Radar Surveys for Black-capped Petrels on Hispaniola: January – March 2014

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INTRODUCTION

The Black-capped Petrel (*Pterodroma hasitata*) is an endangered seabird in the family *Procellariidae*. The species breeds in the Caribbean where it is known to nest on the island of Hispaniola. The petrel, also known as 'Diablotin', feeds at sea and nests near the high mountain summits of the island.

Over the last decade, audio/visual surveys for Black-capped Petrels have focused on known areas of activity, including Lomo del Toro in the Dominican Republic and Pic La Visite in Haiti. Working from discoveries made during those surveys, more recent efforts have focused on discovering additional areas of petrel activity on-island. Environmental Protection in the Caribbean (EPIC) used marine radar to survey for the Endangered Black-capped Petrel on Hispaniola in 2012 and 2013. The radar was shown to be a useful tool in identifying Black-capped Petrels, identifying both flight corridors and nest activity centers.

METHODS

During February and March 2014, EPIC staff along with members of Grupo Jaragua (GJI) and Societe Audubon Haiti (SAH), used marine radar to survey for Black-capped Petrels throughout Hispaniola. The group focused almost entirely on flight corridors and nest activity centers that had not been previously surveyed for petrels. In addition to surveying for petrels, EPIC trained GJI and SAH staff on use of marine radar.

At all survey sites, the team concurrently identified petrels using both audio/visual (A/V) methods and radar. Data collected in 2012 and 2013 allowed us to better understand the timing and movements of petrels in and around the nesting area. Based on this data, this year's surveys began at sunset, when petrels became active at the nesting area and ended five hours later, when petrel activity slowed.

For surveys, we set up our radar within 1.5km of potential nesting sites or fight corridors. 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. 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 5 km/hr), and if known, species and number of individuals detected.

A second surveyor was stationed at the base of the known nesting cliff or along the flight corridor with 10x binoculars for observations during dusk observations, and a night-vision scope when daylight became insufficient. This observer constantly visually scanned the airspace above potential nesting habitat and all visible sky for flying petrels and listened for calling petrels. We used an infrared spotlight to increase the range and target visibility. The light emitted from the spotlight is invisible to the naked eye and therefore does not affect bird behavior.

During the survey, the radar and A/V crew stayed in communication. When the radar crew detected a target that was potentially a petrel, they alerted the A/V crew, allowing the A/V crew to locate and identify the target. Similarly, the A/V crew communicated to the radar crew all flying species that it detected, including birds, bats, and large insects.

Following each survey, we downloaded data and reviewed the recorded images of the radar survey. During this review, we re-analyzed all targets measuring flight speed, flight direction, and target size. This second evaluation of the survey assured researchers that no targets were missed or incorrectly measured.

Herein, we report on the results of radar surveys for Black-capped Petrels on Hispaniola in 2014, including surveys in both the Dominican Republic and Haiti.

RESULTS (also see Table 1)

Arroyo Cano Valley, Cordillera Central, Dominican Republic (DR13)
4 February 2014
Total Petrel Targets: 0

During 2013, petrels were found to be using the Ocoa Valley on the south side of the mountain range. In 2014, we surveyed the Arroyo Cano Valley on the west side of Cordillera Central. This drainage was the largest most well-defined valley leading from the lowlands up to the highest peaks of the Cordillera Central. The station looked directly across the entire valley and was unhindered by any vegetation. No petrels were seen on radar during this survey.

Bahoruco Caseta Numero Uno, Sierra de Bahoruco, Dominican Republic (DR14)
5 February 2014
Total Petrel Targets: 25

This is the first time that radar was used to survey for petrels on the north slope of the Bahoruco mountain range. During 2013, while surveying up on the crest of the Bahorucos, we detected petrels flying up from the north side of the range. To verify that birds were in fact coming up from this side of the range and to determine what drainage the birds were using to access the crest of the north, we surveyed a valley that runs from east to west and has smaller feeder valleys that run to the south up to the crest. Our station had very little tree cover and the radar was able to shoot entirely across the valley. We detected petrels flying up to the crest from this north-slope. We assume that birds from this side were either coming in from Barahona to the east or Port au Prince from the west.

*On the following night, we attempted to survey higher up the valley near the crest but the radar's power malfunctioned and we were unable to survey.

