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Acoustic monitoring of diablotin activity on Hispaniola: *Final Report for 2014 Pilot Project*

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Introduction

The Black-capped Petrel is a Caribbean seabird designated by the IUCN as globally Endangered. Key obstacles to conserving the species are (1) limited knowledge of breeding islands and colony locations, (2) a lack of information on threats at breeding sites, and (3) a dearth of reliable and logistically feasible monitoring tools for detecting activity at potential breeding sites, quantifying patterns of colony attendance and tracking trends through time. American Bird Conservancy has engaging Conservation Metrics' expertise and creativity with acoustic monitoring technology to begin to address these obstacles.

An analysis of 2012-2013 data from Loma del Toro carried out by CMI confirmed that Black-capped Petrel vocalizations could be detected despite the complex soundscape on Hispaniola. This project was designed to expand on the 2012-2013 monitoring effort and test two additional questions:

- 1. Can acoustic monitoring be a cost effective and logistically simple way to survey for new breeding sites on Hispaniola?
- 2. Do acoustic metrics (mean calls per minute) provide a valid index for comparing the relative abundance of Black-capped Petrels across sites and through time?

Research in other locations has indicated that acoustic surveys can be an effective tool for monitoring other elusive petrels. For example, helicopter deployed acoustic sensors have helped the Kaua'i Endangered Seabird Recovery Project (KESRP) to identify new breeding sites for the endangered Hawaiian Petrel (*Pterodroma sandwichensis*) on the rugged island of Kaua'i. Furthermore, call rates measured at these exploratory sites can be compared to call rates measured at surveys sites where there is more information about breeding burrow densities (calibration sites) in order to estimate the relative size of new breeding sites discovered by the helicopter surveys.

Here we report on efforts to the acoustic monitoring approach for monitoring Blackcapped Petrels (Diablotin) on Hispaniola.

Collaborators

Joel Timyan, Anderson Jean
Ernst Rupp, Jose Luis Castillo Ferreras, Gerson Feliz
Feliz, Jairo Issac Matos Pirrin, René Jeune
Jim Goetz
Adam Brown, Jim Tietz
Aaron Straight, Guido Ronge

Travel and logistics

Arrived Port-au-Prince
Foret des Pins & Boucan Chatte
- Coordination/protocol dev.
- Song Meter training
- Nest searches & field deployments
- Radar survey
Departed Port-au-Prince

Activities

Funding from American Bird Conservancy allowed Conservation Metrics to travel to Haiti and meet with all of the collaborators working on this project. Below we summarize outcomes for each of the activities delineated in the M.O.U. with ABC.

Activity 1 – Coordination, standardization of field protocols, training

CMI gathered with all of the project collaborators in Foret des Pins, Haiti in February 2014 to present results of the analysis of 2012 data, develop standard deployment protocols, identify potential *calibration* and *exploratory* survey sites for the 2014 field season, and develop a standard recording schedule for Black-capped Petrel monitoring on Hispaniola.

In addition, CMI conducted two Song Meter training sessions with Grupo Jaragua staff and Anderson Jean of Société Audubon Haiti. One hands-on training session covered steps for field deployment and maintenance of acoustic sensors. A separate training session was held on how to program Song Meters.

The 2012 recording schedule was modified to better fit logistical constraints and behavioral patterns of the Black-capped Petrel based on the expert opinion of collaborators working on Hispaniola. Specifically, the new recording schedule was designed to:

- record a 4-hour continuous block starting 1-hour after local sunset, then record 1-minute of every 10-minutes until 1-hour after dawn;
- record only every-other-night to increase deployment period (survey period = 76 nights);

- all sensors are set on Dominican time for consistency (and because majority of sensors were deployed in D.R.); and
- Sunrise/sunset times calculated based on 18.32 N, 71.51 W, and GMT-4.

While in the field Matthew McKown was also able to shadow Gerson and José Luís (Grupo Jaragua) on nest searches and nest checks below the cliff-face in Boucan Chatte. Matthew was also able to observe and participate in a radar survey at Boucan Chatte with Adam Brown, Jim Tietz, and Anderson Jean (during which Blackcapped Petrel calls could be heard in the distance). Both of these opportunities were useful for determining how best to tailor acoustic survey protocols to coordinate with radar surveys and ground searches in the search for new breeding aggregations on Hispaniola.

Activities 2 & 3 – Selection of calibration and exploratory survey points

CMI purchased 6 new Song Meter-2 acoustic sensors for the project, which were delivered to Grupo Jaragua at Foret des Pins. An additional Song Meter provided by CMI in 2012 meant that 7 Song Meters were available for surveys at the end of the 2013-2014 breeding season. The initial plan developed with Grupo Jaragua was to monitor 3 calibration sites for the remainder of the 2013-2014 breeding season (Loma del Toro, Hoyo del Diablo, and Boucan Chatte), and up to 7 exploratory sites for 1-month periods (Farallones Seguin, two sites in the Cordillera Central, two exploratory sites on Loma del Toro, and Caseta 2 and Caseta 3 on the southern part of the Bahoruco range in the Dominican Republic).

