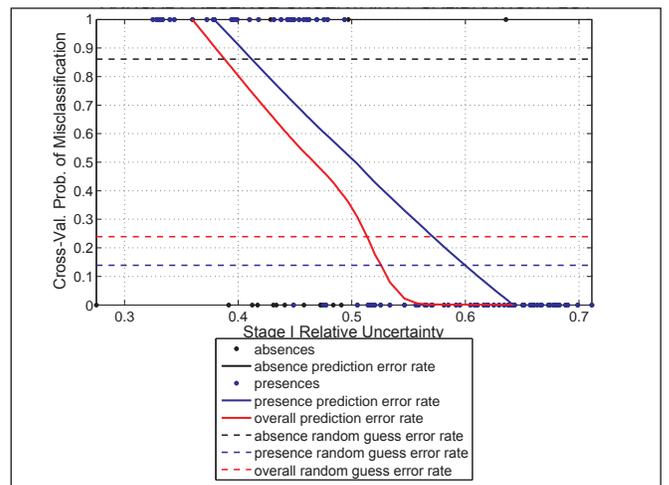
Seasonal Presence Relative Uncertainty Maps



Annual Cross-Validation ROC Plot



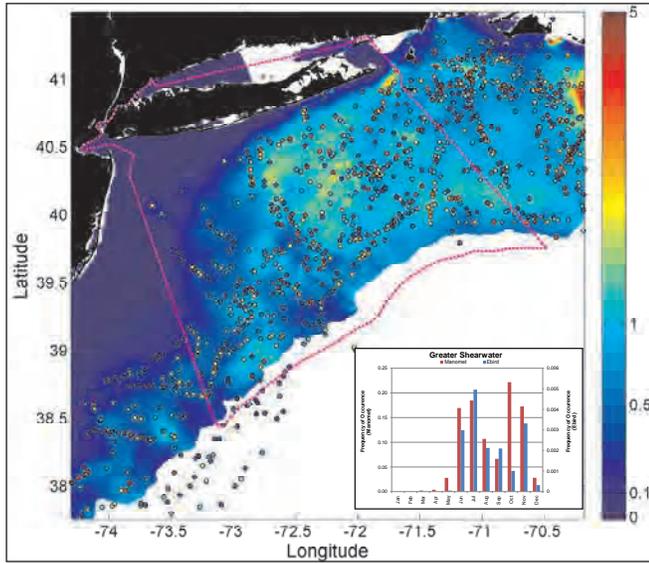
Annual Presence Uncertainty Calibration Plot



