Results of 2013 Radar Surveys on Hispaniola

Adam C Brown, Senior Biologist. Environmental Protection in the Caribbean. 200 Dr. MLK Jr. Blvd. Riviera Beach, Florida 33404 USA

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Summary

In January and February 2013, Environmental Protection in the Caribbean, along with its Hispaniolian partner organizations Grupo Jaragua and Societe Audubon Haiti, completed radar surveys for Black-capped Petrels on the island of Hispaniola. Environmental Protection in the Caribbean was able to successfully 1) conduct a second year population index data at petrel activity areas in Dominican Republic, 2) identify and survey six new radar sites in Dominican Republic, 3) train Grupo Jaragua and Societe Audubon Haiti staff to identify radar sites and complete radar surveys without supervision, and 4) obtain population indices from known nesting sites in southeast Haiti with Grupo Jaragua and Societe Audubon Haiti.

Introduction

Populations of the Black-capped Petrel, one of the most endangered Caribbean seabird species, have been in precipitous decline over the previous 50 years. It is estimated that only 1,000-2,000 pairs of petrels remain. Although they historically nested on islands in the Lesser Antilles, they are currently known to nest only on the island of Hispaniola. The dire conservation status of the Black-capped Petrel has prompted its listing by various authorities as Endangered (IUCN 2011), Threatened, by the International Council for the Preservation of Birds (Collar and Andrew 1988), and Critically Endangered by the Society for the Study and Conservation of Caribbean Birds (Schreiber and Lee 2000). Further, the North American Waterbird Conservation Plan considers the species to be Highly Imperiled, making it an official Focal Species of the U.S. Fish and Wildlife Service (USFWS).

In response to the plight of the petrel, top objectives of the recently published Conservation Action Plan for the Black-capped Petrel (Goetz et al. 2012) are to discover additional breeding locations and to effectively manage of critical on-land breeding locations. Among the Plan's core proposed actions, was the development and refinement of search methodologies for nesting sites. The current Environmental Protection in the Caribbean (EPIC) project addressed this by using proven marine radar technology to identify petrel flyways and nesting areas, and estimated abundance of petrels at nesting sites.

Methods

Radar surveys began at sunset each night, when petrels become active at the nesting and flight corridor areas, and ended five hours later, when petrel activity slowed.

For surveys we set up our radar within 1.5km of the potential nesting site or flight path. Although radar can detect targets at much greater distances, resolution suffers greatly. Setting the range at 1.5 km is standard practice when surveying for seabirds as it allows the surveyor to detect targets at a substantial range while recording a clear and powerful target on the radar (Cooper et al. 1991). A laptop computer was attached to the radar unit and recorded all radar images, for subsequent review and analysis.

The radar operator monitored all targets that appeared on the radar's monitor, and recorded time, direction of flight (to the nearest degree), flight behavior (e.g. straight, erratic), velocity (to the nearest 8 km/hr), and if known, noted species and number of individuals detected. The target was recorded as a Black-capped Petrel if the target was recorded flying ≥ 50 km/hr. This velocity cut-off threshold was based on previous radar studies on the closely related/sized Hawaiian Petrel on Kauai, where Hawaiian Petrels were occasionally seen flying slower than 50 km/hr but no other species were recorded flying at that velocity or faster (Day and Cooper 1995).

Staff from either Grupo Jaragua (GJI) or Societe Audubon Haiti (SAH) shadowed EPIC staff during the first three radar surveys in which they accompanied EPIC. EPIC allowed the staff to observe all radar recording methods and explained methodology and reasoning behind radar techniques. During the initial surveys EPIC staff allowed GJI and SAH staff to run small portions of the radar survey and during subsequent surveys, allowed GJI and SAH staff to run larger and more comprehensive portions of the surveys, all while being directly supervised by EPIC staff. The goal was for GJI and SAH staff to be able to run a radar survey completely independently of EPIC supervision.

Results

EPIC successfully located six new Black-capped Petrel activity centers in the Dominican Republic, including three flight corridor sites and three likely new nest colony locations (Map 1; Table 1). We surveyed both the nest site at Loma del Toro and the flight corridor near Pedernales for a second year.

In Haiti, we surveyed eight nights at seven different locations (Table 1). We identified new flight corridors and established population baselines at numerous activity centers.

Following surveys, six staff from Grupo Jaragua and two staff from Societe Audubon Haiti were able to run radar surveys from start to finish without EPIC supervision, including setting up the equipment, running the radar, recording the data, and breaking down the equipment following surveys.

Dominican Republic Radar Locations

Ocoa

This site is a well-defined drainage on the southeastern side of the Cordillera Central. It connects the sea along the south coast to the high peaks of the Cordillera Central, including those in Valle Nuevo National Park. The habitat in the high country of this range looks very good for potential nesting habitat, however petrels have never been known to nest in the range. On radar, we observed Black-capped Petrels flying up and down this drainage and heard a single bird as well.