In the end, logistical constraints prevented repeated deployments at multiple exploratory sites and no sites could be monitored in the Cordillera Central. Sites monitored in 2014 are shown in *Table 1*. Although fewer exploratory sites were visited in 2014, an unanticipated increase in nest density data at survey sites increased the number of available calibration sites, including a new "high" density area discovered at the exploratory site along the cliffs of Seguin, Haiti.

Figure 1 Acoustic survey sites monitored on Hispaniola in 2014



Activity 4 – Collisions with cell phone towers

In 2013, radar surveys conducted near a cell phone tower in Haiti resulted in the discovery that petrels were being downed by collisions with the tower. Given that seabird collisions with wires and metal towers produce distinctive sounds, we proposed to test the use of acoustic sensors to detect collision sounds at this site. Discussions about the cellphone tower layout with Jim Goetz and Adam Brown in February, however, indicated that acoustic monitoring of these towers could be more complex than initially envisioned. First of all, the survey site has two cellphone towers, one of which is supported by 4 guy wires. The other tower has security lights at its base thought to attract petrels on cloudy nights. Finally, one of the towers is powered by a diesel generator which could mask the sound of seabird collisions. This spatial complexity raised questions about where best to place the one sensor available for the test.

No sensors were deployed at cellphone towers in 2014. CMI will work with Jim Goetz to deploy an extra Song Meter at a tower site in January 2015 for exploratory research.

Activity 5 – Re-deploy units for 2014/2015 season

Grupo Jaragua re-deployed 6 of the available acoustic sensors at calibration survey sites in Nov. 2014. Jim Goetz will re-deploy the 7th acoustic sensor at the Farallones Seguin survey site in Haiti at the end of November. All of these sensors have been programmed to record with the same recording schedule as used in 2014 (file name = BCPE_HISP_2013_2014_Every2_4_hour.SET). The plan is then to move at least 3 units to exploratory sites in the Dominican Republic starting in late January or early February 2015. CMI will continue to work with Ernst and Jim and the team on the deployment and retrieval schedule for the 2014-2015 season.

Analysis of the 2014 acoustic data

ABC and CMI will work together to fund the analysis of the 2014 data in early 2015. To date, we have received 142.2 GB of the acoustic data collected 2014. A further ~10 GB (April recordings at Farallones Seguin) remain in Haiti. These data will be transferred electronically to CMI in December 2014.

Finally, CMI has already begun work on the development of a classification model for Black-capped Petrels. This will allow CMI to quickly process the 2014 acoustic data when funding becomes available.

Sensor ID	Location	Site type	Date deployed	Date retrieved	Easting	Northing	Nest estimates	Data collected (GB)
CM 26	Cueva Morne Vincent	Calibration	2/14/14	4/13/14	210704	2024916	1	21.7
CM 23	Hoyo del Diablo	Calibration	3/20/14	6/2/14	215501	2022302	3	26.9
10T20	Loma del Toro - Torre	Calibration	3/21/14	(mid June)	214762	2023178	6	0
CM 27	Loma del Toro	Calibration	3/18/14	6/1/14	213353	2024067	17	26.8
CM 25	GJ (Bahoruco)	Exploratory	3/21/14	6/3/14	215296	2023188	1	26.9
CM 24	NVA (Bahoruco)	Exploratory	2/17/14	5/3/14	213009	2024267	2	20.5
CM 28	Farallones Seguin	Exploratory	2/18/14	4/14/14	791905	2030883	30	19.4*

Table 1Acoustic survey sites monitored and data collected in 2014.

* Some data not transferred successfully. Expect to get 1 more month of data (from April and May) buy Dec. 2.

Financial summary

A summary of expenditures to date are shown in *Table 2*.

Ordinary Income/E	xpense	
Expense		
50000 · Customer Expenses		
	50020 · Data Storage	206.17
	50025 · Equipment	4,223.55
	50070 · Travel	1,284.30
	Total 50000 · Customer Expenses	5,714.02
66000 · Labor Expenses		
	66150 · Officers Compensation	6,944.26
	66200 · Employer Payroll Tax Expense	271.72
	66500 · Payroll Service Fees	90.00
	Total 66000 · Labor Expenses	7,305.98
	Total Expenses	13,020.00
Net Ordinary Income		-13,020.00
Balance		0.00

Table 2 Expenditures for the 2014 acoustic monitoring pilot project