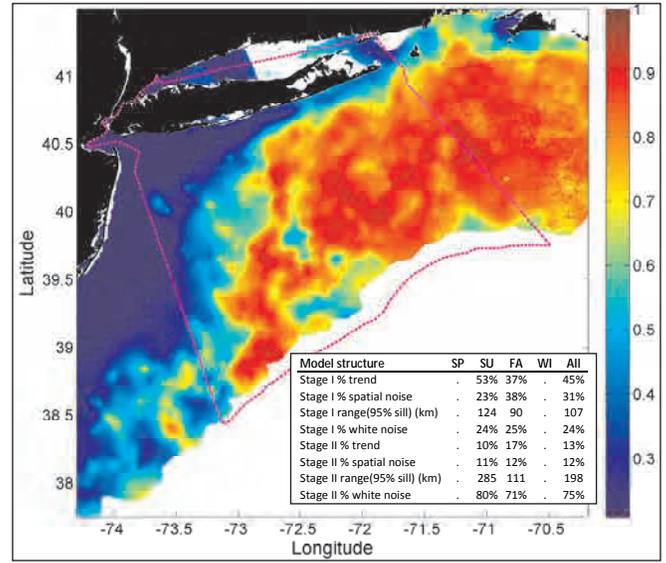
Great Shearwater

Stage I x II: Relative Abundance Predictive Model

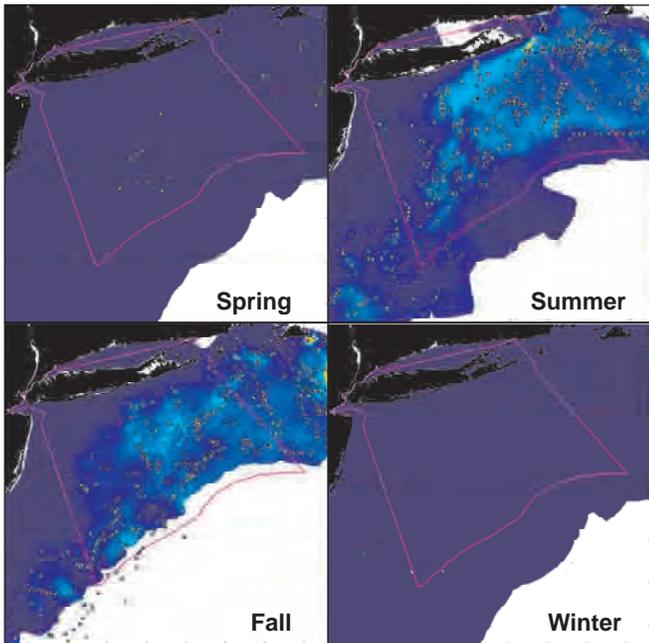
Annual Predicted SPUE Map



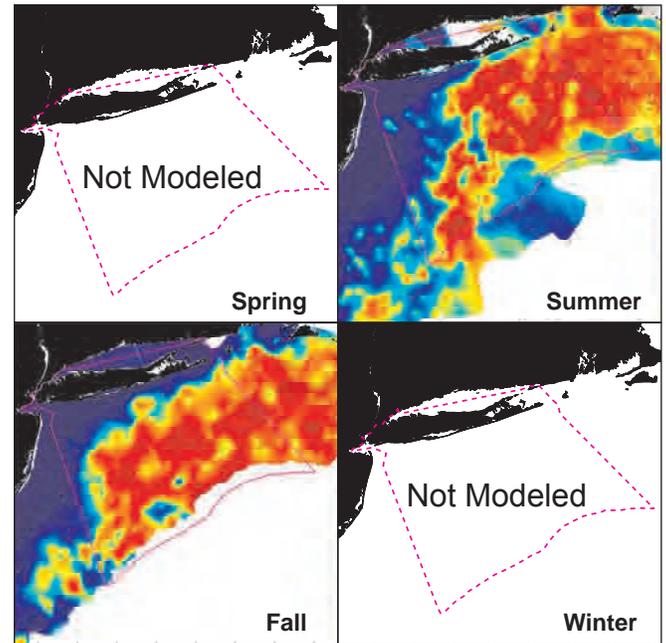
Annual SPUE Relative Uncertainty Map



