

April 30, 2016

Dr. Megan Tyrell  
North Atlantic LCC Coordinator  
U.S. Fish and Wildlife Service  
300 Westgate Center Drive  
Hadley, MA 01035

**Re: Performance Report – 04/30/2016  
F14AP00174**

Dear Megan:

Below is a detailed report highlighting the progress we have made on the above-referenced project as of April 30, 2016. Please do not hesitate to contact me to discuss any of the material provided here.

Sincerely,



Brooke Maslo, Ph.D.  
Assistant Professor

## PROTECTION OF CRITICAL BEACH-NESTING BIRD HABITATS IN THE WAKE OF SEVER COASTAL STORMS

### Interim Progress Report

April 30, 2016

#### Tasks Completed This Period

1. Completion of all NJ-based pre- and post-Sandy species distribution models, calculation of storm-created habitat, and response of target species to habitat changes.
2. Dissemination of Results at 2016 Piping Plover and Least Tern Workshop, Shepherdstown, WV (January 2016) and Northeast Association of Fish and Wildlife Agencies 72<sup>nd</sup> Annual Conference, Annapolis, MD (April 2016)
3. Submission of Final Draft: *Identification of Potential Beach-nesting Bird Habitat to be Set Aside in Municipal Beach Management Plans*
4. Evaluation of the 4 target species as “umbrellas” for beach-nesting bird conservation.
5. Creation of preliminary beach-nesting bird habitat assessment protocols for use after significant coastal storms.

1. Completion of all NJ-based pre- and post-Sandy species distribution models, calculation of storm-created habitat, and response of target species to habitat changes.

All models have been finalized, and we are now in the process of compiling the data and extracting the important results for future dissemination. We anticipate completion of this task by mid-summer.

2. Dissemination of Results at 2016 Piping Plover and Least Tern Workshop, Shepherdstown, WV (January 2016) and Northeast Association of Fish and Wildlife Agencies 72<sup>nd</sup> Annual Conference, Annapolis, MD (April 2016)

On January 14, 2016, Dr. Brooke Maslo (Rutgers) and Todd Pover (Conserve Wildlife Foundation of New Jersey) presented a talk entitled *Identifying Newly Created Habitat after Superstorm Sandy* to participants of the 2016 Piping Plover and Least Tern Workshop in Shepherdstown, WV. The presentation summarized the results of our analyses on piping plovers. We highlighted the following findings: 1) prior to Superstorm Sandy, NJ had ~675 ha of suitable habitat (as defined by areas with a piping plover probability of occurrence >0.47); 2) Superstorm Sandy created ~32 ha of additional habitat; however, habitat was largely restricted to areas that are already managed for beach-nesting birds; 3) running the model with the assumption that all portions of the study area have the potential to be managed for beach-nesting birds significantly

increased the total amount of suitable habitat; and 4) there is a lag time between the creation of new habitat and occupancy by piping plovers.

On April 4, 2016, Dr. Maslo presented a truncated version of this work at the Northeast Association of Fish and Wildlife Agencies in Annapolis, MD.

### 3. Submission of Final Draft: *Identification of Potential Beach-nesting Bird Habitat to be Set Aside in Municipal Beach Management Plans*

In Fall 2015, we completed a draft report entitled *Identification of Potential Beach-nesting Bird Habitat to Be Set Aside in Municipal Beach Management Plans*. The purpose of the document is to provide a decision support tool for the USFWS NJ Field Office (NJFO) and the NJ Endangered and Nongame Species Program (ENSP) to provide evidence-based justification for the inclusion of beach-nesting bird habitat management into municipal beach management plans, particularly in areas where beach-nesting birds are not present. The report provides detailed information on the purpose of the document, the methods used in identifying suitable habitat, and the total amount of potential habitat existing within each municipality. We also provide a map of each municipality that illustrates where potential habitat occurs. We solicited feedback from several agencies, including USFWS, NJFO, ENSP, and the North Atlantic LCC, and we received very helpful comments and suggestions. In March 2016, we submitted the final report to all stakeholder groups.

### 4. Evaluation of the 4 target species as “umbrellas” for beach-nesting bird conservation.

As an extension of our work, we conducted an investigation of each of our target beach-nesting birds as a potential umbrella species for conservation. We used the pre-Sandy species distribution models we developed to identify overlap in the spatial extent and niche characteristics among piping plovers, American oystercatchers, least terns and black skimmers. We also quantified the benefit and efficiency of using each species as a candidate conservation umbrella for the remaining group.