La Descubierta Valley, Sierra de Neiba, Dominican Republic (DR15)
8 February 2014
Total Petrel Targets: 14

The Sierra de Neiba had never before been surveyed for Black-capped Petrels. One small patch of forested habitat on the western edge of the crest was identified as potential petrel habitat by Ernst Rupp of GJI. We identified a large drainage flowing southwards from the potential habitat and surveyed at the mouth. Our survey station was among low dry scrub. We were able to see the ridges on either side of the valley and had a clear view both down and up the valley. We identified a small number of petrel targets flying up into the habitat from the south. The station is located near the northwest side of Lago Enriquillo and is quite a long way from the Caribbean Sea. We assume that the birds we detected were flying in from either Barahona or Port-au-Prince.

Boucan Chat Valley, Morne Vincent, Haiti (H8)
15 February 2014
Total Petrel Targets: 10

This survey location was located directly across the valley west of the petrel nest cave that GJI monitors annually. The station is somewhat hindered by trees, but we wanted to try and survey as close to the Boucan Chat colony as possible and this location was the best possible scenario. We observed a small amount of petrel targets during the survey period. We heard petrels occasionally through the survey as well. The flight corridor for this nest site is likely the valley that drains south from Boucan Chat, through Savane Zombi, and into the Caribbean Sea. This flight corridor, when surveyed at Savane Zombi in 2013, had over 1,000 petrel targets.

Tet Kay Jak, La Selle Mountains, Haiti (H6)
19 February 2014
Total Petrel Targets: 307

This survey station was the same location we surveyed at in 2013, located just north of the village of Seguin. During 2013, we observed numerous petrels striking the communications towers at this site. The site is also adjacent to what is believed to be the largest nesting colony of Black-capped Petrels in the world at the La Visite Escarpment. Our numbers this year were lower than in 2013. Notably, the weather during this year's survey was clear and windless, while during 2013 it was foggy and windy. At this site, we observed and heard petrels simultaneously as well as observed many targets in pairs circling near the cliff face of the Escarpment. Also, we observed petrel targets flying from a site west of the survey location, potentially from an undocumented nesting area in that location. We did not observe a single petrel circling or striking the communications towers during our survey.

Camp Perrin, Massif de La Hotte, Haiti (H9)
23 February 2014
Total Petrel Targets: 3

This survey station was located on the east slope of the La Hotte range at the mouth of the largest drainage that feeds eastward from the range. This drainage feeds into a larger drainage that flows southwards into the Caribbean Sea. The station was located in the river bed and had clear views in every direction out to 1.5 kilometers. The three petrel targets that were detected were all heading into the range and flew up within minutes of each other.

Les Anglais, Massif de La Hotte, Haiti (H10)
24 February 2014
Total Petrel Targets: 21

This survey station was near the Caribbean Sea on the south coast of Haiti in the Les Anglais River drainage. This large and well defined drainage feeds up to Pic Macaya. We observed birds flying up the drainage very early in the evening and had very little activity after that. This makes sense considering how close the station was to the sea. There are four large drainages that feed southwards from La Hotte and this is one of those drainages. We observed a moderate amount of petrel targets overall.

Pic Macaya Caseta, Massif de La Hotte, Haiti (H11)
25 February 2014
Total Petrel Targets: 0

This station was located on the south side of the valley just below the saddle between Pic Macaya and Pic Formon. This valley is fed by the two main drainages that come from the south coast, Port-a-Piment River and Les Anglais River. The habitat was in a large clearing in pine forest habitat. The station covered this valley between the two peaks very well. No petrel targets were heard or seen from this station despite the location being immediately below the nest habitat.

Port-a-Piment River, Drouillette, Massif de La Hotte, Haiti (H12)
26 February 2014
Total Petrel Targets: 2

This station was near the head of the large and well defined Port-a-Piment River valley, just below the large headwall on the south side of Pic Formon. This river valley is the most direct flyway for a petrel to take from the sea to the nest habitat on Pic Formon. The station was above the river valley floor and covered a large elevation gradient both down and up. The station was in broad-leaf habitat but the pine forest habitat was immediately above the station. We only had two petrel targets, both moving up the drainage, observed approximately an hour after sunset.