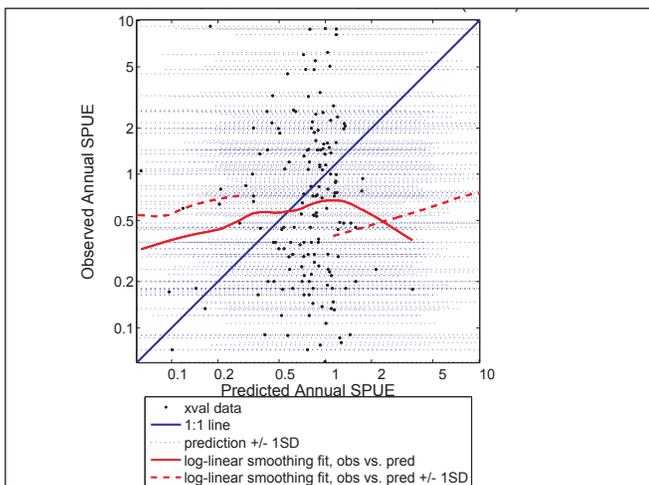
Seasonal Predicted SPUE Maps



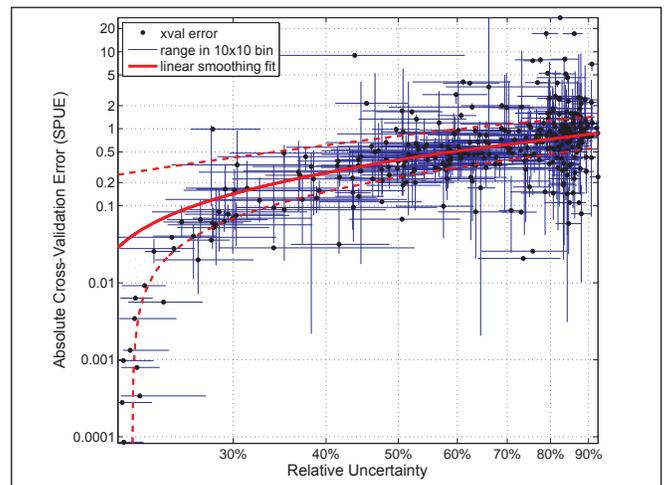
Seasonal SPUE Relative Uncertainty



Annual Cross-Val Observed vs. Predicted



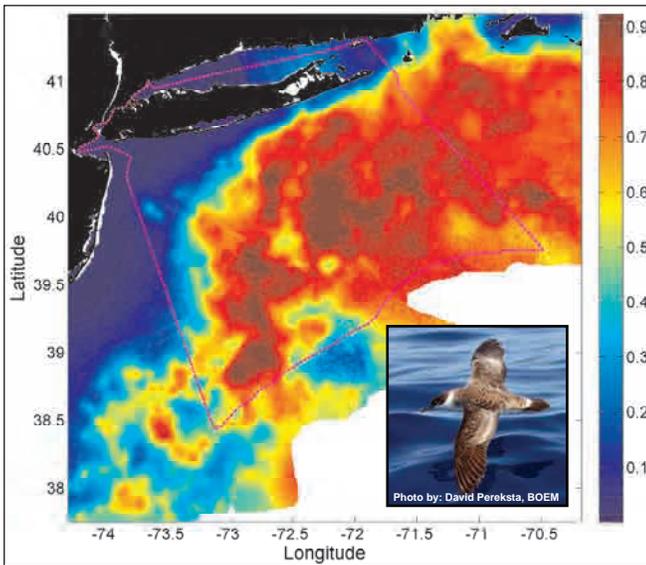
Annual SPUE Uncertainty Calibration Plot