Valle Nuevo National Park

This site was located at the very head of the Ocoa drainage in the Cordillera Central. The site is characterized by steep forested mountainsides that are interspersed with cliff faces. Our radar was set up where we could monitor birds flying up and down the drainage as well as entering and exiting the potential nesting habitat. On radar, we observed birds at this site, including birds circling in front of the potential nest area. In addition, we saw and heard a petrel adjacent to the petrel habitat with nightvision.

Pedernales
This site is a well-defined drainage located approximately 8km north of the south coastline, leads up the south slopes of the Sierra de Bahoruco, and accesses the high peaks on the western edge of the range. This site was surveyed in 2012 as well. On radar, we observed petrels both flying up and down the drainage.

Pelempito
This site is near the head of a well-defined drainage that leads from the south coast of Hispaniola and accesses the eastern end of the Sierra de Bahoruco. This is the first year that we surveyed this location. On radar, we observed petrels at this site, both going up and down the flight corridor. At the head of the flight corridor, we observed birds splitting off and flying up multiple drainages.

Eastern Bahorucos
This site is located at the upper end of the old bauxite mine just below the crest of the eastern Sierra de Bahorucos on the south slope. The site allowed us to monitor flight activity along the south faces of the high peaks on the eastern end of the range. On radar, we observed more petrels at this site than any other location in the Dominican Republic. In addition, we heard and observed numerous petrels flying at this site with nightvision.

East Central Bahorucos
This site is located on the crest of the Bahorucos, towards the central portion of the range, and is located at the head of both a drainage that feeds up from the eastern end of the range as well as a drainage that feeds up from the north. On radar, we observed birds flying along the crest both westwards and eastwards. Additionally, we observed birds flying up the drainages from the east and from the north. This site was the first time we observed birds accessing the Sierra de Bahoruco from the north. In addition, we both heard and observed petrels flying at this site with nightvision.

West Central Bahorucos
This site is located on the north slope of the Bahorucos, just below the crest. It is approximately 9km east of Loma del Toro. The radar site was in a small meadow and we were able to monitor birds flying along the crest. On radar, we observed petrels flying east and west along the crest. In addition, on radar we also observed birds flying up and over the crest from the south side of the range. We also on radar observed birds flying from the north, potentially from a drainage to our northwest, and accessing the high crest. On radar, we observed birds circling some of the steep forested slopes, indicating potential nesting at this site. We also, heard and observed petrels at this site with nightvision.

Loma del Toro
This is the known nesting site for Black-capped Petrels in the Dominican Republic. Our radar station is located just below the summit on the north slope. The site overlooks the valley in Boucan Chat, Haiti as well as the valley below the north slope of Loma del Toro. We surveyed this site in 2012 as well. In 2013, we surveyed this site all night, from sunset to sunrise, to get an idea of petrel activity at the colony throughout the night. We observed petrels on radar, observed them with nightvision, as well as heard petrels.

Haiti Radar Locations

Savanne Zombie
This survey location was along a deep valley on the eastern end of Massif de la Selle. The valley runs north and south, starting high up on the eastern flanks of Peak La Selle and the western flanks of Loma del Toro (in the Dominican Republic) and emptying out along the south shore of Haiti. This site had the highest number of targets recorded among all sites on Hispaniola. On radar, we were able to see birds

both flying into mountain areas as well as down from them. Additionally, we were able to see birds flying up numerous drainages, indicating this flyway feeds birds to numerous nesting locations. In addition to radar targets, we also saw and heard numerous calling petrels from this location.

Fond Verette

This survey location was along the base on the north side of Peak La Selle. We placed the radar in the main riverbed at a large confluence of valleys, one that leads directly up the north side of Peak La Selle and the other than leads up the northeast side of Peak La Selle. The main valley drains northwestwards into Lake Azuei. We detected a low number of petrels at this site. Most petrels that are accessing Peak La Selle from the north are likely doing so up drainages closer to the western edge of the range. The birds that we did detect, all came in small groups of 2-3 birds at a time, a similar grouping behavior we observed at other sites.

Furcy

This site was located 2.5 km north of the La Visite escarpment. The radar was placed on a prominent point that enabled the surveyors to detect petrels flying along the escarpment as well as flying up the drainages from both the northeast and northwest. From this location, we observed hundreds of birds accessing the La Visite escarpment from the north side drainages. This flyway is substantially further away from the sea (50km) than birds accessing this site from the south slopes (16km). However, the drainages on the north side of Massif de la Selle are much more defined than those on the south slopes and therefore potentially provide a more well-defined approach to nesting areas for the petrels. In addition to radar, we heard numerous calling petrels from this location.

Jacmel

This site was located on the western end of Massif de la Selle in a large drainage, approximately 7km northeast of Jacmel. This drainage starts high up on the western slopes of Morne de Enfer and drains out to the sea in Jacmel. We surveyed this location in attempt to try and define any petrel activity that might be taking place on Morne de Enfer. There are numerous additional drainages that lead to this peak, most notably from the south coast near Marigot (see Marigot below). This flight area had a low density of petrel activity, the lowest among all the sites we surveyed in Haiti.

