APPENDICES

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APPENDIX 1: REPORT ON WORKING GROUP ACTIVITIES 2012 – 2020 AND PLANNING PROCESS FOR 2021 CONSERVATION PLAN

The practice of conservation is a cyclical process of overlapping activities. The following sections summarize activities of the IBPCG from 2012-2020, relating them to the Conservation Standards elements. The summary picks up at Implementation (following the release of the 2012 Conservation Plan.

Implement

- Implemented several of the actions in the 2012 Conservation Action Plan (see Table A1-1 **Review of Actions from 2012 Conservation Action Plan for the Black-capped Petrel**, undertaking field investigations and conservation interventions each year.
- Developed workplans, timetables and budgets for research, monitoring and for conservation interventions 2012- present.
- Used internal funding from our organizations and obtained financial assistance from multiple supporters.
- Coordinated fund-raising efforts in order to maximize synergies and minimize direct competition.

Analyze And Adapt

- Members of the International Black-capped Petrel Conservation Group active in research, monitoring and conservation interventions in the field, have modified or expanded their activities based on findings each year.
- Thanks to the improved techniques for finding petrels in new places, seized opportunities to implement various forms of management, which were only hypothetical in 2012.
- To create a full revision of the international scale 2012 Conservation Plan, a subset committed to a course of weekly conferences from February to September 2020 to revisit and refine the plan.
- Realized that some of the desired conservation actions have pre-requisite activities that need to be explored well in advance of any implementation.

Share

- Published some field studies in peer-reviewed journals with open access
- Posted unpublished field reports in an archive online: (https://www.birdscaribbean.org/our-work/working-groups/black-capped-petrel-wg/)
- Shared annual or more frequent summaries of activities with the wider IBPCG and seabird conservation community via listservs
- Convened biannual meetings at BirdsCaribbean International Conferences
- The core planning team signed a Memorandum of Understanding in which they agreed to share data openly and freely to the benefit of greater understanding and priority conservation actions for the species.
- Created multiple information summaries and shared spaces (see appendices 2 - 8).
- Incorporated results of petrel experts from other areas Réunion, Kauai, Cape Verde, Galapagos (acknowledgements)
- Shared results. The Miradi-related elements of this Plan are publicly available at www.miradishare.org

Assess

- Reaffirmed scope, vision and specified site-specific targets for petrel conservation
- Brought in new information on nesting habitat, habitat modeling and threats, and incorporated results from new seabird multi-population viability model.
- Undertook situational analyses for each site and populations of petrels at sea. Consulted active NGOs (Grupo Jaragua, EPIC), and biologists working with local communities in confirmed nesting areas (J. Goetz, A. Brown, E. Rupp) and at sea (Y. Stage, P. Jodice, G. Wallace).
- Drew on representatives at the IBPCG meeting held in 2019 (at the BirdsCaribbean International Conference in Guadeloupe) to gather additional input into the situations across the species range, especially probable and suspected areas in the Lesser Antilles.
- Consulted with external petrel experts we gained additional insights on various threats (for which few data were available) and to strategies as determined by other Pterodroma experts: Jérôme Dubos (Université de La Réunion), Martin Riethmuller (Société d'Études Ornithologiques de La Réunion), Teresa Militao (Universitat de Barcelona), Jacob Gonzalez-Solis (Universitat de Barcelona) and Herculano Dinis (Associação Projecto Vitó), Andre Raine (Kauai Endangered Seabird Recovery Program), Carolina Proaño (Galapagos Science Center), and Leo Zurita Arthos (Universidad San Francisco de Quito).
- Developed goals in the form of the status of Key Ecological Attributes (KEAs) relating to the petrel targets.

Plan

- Developed strategies, documenting our assumptions about drivers of change, and drafting objectives, activities, and indicators.
- Rated Strategies, examined possible negative outcomes
- Compiled information needs (monitoring and research recommendations.)
- Brought in external resources, including new publications and guest lectures from *Pterodroma* petrel experts from other areas (Réunion, Kauai, Cape Verde, Galapagos) to create an atmosphere of learning and cross-collaboration.
- Looked for examples from beyond taxa-specific conservation plans to other plans where human communities are central themes (e.g., Masai Mara Conservation Action Plan).

The conservation of the petrel has benefited from the close collaboration of many partners. Jennifer Wheeler

Table A1-1: Review of Actions from 2012 Conservation Action Plan for the Black-capped Petrel

~~Table 2 from 2012 Conservation Action Plan is replicated below, annotated with notes on progress and current relevancy.~~ Almost all actions are still relevant and carried forward into the 2021Conservation Action Plan: these are marked "In 2021 Plan."

Many actions are "ONGOING;" a few are essentially "COMPLETED;" only a few actions are noted as "DROPPED." In 2012 we lacked information needed to assess nesting sites separately or to rate threats and strategies. With advances in knowledge, we are better able to characterize sites specifically, rate threats, and identify and describe top strategies at particular sites.

