Burrow Distribution and Habitat Parameters in Leach's Storm Petrel

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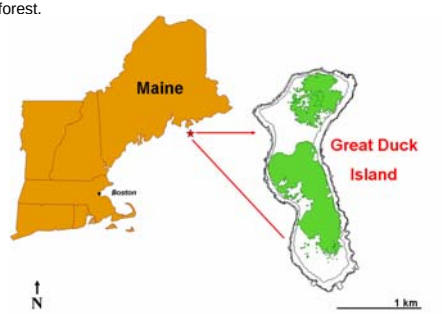
Introduction

Historically, efforts to estimate nesting populations of Leach's Storm Petrel (*Oceanodroma leucorhoa*) have produced variable results. On Great Duck Island (GDI), census numbers for this species have ranged from 800 to 16,000 breeding pairs (Ambagis 2002). In the most recent census for GDI, Ambagis (2002) calculated that the island supports 9,300 ± 6,500 pairs. The high degree of variation in these population estimates may reflect the patchy distribution of this species' inconspicuous nesting sites, or burrows. To increase the accuracy of future census efforts on GDI, this study sought to refine a model that would account for the distribution of petrel burrows on the island.

Great Duck Island (GDI)

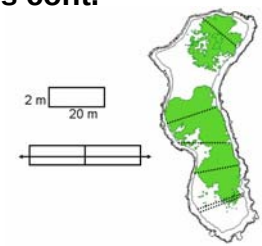
GDI reportedly supports the largest breeding colony of Leach's Storm Petrels in the eastern United States (Chilelli 1999). GDI is located in the western North Atlantic in the Gulf of Maine (lat. 44° 09' N, long. 68° 15' W). The island is approximately 10 km from the Maine coast, is roughly 2 km long by 1 km wide, and incorporates an area of approximately 109 hectares. Roughly 54 % of the island includes forested regions, consisting primarily of red spruce *(Picea rubens*). The remaining vegetation on the island is predominated by heath and open meadow. In the map below, the areas of green shading indicate sections of spruce forest.



Methods

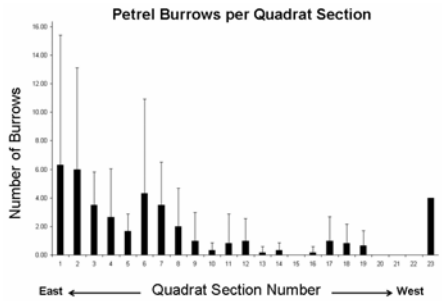
This study employed 125 quadrats. Individual quadrats encompassed a 2 x 20 m area, and were arranged continuously along six transect lines. Each transect spanned the island from one edge of the berm to the other, and included between 19 and 23 quadrat sections, depending upon the island's respective width. All transects followed a consistent compass bearing, haphazardly selected, traveling roughly from east to west. In total, 5000 m² (0.5 hectare) were surveyed.

Methods cont.



All quadrats were exhaustively searched for petrel burrows, and these counts underwent a square-root transformation prior to analysis. In addition, a series of habitat parameters were measured per quadrat, including: vegetational density, soil characteristics, as well as features of the substrate and ground cover. All data recorded in proportions underwent arcsine transformation prior to analysis. Each quadrat was also assigned one of five habitat classifications, including: (1) not forested; (2) partially forested; (3) forest edge, comprised of the first complete 20 meters of the forest; (4) intermediate forest, comprised of forest 20 to 40 meters from the forest perimeter; and (5) forest middle, forested areas 40 meters or more from the forest edge. All subsequent statistical analyzes were conducted employing SYSTAT 12.0.

Results

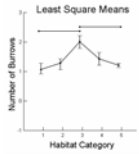


Mean burrow counts per quadrat section number revealed a west to east bias with regard to petrel burrow distribution.

Burrow counts per quadrat were analyzed with respect to individual habitat parameters in a multiple regression analysis with forward stepwise entry (alpha level 0.15). This analysis accounted for 16.1 % of the burrow count variability, P<0.05. The most significant variable highlighted by this analysis was the proportion of deadwood per quadrat section, which had a partial correlation of 0.32.

Results cont.

The most effective model analyzed burrow count numbers relative to the proportion of deadwood and designated habitat categories. This General Linear Model (GLM) accounted for 28.1 % of the burrow count variability, r = 0.53. A *pos hoc* pairwise comparison conducted using Tukey's Honestly-Significant-Difference Test revealed a significant differential between habitat categories 1 and 3, or not forested and forest edge habitat, P<0.05. There was also a significant difference between habitats 3 and 5, or the forest edge and forest middle, P<0.05.



Effect	P-value
Habitat Category	0.037
Proportion Deadwood	< 0.001
Interaction Term	0.055

Conclusion

Petrel burrows are not evenly distributed on GDI. The highest concentrations of burrows occur within the first 20 meters of the forest edge, particularly on the eastward side of the island. Future population estimates calculated for GDI should account for the differential between burrow numbers along the forest edge relative to open habitats and forested habitats located more than 40 meters from the forest perimeter. Furthermore, as petrel burrow numbers positively correlate with the proportion of deadwood in a given habitat, accounting for this habitat variable may increase the accuracy of future census efforts as well.

Acknowledgements

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References

Ambagis, J. 2002. *Census and monitoring techniques for Leach's Storm Petrel (Oceanodroma leucorhoa).* Master's thesis, College of the Atlantic, Bar Harbor, ME, USA.

Chilelli, M. 1999. *Leach's Storm-Petrel Assessment*. Maine Department of Inland Fisheries and Wildlife, Wildlife Division, Resource Assessment Section, Bird Group.