Jeremie River, Massif de La Hotte, Haiti (H13)
27 February 2014
Total Petrel Targets: 20

This station is located on the north slope of the La Hotte mountain range. The Jeremie River feeds from the Caribbean Sea up the north side of the range to Pic Macaya. The station was located in the lower part of the watershed where the river drainage becomes very well defined. There are only two drainages that feed from the nest habitat down the North Slope and this is one of them. We observed 20 petrel targets in this flyway, all of which were flying inland and were detected just after sunset.

Rouseau River, Massif de La Hotte, Haiti (H14)

28 February 2014
Total Petrel Targets: 0

This station was located in large river drainage on the north slope of the La Hotte range. The station was approximately half way up the drainage between the sea and the nest habitat. The drainage itself is very well defined at this point. There are only two drainages that feed from the nest habitat down the North Slope and this is one of them. No petrel targets were observed at this location.

Torbeck River, Massif de La Hotte, Haiti (H15)
1 March 2014
Total Petrel Targets: 29

This station was located along the Torbeck River drainages on the south slope of Massif de La Hotte, approximately half way between the Caribbean Sea and the nest habitat on Pic Formon. The station was located at the location where the drainage becomes very well defined and funnels up to the nest region. The radar was located on a higher slope on the side of the drainage and shot across the drainage. We observed 29 petrel-targets, all flying up drainage, at this station.

DISCUSSION

Our radar surveys this year, took place alongside other Black-capped Petrel conservation work, including presenting petrel work at the Congresso of Caribbean Biodiversity as well as working on the petrel documentary, *Save the Devil*. All of these were completed in partnership with our partner groups on Hispaniola, Grupo Jaragua (GJI) and Societe Audubon Haiti (SAH).

One of the highlights of the radar survey season was locating new petrel activity centers in Sierra de Neiba and the north slope of the Bahorucos. For both of the locations, the flyways headed inland towards Lago Enriquillo where the petrels would need to fly either east towards Barahona or west towards Port-au-Prince. From the Sierra de Neiba station, Port-au-Prince is approximately 60km while Barahona is approximately 85km. The station on the north slope of the Bahorucos was approximately 90km from Port-au-Prince and 55km from Barahona. Both places are quite far from the sea and the petrels make a long trip to get from the sea to the nest sites associated with these flight corridors.

The petrels flying into the Bahorucos appeared to be heading to the main east-west ridge of the range. We observed this flight last year from the ridge line itself, and this year's observation substantiated last year's data. The petrels flying into the Neibas were headed to the western portion of that mountain range. According to Ernst Rupp of Grupo Jaragua, there is a small patch of wooded habitat at the head of this drainage that has the potential for petrel nesting. Following up the radar survey with a field visit and nest searching would be highly recommended.

Surveys near Tet Kay Jak in Massif de La Selle had smaller numbers than our two surveys from that same spot last year. We also did not see any petrel strikes on the towers at this location. We believe that this was due to no bright lights at the towers, clear weather, and a bright moon.

We were surprised to find such low numbers of petrel targets in the Massif de La Hotte. We surveyed all of the main drainages in the range as well as the nesting habitat just below the known nest sites at Pic Macaya and Pic Formon and only encountered low densities of petrels. This range had lower densities of petrel targets on radar than does the Bahoruco range in the Dominican Republic.

The main problem we encountered this year was the radar itself. While working with staff from Grupo Jaragua, one of their members attempted to attach the batteries to the radar to power it up, but cross-wired it by accident. When the radar was turned on, a number of fuses in the system blew. A fair number of days were taken to fix the radar and enough time was lost that we were unable to do follow up radar surveys in the Bahorucos. Once the radar was fixed, the screen remained broken and we had to wire our laptop to the radar to view the targets through the laptop screen. This worked very well. The radar had to be taken off of Hispaniola following our research this year to be fixed by the manufacturer, Furuno.

For the next few years, we will not be doing any radar work on Hispaniola. We would like to create a research and monitoring strategy with the radar that will allow us to monitor population trends on Hispaniola using the radar in the future.

We are looking forward to bringing the radar to Dominica next winter. We have applied for the Disney Worldwide Conservation Fund grant again to fund that work. If we do not get that funding, we will be hard pressed to fund that work and will be unlikely to do any radar work next year. We had applied to two other foundations to help fund our radar work but were turned down. If we are in a scenario with no funding for radar work, ABC funding would go a long ways to get the petrel radar work up and running in the Caribbean.

APPENDIX

Table 1. Radar station locations and petrel-like targets at each station.