ACTIONS (from 2012 Conservation Action Plan, Table 2)	Progress Report
OUTPUT 1.A. Reduce Existing Threats: Known threats of habitat loss, predation and tower kills quantified, prioritized and reduced 1.A.i. Maintain existing forest cover at known sites; incorporate petrel conservation into existing reforestation projects In 2021 Plan, interventions commenced at one site in Haiti, Morne Vincent 1.A.ii. Assess which towers pose mortality threat; prioritize actions in accordance with assessment; develop mitigation measures such as reduced lighting, re-locating, and co-locating on existing towers to reduce number of structures In 2021 Plan, some interventions commenced 1.A.iii. Identify key predators and predation levels; prioritize sites and predators; reduce predator impact on BCPE with traps or other predator control methods In 2021 Plan, some interventions commenced 1.A.iv. Increase fire-control measures, and increase vigilance and enforcement In 2021 Plan, priority particularly for La Visite	As nest sites are discovered, threats are characterized by field observations and camera traps. Threats have been rated for each individual nesting site, although impacts of threats are not yet quantified. Determining impact of highest threats is a research priority. Some preliminary interventions have been made (modified lighting at one particularly dangerous tower, some pre-breeding predator trapping; some reforestation), but need to be expanded and effectiveness determined. (1.A.i.) Reforestation at forest buffer areas as well as farming practices that reduce needs to clear forest have offset the rate of deforestation in the border areas near Morne Vincent
OUTPUT I.B. Community Involvement: Communities adjacent to the known breeding sites are integrated in a participatory conservation process 1.B.i. Conduct social research to understand human dependency and impact on BCPE forest habitat as well as potential direct impacts on BCPE populations In 2021 Plan 1. B.ii. Create participatory management plans for sites with human impacts In 2021 Plan 1.B.iii. Work with communities to manage hunting pressures and/or predation Abandoned - Harvest by humans not considered an important threat, and community control of predators not discussed	These actions are most relevant to the sites in Haiti, where communities are located within the Parks hosting petrels. At Morne Vincent, community engagement relating to sustainable agriculture and public education is ongoing. These and strategies of community development seek to provide citizens with concern for the petrel, and to provide them with skills and resources to improve environmental conditions in their fields and nearby forest. Direct interventions at La Visite ridge have not commenced, but James Goetz's Payment for Ecosystem Services Program near Seguin illustrates complexity of drivers of resource use. A socio-economic study specifically for the ridge area is recommended.

I.C. Breeding Distribution: Nesting sites are known, mapped and characterized across the breeding range 1.C.i. Develop habitat model that accurately characterizes known nesting sites (e.g. with satellite images and spatially explicit modeling that accounts for slope and vegetation cover) Completed 1.C.i. Identify potential nesting and restoration sites based on characterization (above) Completed 1.C.ii. Compare historical and potential BCPE nesting sites on Cuba, Dominica, Guadeloupe, Hispaniola, Jamaica, Navassa, etc. to known BCPE nesting characteristics, and survey sites with most potential In 2021 Plan; surveys commenced on all except Navassa (ruled out). 1.C.iii. Develop and refine search methodologies for individual nests and nesting sites, e.g. radar, search dogs, transmitters on birds caught at sea In 2021 Plan	Habitat model developed for Hispaniola and Caribbean, and shared with partners. 100 nests now located in 5 sites on Hispaniola. Autonomous recording units and ground searches continue in promising areas. Radar surveys conducted for most promising areas of Hispaniola, Dominica, Guadeloupe, and Jamaica. ARUs deployed in Dominica and Guadeloupe. Some coastal surveys conducted in Cuba. Petrels captured at Loma del Toro nesting sites and at sea off Hatteras, NC, and tracked by satellite shed light on nesting grounds and foraging areas.
I.D. Knowledge: Additional factors that affect population size, structure and vulnerability are identified 1.D.i. Understand limiting factors and mortality drivers: quantify population vital rates and create a demographic model, conduct Population Viability Analysis In 2021 Plan, ongoing 1.D.ii. Determine whether BCPE is nest-site limited through investigation of intra-specific and inter-specific competition at nest sites Abandoned - Not a research priority 1.D.iii. Investigate current and historical population structure using genetic studies, esp. to determine unique populations In 2021 Plan 1.D.iv. Assess prevalence and impact of parasites and/or disease Abandoned – Not a research priority	Seabird mPVA indicates negative trajectory; determining key species-specific vital rates is a key priority. Genetic work on specimens captured in the 1980s indicates genetic distinction between dark, and light and intermediate morphs.
I.E. Management and Policy: Appropriate legal and policy protection 1.E.i. Protected area boundaries defined legally and marked on the ground Not pursued in 2021 Plan 1.E.ii. Where they do not exist, develop and circulate area management plans in appropriate languages Not pursued in 2021 Plan 1.E.iii. Implement long-term protection measures for expanded breeding areas by elevating protected status or securing conservation concessions To date, no nests outside parks 1.E.iv. Explore national legal protections for the species, e.g. address the possibility of U.S. Endangered Species Act listing; provide international technical support for the process Advised on the US ESA listing 1.E.v. Explore international legal protections for the species, e.g. inclusion in CMS (see Appendix A of Plan) In 2021 Plan	KBAs in Haiti were redefined/refined with the process inextricably linked to the development of the National System of Protected Areas. Specifically, Massif de la Selle formally proposed as a Biosphere Reserve. The USFWS has undertaken a formal Status Assessment and released a Proposed Rule for the listing of the species as Threatened. Species added to Annex 2 of the SPAW Protocol (2014)

2.A.At-Sea Surveys and Seasonal Movements: Seasonal movements and at- sea range of BCPE understood 2.A.i. Place transmitters on birds at nesting sites to understand at-sea movements; investigate differences in at-sea range in the breeding and non-breeding season In 2021 Plan, ongoing 2.A.ii. Continue compilation of at-sea sightings by U.S. Geological Survey and update other databases such as eBird; identify data gaps, e.g. winter surveys off Cape Hatteras In 2021 Plan 2.A.iii. Collect information on at-sea sightings between Cuba and Jamaica In 2021 Plan 2.A.iv. Recruit fishermen, sailors, etc. to report sightings Not pursued	Tracking studies conducted on birds caught at nesting sites and at sea.
2.B. At-Sea threats: At-sea threats and factors that affect population size identified and reduced 2.B.i. Identify prey and dynamics of prey base In 2021 Plan, ongoing 2.B.ii. Investigate and if warranted, reduce fishery impacts on mortality In 2021 Plan, ongoing 2.B.iii. Investigate marine lighting as a source of mortality, e.g. map locations of relevant platforms; develop mitigation for identified threats In 2021 Plan, ongoing 2.B.iv. Assess risk posed by wind development in Caribbean areas In 2021 Plan	Spatial overlap developed using tracking data, and shared with partners.
3.A. Expanded Breeding Locations: Available nesting habitat at known sites increased by doubling the area of suitable threat-free habitat and/or increasing density using artificial nests or other measures. Suitable threat-free habitat at the existing three sites doubled in area 3.A.i. Assess potential for habitat restoration to expand suitable habitat at Macaya, La Visite, and Loma del Toro In Haiti: Restoration preceded by development of tree crop buffers is envisioned as a long-term outcome for Morne Vincent. In DR, restoration at Loma del Toro not currently a priority; Valle Nuevo restoration discussed in 2021 Plan. 3.A.iii. Monitor the regeneration and restoration of forest areas In 2021 Plan 3.A.iv. Use artificial nest burrows, playback attraction and/or translocation to expand current BCPE breeding sites In 2021 Plan	Field projects conducted by partners in Massif de la Hotte were planning steps for habitat protection/restoration, but restoration not actually underway. Yet to be in a position to form a strategic approach to forest protection in and around the La Visite nesting colony.