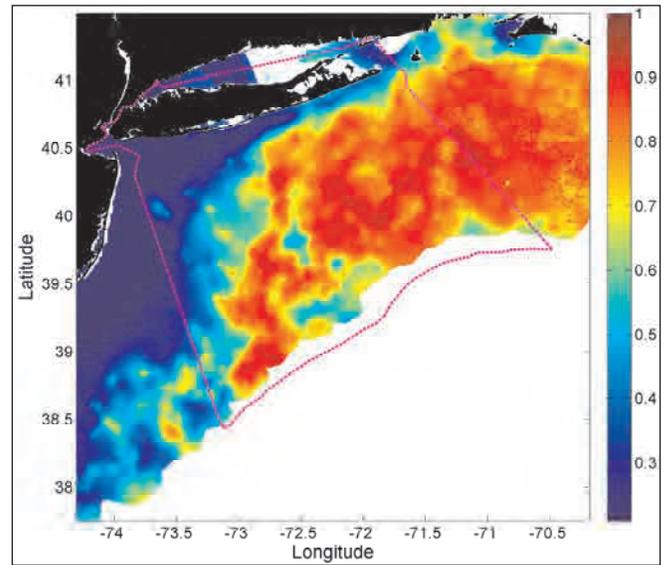
Great Shearwater

Stage I: Presence Probability Predictive Model

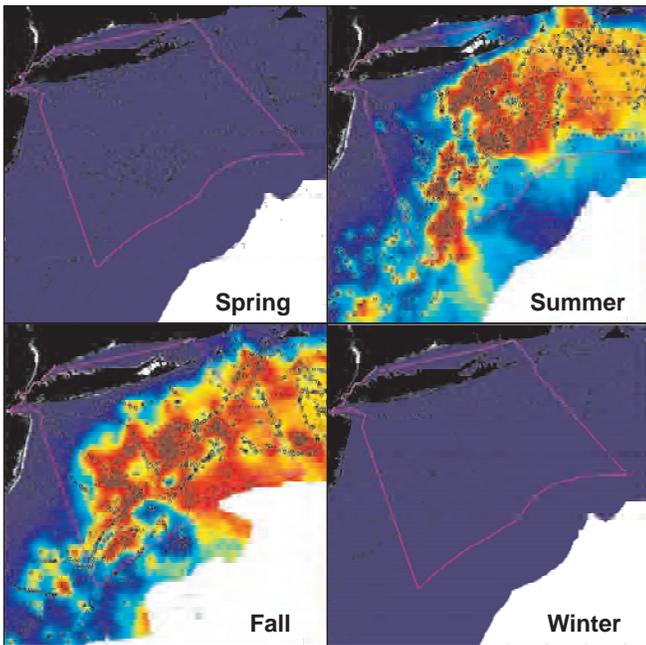
Annual Presence Probability



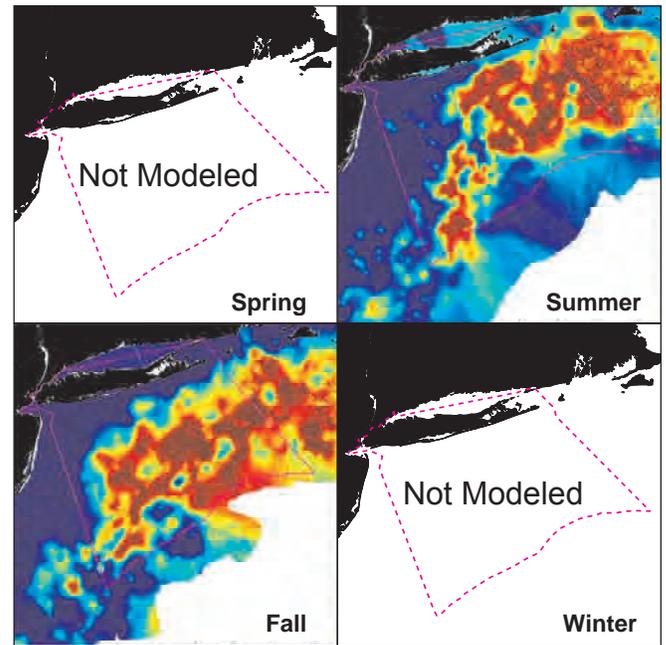
Annual Presence Relative Uncertainty



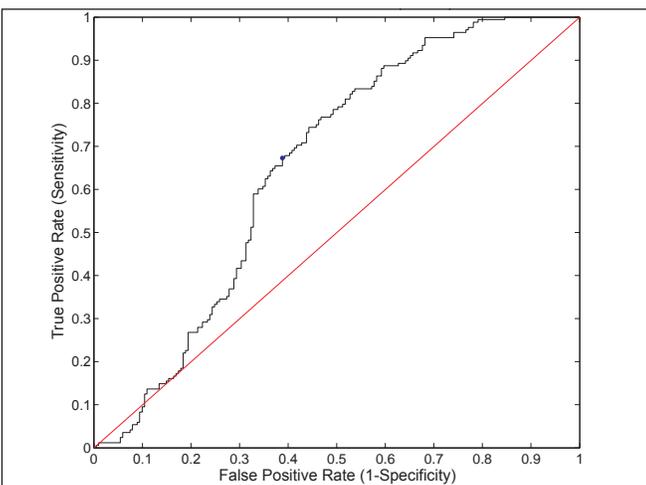
Seasonal Presence Probability Maps



Seasonal Presence Relative Uncertainty Maps



Annual Cross-Validation ROC Plot



Annual Presence Uncertainty Calibration Plot