The Maxent models identified ~649 ha of piping plover habitat within the study area, which encompassed ~86% of the total least tern habitat, but only 14.6% and 13.2% of black skimmer and American oystercatcher habitat, respectively (Table 1). In contrast, ~4,520 ha of suitable American oystercatcher habitat exist across the study area, covering 100% of the total piping plover habitat, ~99% of least tern habitat, and 47% of black skimmer habitat. In general, piping plover and least tern habitat was restricted to oceanfront sandy beaches. Black skimmer habitat suitability peaked in large, undeveloped sandy spits and also extended into salt marshes in the back bay system (Fig. 1). American oystercatcher habitat appeared distributed more evenly across both beach and marsh habitats. Oystercatchers co-occurred with at least one other beach-nesting bird across 37% (~1,8389 ha) of their habitat extent (Fig. 2), while least terns co-occurred with all three remaining species across 72% (~425 ha). Interestingly, all four species co-occurred across the same ~425 ha of the study area.

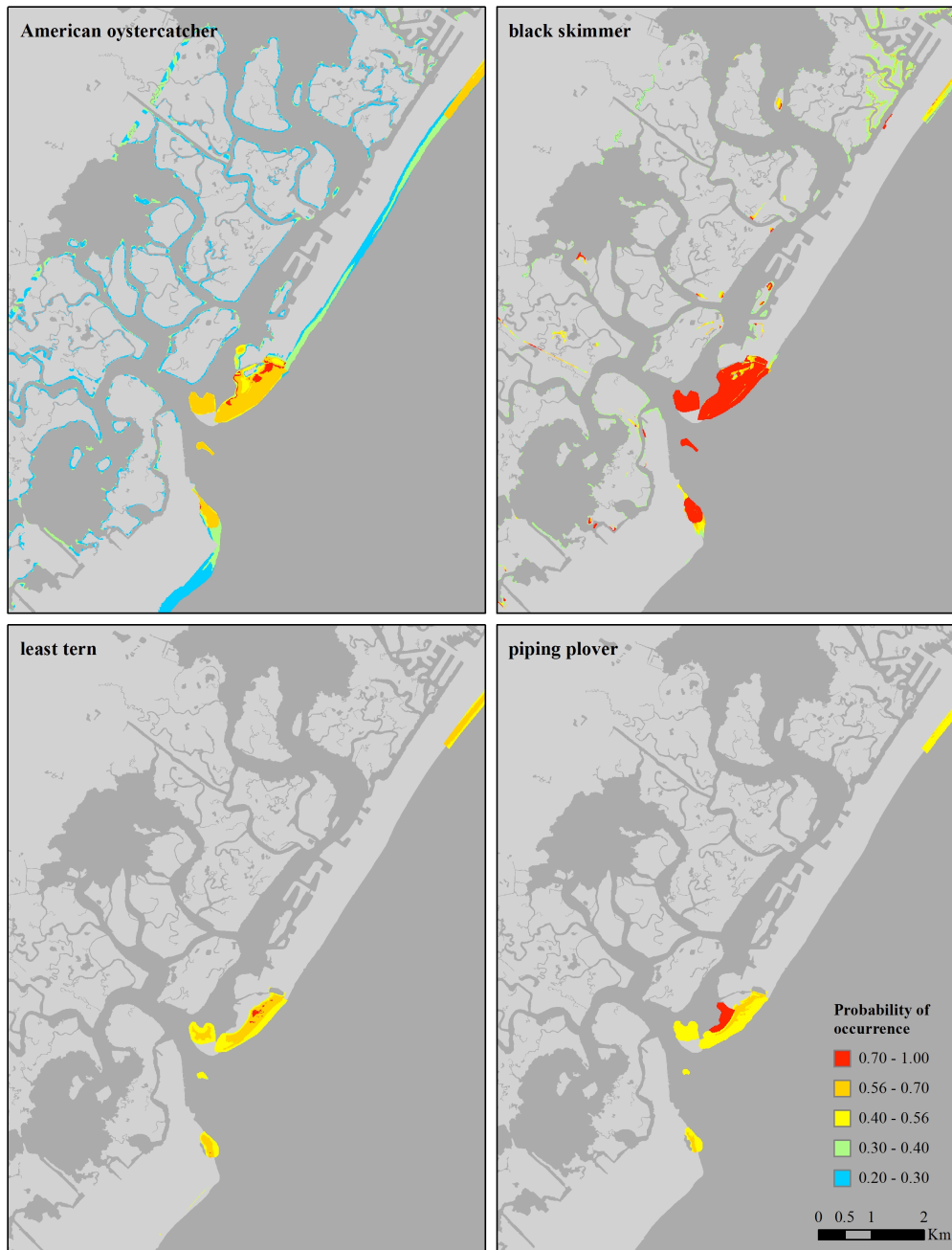
Our results demonstrate that the choice of umbrella species requires explicit consideration of scale and an understanding of the habitat attributes that an umbrella species

represents. Interventions must complement (not replace) species-specific strategies that are of primary importance in small populations of endangered species.