3.B. New Locations: New breeding locations established in a minimum of three new areas through translocation, artificial nests, attraction 3.B.i. Identify new locations suitable for BCPE breeding (near existing breeding sites, or in completely new areas) based on habitat model from item 1.C.i. 3.B.ii. Assess the feasibility of securing suitable habitat and establishing breeding sites in new locations 3.B.iii. Secure suitable habitat (managing and mitigating for threats) and implement long-term protection measures 3.B.iv. Install artificial nest burrows in the new areas and attract birds to nest (through spotlight attraction of adults and introduction to artificial nests, and also through translocation of pre-fledging young) 3.B.v. Carry out late-provisioning studies at known nests to acquire data necessary for translocation applications All in 2021 Plan	These steps in the creation of new breeding locations form a top strategy in the 2021 Plan.
3C. Management of New Locations: Newly discovered or created sites protected and expanded 3.C.i. Set in place long-term protection measures for the newly discovered populations; develop area management plans if needed 3.C.ii. Manage land cover appropriately at each new colony, e.g. assess feasibility of tree planting or restoration to consolidate and expand habitat 3.C.iii. Manage for habitat and invasive predator threats at new and expanded breeding locations All of above in 2021 Plan	Site-specific strategies must be developed for any newly discovered or created sites

APPENDIX 2: SITE PROFILES

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NOTES ON TERRESTRIAL SITE PROFILES

(Terrestrial site profiles are presented from west to east)

Terrestrial profiles contain the following sections:

Map: Maps provided show the general locations of sites described within these profiles. In addition, maps of confirmed sites also show nesting areas (blue minimum convex polygons, calculated from all extant burrows ever evidenced of being active). When available, maps include additional information such as searched areas (dashed white polygons), radar locations within site flyways (pink circles), and location of acoustic autonomous recording units (ARU; pink squares). Filled circles and squares locate surveys that recorded petrel activity; outlined circles and squares locate surveys that did not record petrel activity. For information, national parks in petrel habitat are also mapped (green overlay). Insets show 3D views of confirmed sites.

Vitals:

Search effort: Focuses on fieldwork since the 2012 Plan and Simons et al. (2013) monograph. All radar expeditions to date led by Adam Brown, with Environmental Protection in the Caribbean. All habitat modeling noted is that of Satgé et al. (2020). Audio/visual refers to night-time human listening/looking and/or placement of ARUs.

Dimensions:

- Nesting area based on 95% minimum convex polygon around all extant burrows ever evidenced of being active.
- Dimensions of protected areas based on UNEP-WCMC and IUCN (2020).
- Suitable Area in Protected Area: Computed as the suitable (s>0.90; Satgé et al. 2020) surface areas inside nominal Protected Area.

Number of known nests: Includes all extant burrows ever evidenced of being active.

IBA: Site present in Important Bird Area, as designated by Birdlife International (2020).

KBA: Site present in Key Biodiversity Area, as designated by Key Biodiversity Areas Partnership (2020).

Other: Other area designations reflecting conservation priority, e.g. UNESCO Biosphere Reserves (2020)

Description: Short descriptions of the area, the type of habitat available, and human impact.

Highest threats: Only includes those rated as High or Very High for the particular site (for more details on threats and threat rating, see Threats Rating in the main text and Appendix 3: Threats Rating. For the threat of predation by introduced mammals: many potential harmful introduced species are present in the Caribbean; only the most damaging to petrel populations are noted.