Marigot

This site was located in a large drainage, approximately 5km north of Marigot. The radar was placed at a large confluence in the drainage from where we were able to monitor birds flying up drainages to both Morne de Enfer and La Visite National Park. From our location we detected birds flying up and down drainages to both Morne de Enfer and La Visite National Park.

Tet Kay Jak

We surveyed this location on two nights. During the first night a large storm enveloped the ridgeline and forced us to end the survey early. The second night we completed a full survey and the total birds detected number is from that night. This radar station was located at the western end of the La Visite escarpment, at the immediate edge of the escarpment itself. From this location, we could observe birds from the north, south, east, and west. We were able to observe birds flying along the escarpment as well. From this location, we only observed birds approaching the escarpment from the north. Not a single bird was observed approaching from the south slopes. We observed numerous types of flight behavior including; birds circling, birds making large turns, pairs of birds joining and separating while in flight, as well as typical straight-line flight behavior. A large number of birds were heard from this location as well.

***In addition to detecting birds on radar at this site, we found numerous petrels grounded at the base of the communication towers on Tet Kay Jak. The three birds we found alive were all able to fly away.

However, numerous dead birds were located as well. It appears the birds were attracted to the bright lights on the towers and then while approaching those lights, struck the guy wires attached to one of the towers.

Belle Anse

This radar station was placed on the lower south slopes of Peak La Selle, in a well-defined drainage 5km northeast of Belle Anse. The radar was placed at a confluence of drainages, the western of which fed the high peaks of Morne Mare Rouge and the eastern of which fed the high southern slopes of Peak La Selle. We observed birds flying both up and down both drainages; however the majority of birds were using this drainage to access Morne Mare Rouge.

Issues Encountered During the Field Season

The difficulties we had during this field season were centered on access. The majority of areas that provide the best potential nesting habitat for Black-capped Petrels are not accessible by vehicle. In many of the areas, specifically those on the eastern end of the Bahorucos and the high peaks of the Cordillera Central, even walking to them with the equipment would be very difficult. The best option for accessing these areas would likely be helicoptering into the sites.

The sheer expanse of potential habitat in the mountain ranges of the Dominican Republic provides for difficult planning. There are numerous potential flight corridors and steeply forested slopes in the high country of the Dominican Republic, knowing which areas to prioritize has been a difficult process.

After two years of surveys, we are beginning to better understand the use of flight corridors and the nesting habitat preferences for petrels. In the future, this will help direct the prioritization of new radar survey locations.

Future Cooperative Research and Funding Needs

In 2014, the radar team will return to Hispaniola. In the Dominican Republic, we will focus on surveying additional areas within the central and northern portions of the Cordillera Central. We will begin surveys in the Sierra de Nieba as well. Also, we will survey location within the Bahorucos for a second and third year.

In Haiti, we will re-visit high density petrel sites in the Massif de la Selle. In addition, we will visit new sites in this range. Furthermore, we will survey locations in the Massif de la Hotte, the first time the radar will be used in this mountain range.

Funding will be needed for future radar surveys; specifically to support the EPIC staff while on Hispaniola and for the GJI and SAH staffs to support EPIC while they are on-island. In years following 2014, we will begin surveying the southeastern coast of Cuba, the Blue Mountains of Jamaica, and the high peaks of Dominica for Black-capped Petrels. Funding for those projects will be critical to their success.

Figures and Tables

Figure 1. Map of 2013 Hispaniola radar sites. Map courtesy of Google Earth

Table 1. 2013 Hispaniola radar sites and targets detected

Station	Date	Location	Lat	Lon	Petrel-like targets
DR7	1/23/2013	Ocoa River	18 29 48.9	-70 30 39.4	82
DR8	1/24/2013	Upper Ocoa River	18 40 14.8	-70 35 11.2	84
DR1	1/26/2013	Pedernales	18.090417	-71.733509	64
DR9	1/27/2013	Pelempito	18 05 28.7	-71 30 34.2	87
DR10	1/28/2013	Eastern Bahoruco	18 08 59.3	-71 32 59.3	320
DR11	1/29/2013	East Central Bahoruco	18 11 15.6	-71 34 23.3	117
DR4	1/30/2013	Loma del Toro	18.292700	-71.719180	300
DR12	1/31/2013	West Central Bahoruco	18 15 59.0	-71 39 33.6	66
H1	2/3/2013	Savanne Zombie	18 17 02.0	-71 48 10.8	1,570
H2	2/5/2013	Fond Verette	18 23 29.6	-71 51 22.8	10
H3	2/6/2013	Furcy	18 22 54.0	-71 17 11.0	357
H4	2/7/2013	Jacmel	18 17 23.4	-72 30 39.4	6
H5	2/8/2013	Marigot	18 15 29.9	-72 18 37.8	51
H6	2/9/2013	Tet Kay Jak	18 20 32.6	-72 17 26.1	458
H6	2/10/2013	Tet Kay Jak	19 20 32.6	-72 17 26.1	1054
H7	2/11/2013	Belle Anse	18 14 31.8	-72 01 04.4	49