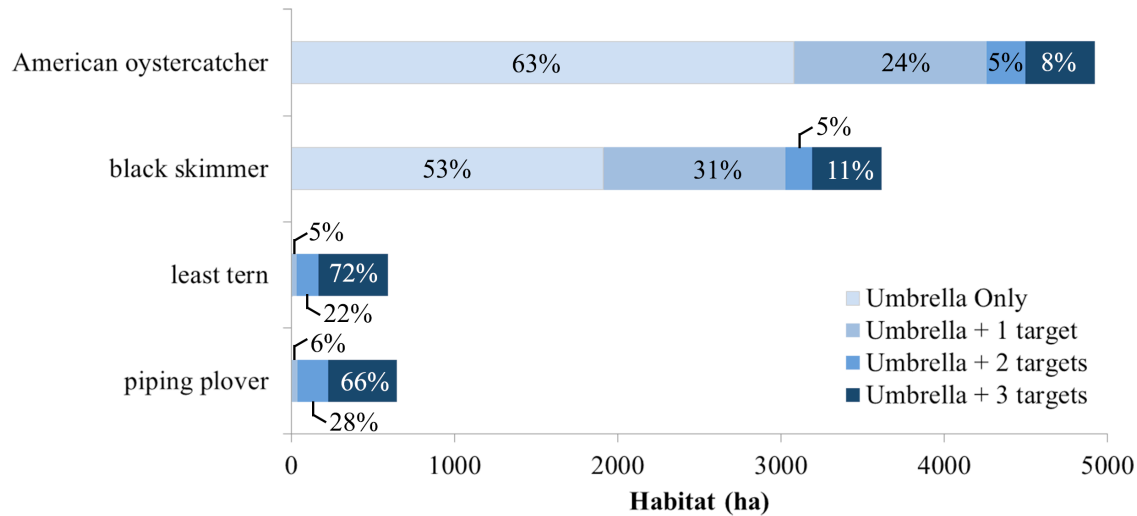
We submitted this research as a manuscript to *Biological Conservation*, which is now in revision. We anticipate submitting the revised draft before the end of June 2016.

**Table 1** Total predicted suitable habitat area for each beach-nesting bird species in New Jersey, USA. Percentage values denote the fraction of a species' nesting habitat that is encompassed in the habitat area of another species (e.g., 34.3% of the nesting habitat of American oystercatchers falls within the habitat of black skimmers).

	American oystercatcher	black skimmer	least tern	piping plover
	4920.4	3605.6	591.7	649.1
American oystercatcher	100%	46.9%	99.0%	100%
black skimmer	34.3%	100%	81.0%	81.3%
least tern	11.9%	13.3%	100%	78.0%
piping plover	13.2%	14.6%	85.6%	100%



**Fig. 1.** Example of Maxent model results for American oystercatchers, black skimmers, least terns, and piping plovers in a portion of the study area. Images represent differences in breadth of suitable habitat across species, with least terns and piping plovers being restricted to sandy, oceanfront beaches. Black skimmer probability of occurrence peaks on large, undeveloped sandy spits but is only marginally above the suitability threshold in some salt marsh areas. American oystercatcher habitat is more widely distributed across both beach and marsh habitats.



**Fig. 2.** Distribution of a candidate umbrella species' co-occurrence with 1, 2, and 3 target species, described as both total area and percentage of habitat extent.

## 5. Creation of preliminary beach-nesting bird habitat assessment protocols for use after significant coastal storms.

Now that our modeling and analyses are complete, we are developing a technical report/guidance documents to outline a response protocol to identify and prioritize for protection storm-created habitat. We have modified the approach to include 2 response phases. The first phase includes guidelines for a rapid assessment, suggesting that managers visually identify sites with potentially high habitat value, quantitatively score those sites based upon suitability criteria, and then rank those sites for protection. The final assessment would include projecting our species distribution model with post-storm landscape data (i.e. locations of beach erosion and accretion, dune blowouts, overwash, etc.) and use model-generated suitability scores to rank sites. The guidelines will also identify regulatory and access requirements of wildlife agency personnel (i.e. immediate access to sites, representation at multi-agency storm response meetings, etc.) to effectively identify candidate sites for protection, as well as make recommendations for considering anthropogenic and cultural factors into the ranking system. We are aiming to submit a draft report to our stakeholders by late summer, and to hold 2 workshops for land managers in the fall.

## Future Work

At the 2016 Piping Plover and Least Tern Workshop, the Principal Investigators discussed with the North Atlantic LCC and other USFWS personnel the potential for expanding our NJ-based model to the entire NY-NJ Recovery Unit. As we did have some limited funds remaining to support our GIS specialist, we are working toward that goal. Several challenges exist. First, the

land use data available for New York State is not as detailed as New Jersey; therefore, expanding the model requires us to manually create a land use layer for the entire Long Island coastal region. We are investigating ways of expediting this process, but we may not have enough time or funds to support the hours needed to complete this task. In addition, we have thus far been unable to secure nesting occurrence data or geospatial data on current beach-nesting bird management zones. Because these data were critical to understanding probability of occurrence in NJ, we cannot expand our model without knowledge of the spatial extent of protected areas. We are working with Steve Papa to obtain this information.

## **Youth and Veteran Involvement**

We are continuing to employ part-time a female, minority youth, who is assisting PI-Maslo in the generation of models and maps.