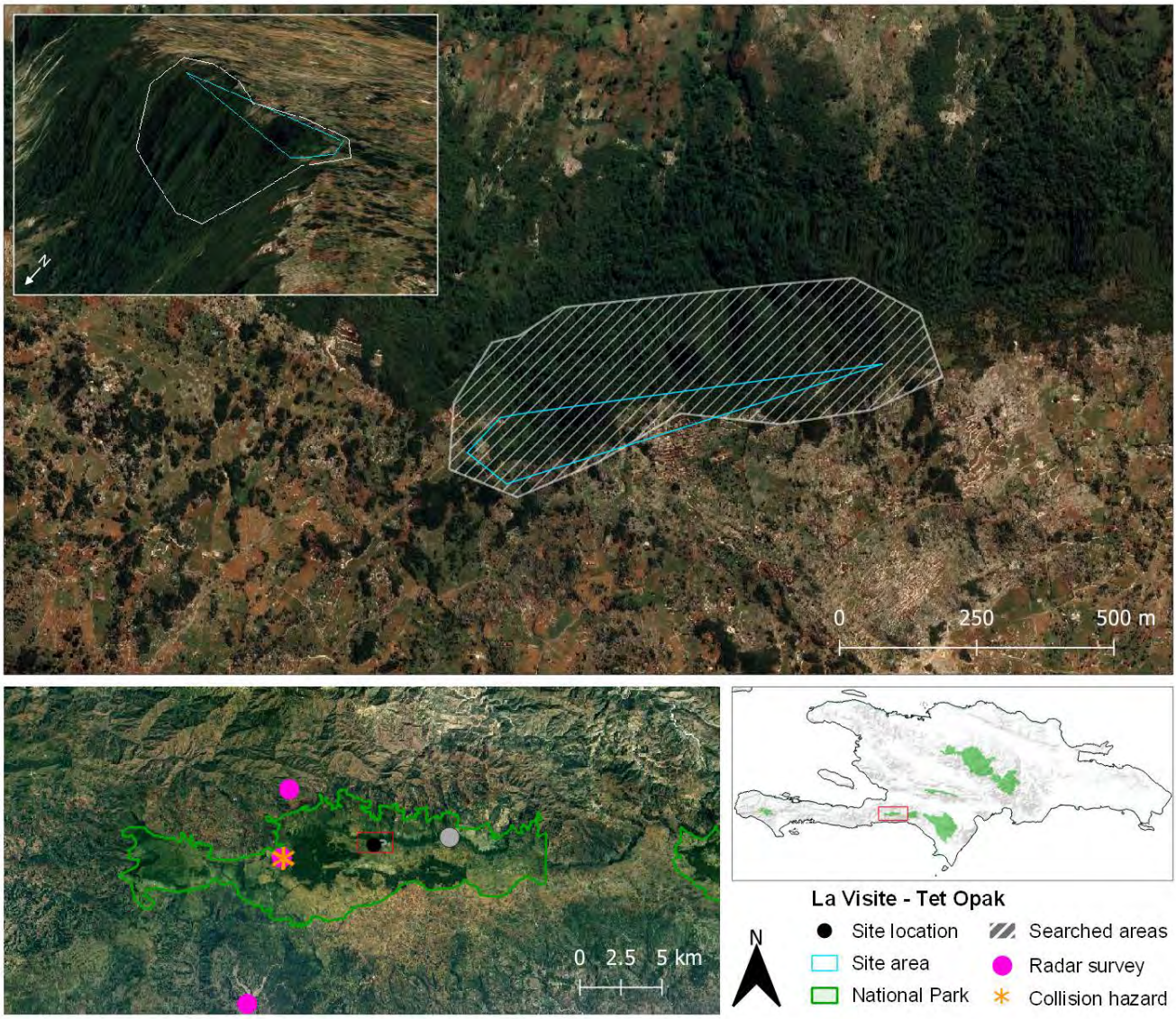
Other information include:

- **Existing/Recent Research and Monitoring**
- **Existing/Recent Conservation Interventions**
- **Planned Strategies**
- **Critical Information Needs**

LA VISITE (TET OPAK) - Haiti

Confirmed nesting

Site map (see map notes on page 72):



Vitals:

- Located at the western end of Massif de la Selle, in the La Visite escarpment, southcentral Haiti. Altitude: 2200m above sea level.
- Area thoroughly surveyed with radar (2013, 2014, 2017), and ground searches in 2013 and 2017 onwards.
- 42 nests (October 2020). Additional nests are suspected in adjacent areas.
- Nests spread over 0.01 km2.
- Protected Area: La Visite National Park, 114.3 km2, lacks effective protection enforcement.
- 25.6 km2 of suitable nesting habitat available in Protected Area, based on modeling.
- Nearest confirmed nesting area: Morne Vincent, Haiti; 50 km to the east.
- IBA: yes; KBA: yes. Within UNESCO's La Selle - Jaragua-Bahoruco-Enriquillo Transboundary Biosphere Reserve.

Description:

- La Visite National Park is characterized by a dry, karstic environment with large swaths of remaining broadleaf and Hispaniola Pine forests surrounded by numerous farming communities.
- The La Visite escarpment is an area of steep north-facing slopes, with a remnant broadleaf forest that is 7 km

long and ranges from 40-500 m wide.
- Tet Opak refers to a specific area within a large drainage. A low descending ridge creates a natural barrier, effectively splitting the drainage into two shallow valleys.
- Nests are located in both valleys, on slopes with thick vegetation and on the ridgeline in areas actively being cleared for agriculture.
- The presence of farming communities, which have been using the area before the creation of the park, is tolerated within park boundaries though illegal.

Highest Threats:
- **Expansion of agriculture is a Very High ongoing** threat fueled by non-sustainable, low-yield farming practices in communities above and below the escarpment.
- **Livestock grazing is a High ongoing threat** as conversion to pasture increases exposure of burrows and is a step towards full vegetation clearing for row crop farming.
- **Fires** started in pine forests to expand nearby farming land have caused fatal attraction of breeding petrels and also **pose a High ongoing threat**.
- **Predation by introduced mammals**, fostered by the nearby presence of human settlements, **is a High ongoing threat**.
    - Cats are abundant.
    - Dogs are common
    - Mongoose are present
    - Rats are extremely abundant.
- **Collision with lighted telecommunication towers** was formerly a High threat but alteration of its lighting system has decreased its impact to Low.
- **Other threats** include: Extraction of wood and non-timber forest products (e.g. tree ferns): Medium; Groundings from Light Pollution: Medium; Harvest by humans: Low.

Existing Research and Monitoring:
- Visited annually since 2018, with all known nests visually inspected throughout the breeding season.
- Camera traps are placed at the site and most nests are being monitored.

Existing Conservation Interventions:
- None yet in place
- Conservation work by IBPCG has been challenged by the remoteness of the area and the lack of an established presence there.