Station	Date	Location	Heading	Petrel-like targets
DR13	2/4/2014	Arroyo Cano	50	0
DR14	2/5/2014	Bahoruco Caseta 1	193	25
DR15	2/8/2014	La Descubierta	154	14
H8	2/15/2014	Morne Vincent	235	10
H6	2/19/2014	Tet Kay Jak	10	307
H9	2/23/2014	Camp Perrin	240	3
H10	2/24/2014	Les Anglais	60	21
H11	2/25/2014	Macaya Caseta	78	0
H12	2/26/2014	Drouillette	50	2
H13	2/27/2014	Jeremie River	340	20
H14	2/28/2014	Rouseau River	290	0
H15	3/1/2014	Torbeck River	9	29

Map 1: Hispaniola Black-capped Petrel Radar Stations

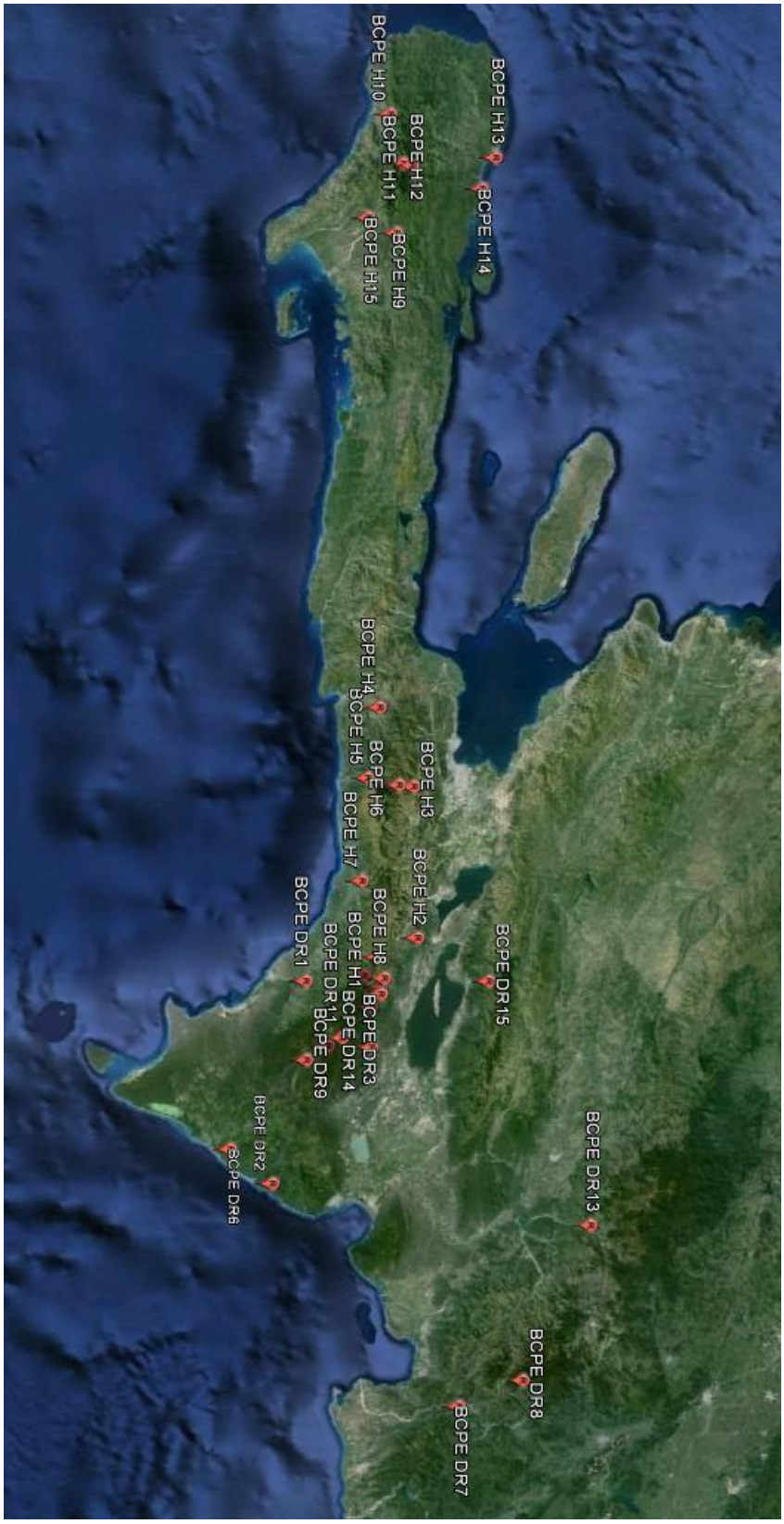

Image 1: Grupo Jaragua Staff with radar

Image 2: Pic Formon, Haiti

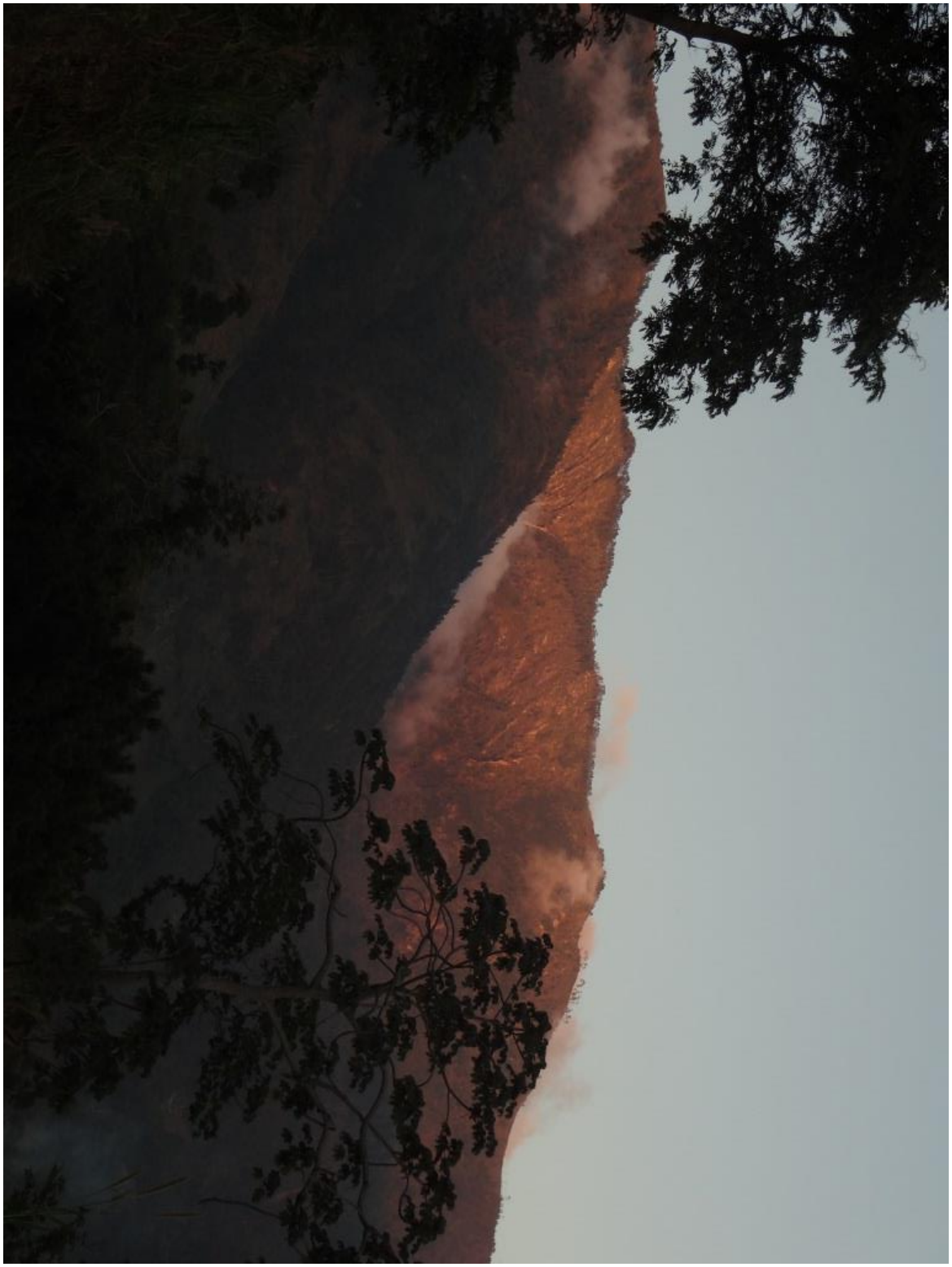

Image 3: EPIC/SAH radar truck in Haiti