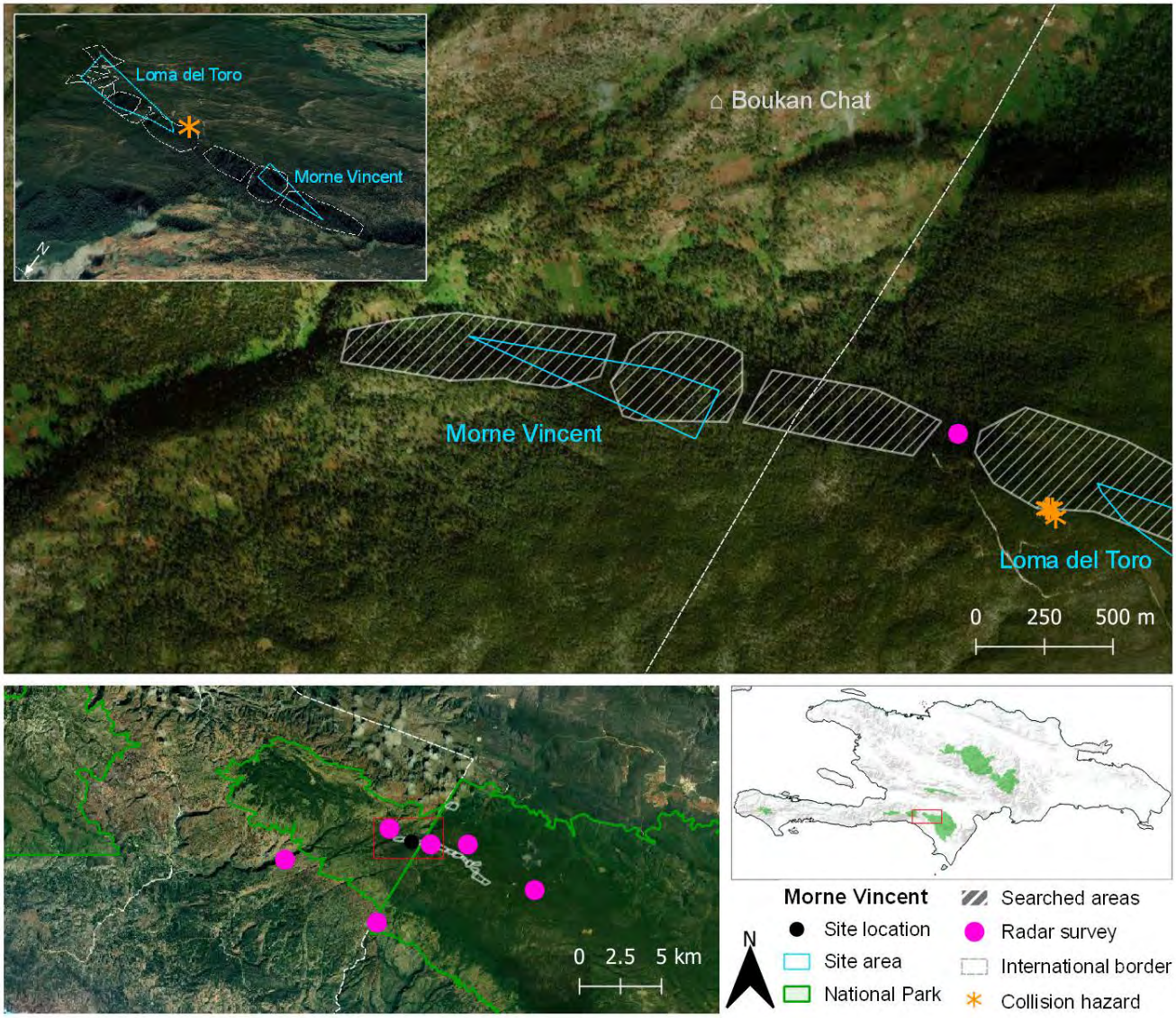
Planned Strategies:
- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites
- S4: Reduce predator pressure
- S5: Reduce flight hazards
- S7: Scoping study of socio-economic drivers of the threats at La Visite National Park

Critical Information Needs:
- Continued monitoring of the site for indicators of Key Ecological Attributes
- Continued search for nesting sites along remainder of the escarpment.
- Impact of predators.
- A better understanding of the socioeconomics of communities living in the La Visite National Park is needed to propose relevant strategies**.**

MORNE VINCENT - Haiti

Confirmed nesting

Site map (see map notes on page 72):



Vitals:

- Located at the east end of Massif de la Selle, on Haiti's eastern border with the Dominican Republic. Altitude: 2000m above sea level.
- Area thoroughly surveyed with radar (2012-2014, 2017), ARUs and ground searches since 2010.
- 17 nests (October 2020). No or few additional nests suspected.
- Nests spread over 0.13 km2
- Protected Area: Foret de Pins I National Park (Parc National Naturel), 65 km2, lacks effective protection enforcement.
- Very little suitable nesting habitat remaining in Protected Area: 2.3 km2, based on modeling and observation.
- Nearest confirmed nesting area: Loma del Toro, Dominican Republic, abuts Morne Vincent and can be considered the same nesting area (1 km). La Visite - Tet Opak is located 50km to the west.
- IBA: no; KBA: yes. Within UNESCO's La Selle - Jaragua-Bahoruco-Enriquillo Transboundary Biosphere Reserve.

Description:

- In a high elevation region characterized by heavily forested patches in a dry, karstic environment, intermixed with small impoverished farming communities.
- Morne Vincent site consists of dispersed mature Hispaniola Pine, mostly cleared of undergrowth, although small, scattered patches of remaining broadleaf undergrowth are still present.
- Abutted by community of Boukan Chat (very roughly estimated as a population of 5,000), other smaller communities nearby

Highest Threats:

- **Predation by introduced mammals is a High ongoing threat**.
    - Cats are present but not abundant.
    - No mongoose have yet been observed
    - Rats are extremely abundant.
- **Collision with lighted structures** on the nearby Loma del Toro peak (<1km) **poses a High ongoing threat** to petrels at Morne Vincent.
- **Expansion of agriculture** by citizens of Boukan Chat, driven by poor agroecological practices, was **formerly a Very High threat;** however, conservation interventions of the last decade appear to have brought the threat to **Low**.
- **Other threats** include: Fire mortality: Medium; Groundings from Light Pollution: Medium; Fire damage to habitat: Low; Extraction of wood and non-timber forest products: Low; Harvest by humans: Low.

Existing Research and Monitoring:

- Visited annually since 2010, with all known nests visually inspected throughout the breeding season.
- A handful of camera traps are placed at the site.

Existing Conservation Interventions:

- Positive relationships built within the Boukan Chat community and community-development and environmental education initiatives launched with partners Plant with Purpose and GIZ (the German government's international aid organization).
- Farmer education on sustainable practices on existing farmland and in forest conservation values to reduce pressure to convert forest.
- Continued program of education and outreach to the public (e.g., Diablotin Festival, support to soccer team) and in schools.
- Success of conservation interventions is evidenced by the continued existence of the site and because the number of occupied nests seems stable.

Planned Strategies

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites
- S4: Reduce predator pressure
- S5: Reduce flight hazards
- S6: Strategies of community development in Boukan Chat

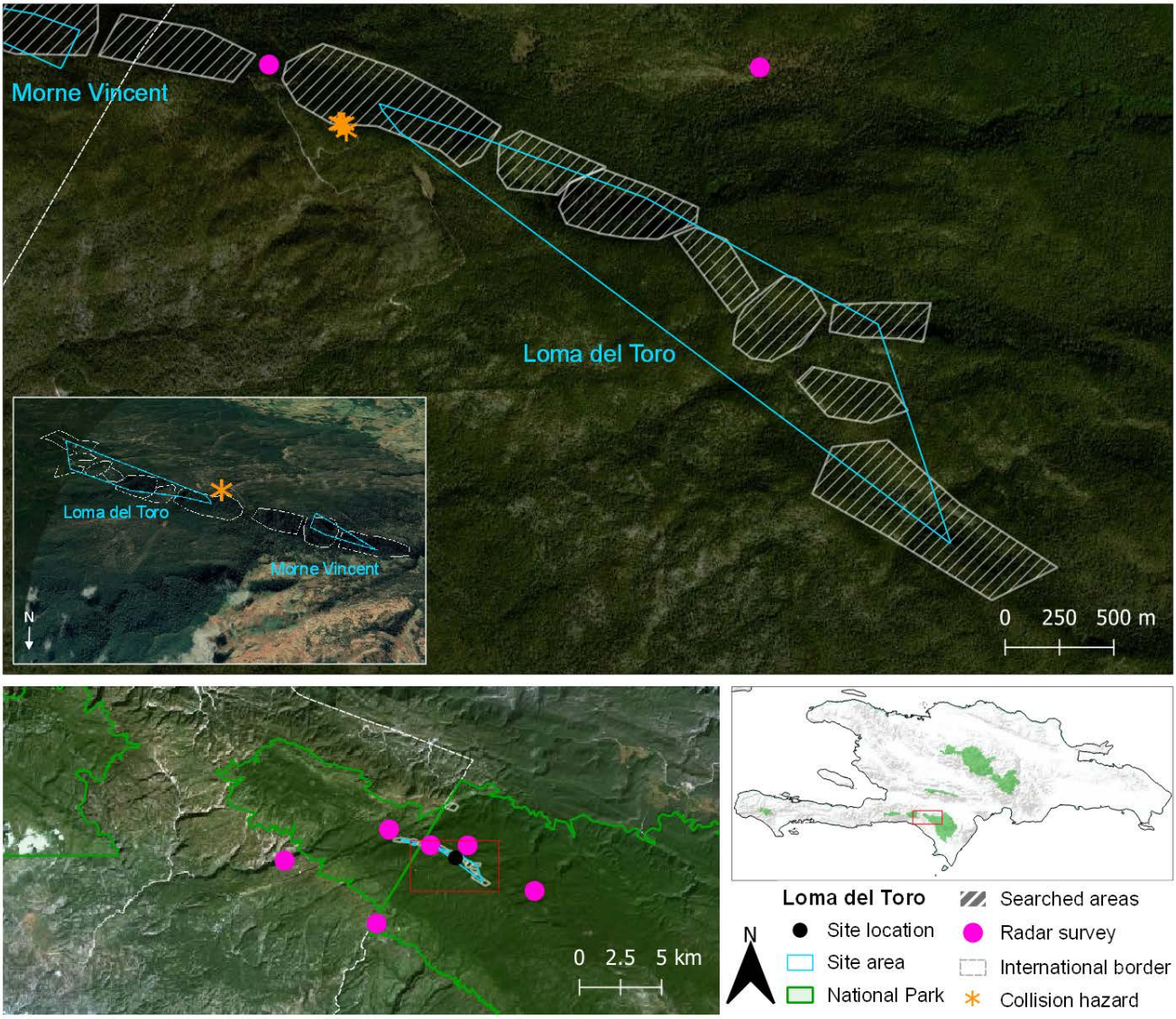
Critical Information Needs:

- Continued monitoring of the site for indicators of Key Ecological Attributes.
- Impact of nearby lighted telecommunication towers.
- Locating nesting areas and assessing habitat quality and encroachment

LOMA DEL TORO – Dominican Republic

Confirmed nesting

Site map (see map notes on page 72):



Vitals:

- Located at the west end of Sierra de Bahoruco, on the Dominican Republic's western border with Haiti. Altitude: 2300 m above sea level.
- Area thoroughly surveyed with radar (2012-2014, 2017), ARUs and ground searches since 2010.
- 28 nests (October 2020). Few additional nests suspected.
- Nests spread over 1.5 km2
- Protected Area: Sierra de Bahoruco National Park, 1092 km2.
- Protected Area hosts large swaths of suitable nesting habitat: 57 km2, based on modeling.
- Nearest confirmed nesting area: Morne Vincent, Haiti, abuts Loma del Toro and can be considered the same nesting area (1 km). Also in the Sierra de Bahoruco mountain range, Loma Quemada, Dominican Republic, is located 20 km to the east.
- IBA: yes; KBA: yes. Within UNESCO's La Selle - Jaragua-Bahoruco-Enriquillo Transboundary Biosphere Reserve.

Description:

- In a high elevation area characterized by broad expenses of forests of Hispaniola Pine in a dry, karstic environment.
- Nesting areas in Loma del Toro consist of dense broadleaf undergrowth in dispersed Hispaniola Pine forest, on medium to steep slopes.
- Nesting sites are grouped into three main independent clusters of 15, 8, and 2 monitored burrows.
- No reported human encroachment.

Highest Threats:

- **Predation by introduced mammals is a High ongoing threat**:
    - Cats are present but not abundant.
    - No mongoose have yet been observed
    - Rats are extremely abundant.
- **Collision with lighted structures** on the Loma del Toro peak (<100 m from main cluster) **pose a High ongoing threat** to the petrels at Loma del Toro.
- **Other threats** include: Fire mortality: Medium; Groundings from Light Pollution: Medium; Fire damage to habitat: Low.

Existing Research and Monitoring:

- Visited annually since 2010, with most known nests visually inspected (25 out of 28) throughout the breeding season.
- Camera traps are placed at the site and most nests are being monitored.
- Predator control has been trialled and is planned for future years (cats and rats).

Existing Conservation Interventions:

- Positive relationships built within the nearby Boukan Chat community, Haiti, and community-development and environmental education initiatives launched with partners Plant with Purpose and GIZ (the German government's international aid organization).
- Continued program of education and outreach to the public (e.g., Diablotin Festival) and in schools.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites
- S4: Reduce predator pressure
- S5: Reduce flight hazards
- S6: Strategies of community development in Boukan Chat
- S8: Engage with DR government to plan and strengthen oversight of parks

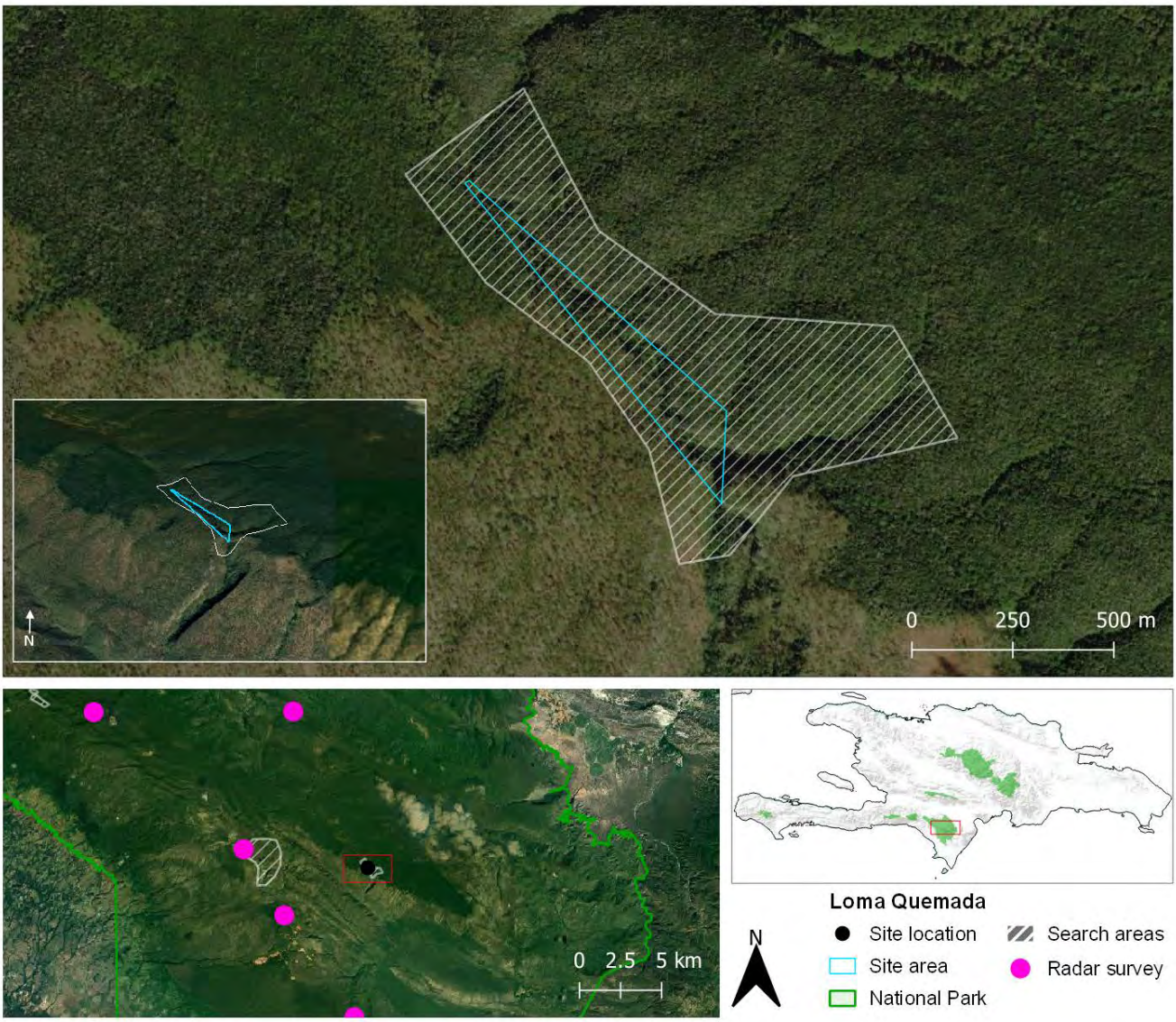
Critical Information Needs:

- Continued monitoring of the site for indicators of Key Ecological Attributes.
- Impact of predators.
- Impact of lighted telecommunication towers.

LOMA QUEMADA – Dominican Republic

Confirmed nesting

Site map (see map notes on page 72):



Vitals:

- Located in the eastern Sierra de Bahoruco, in the southwestern Dominican Republic. Altitude: 1700 m above sea level.
- Area covered by radar (2013, 2017); moderately surveyed with ARUs and ground searches since 2015.
- 7 nests (October 2020). Additional nests suspected in adjacent areas.
- Nests spread over 0.11 km2
- Protected Area: Sierra de Bahoruco National Park, 1092 km2.
- Protected Area hosts large swaths of suitable nesting habitat: 57 km2.
- Nearest confirmed nesting area: Also in the Sierra de Bahoruco mountain range, Loma del Toro, Dominican Republic, is located 20 km to the west.
- IBA: yes; KBA: yes. Within UNESCO's La Selle - Jaragua-Bahoruco-Enriquillo Transboundary Biosphere Reserve?

Description:

- Nesting site with the lowest elevation, characterized by broad expenses of forests of Hispaniola Pine in a dry, karstic environment.
- Nesting sites located along the bottom of a dry canyon vegetated with broadleaf trees and shrubs. The area has generally undisturbed broadleaf vegetation, despite pig damage.
- All nests in deep caves, crevices with narrow entrances (likely due to pig pressure).
- No reported human encroachment.

Highest Threats:

- **Predation by introduced mammals is a High ongoing threat**:
    - Cats are not abundant but regularly observed.
    - No mongoose have yet been observed
    - Rats are extremely abundant.
- **The presence of feral pigs is a High ongoing threat**, with pigs destroying burrows and occasionally depredating nest occupants.
- **Other threats** include: Fire mortality: Medium; Groundings from Light Pollution: Medium; Fire damage to habitat: Low.

Existing Research and Monitoring:

- Visited annually since 2016, with all known nests visually inspected throughout the breeding season.
- Camera traps are placed at the site and most nests are being monitored.

Existing Conservation Interventions:
No conservation interventions are ongoing but solutions to control the feral pig population are sought with local hunters.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites
- S4: Reduce predator pressure
- S8: Engage with DR government to plan and strengthen oversight of parks

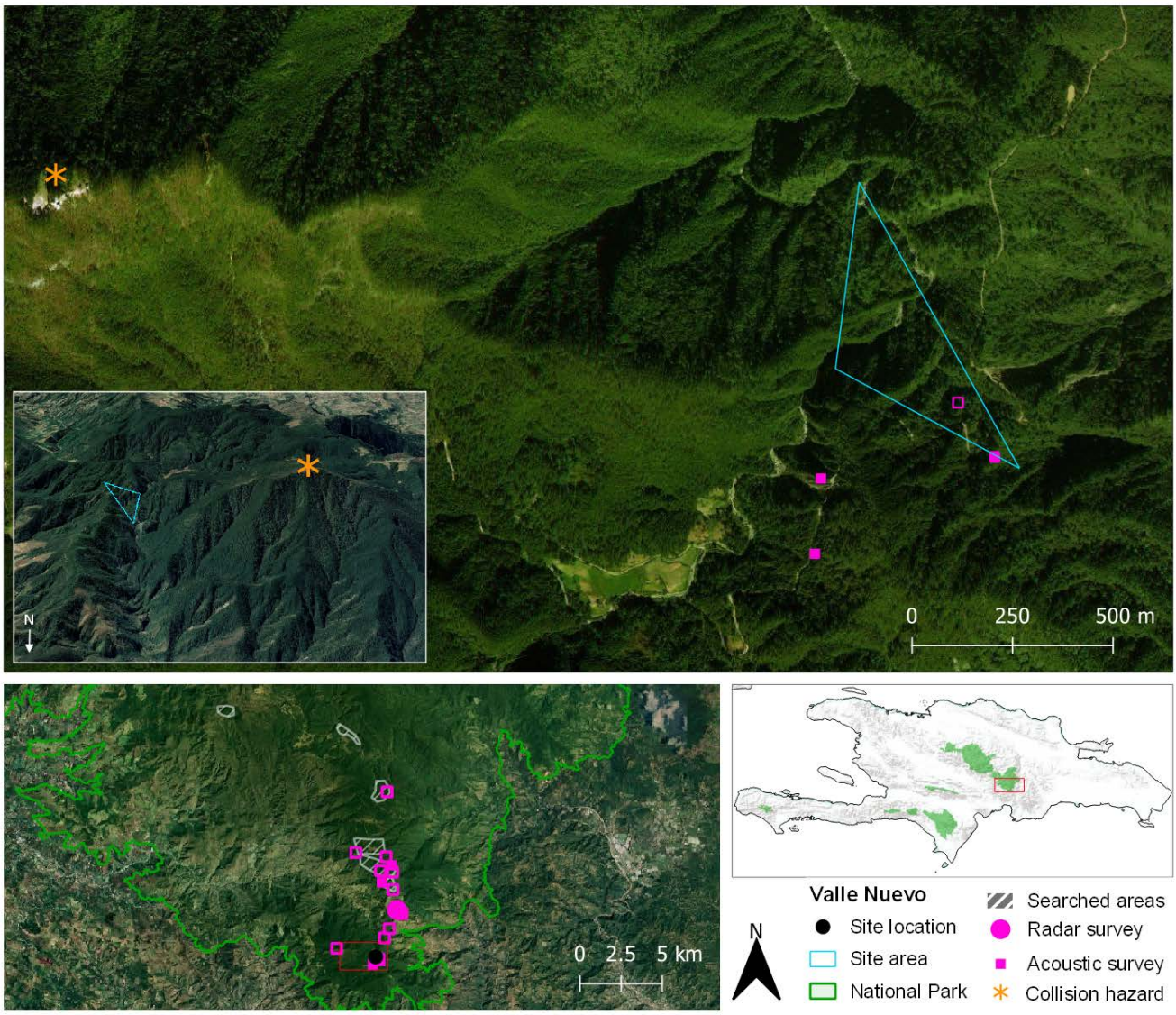
Critical Information Needs:

- Continued monitoring of the site for indicators of Key Ecological Attributes.
- Impact of introduced mammals.

VALLE NUEVO – Dominican Republic

Confirmed nesting

Site map (see map notes on page 72):



Vitals:

- Located in the southeastern Cordillera Central, in the central Dominican Republic. Altitude: 2000 m above sea level.
- Area covered by radar (2013, 2017); moderately surveyed with ARUs and ground searches.
- 11 nests (October 2020). Additional nests suspected in adjacent areas.
- Nests spread over 0.14 km2
- Protected Area: Valle Nuevo National Park, 906 km2.
- Protected Area hosts large swaths of suitable nesting habitat: 54 km2 based on modeling.
- Nearest confirmed nesting area: Loma Quemada, Dominican Republic, is located 100 km to the southwest.
- IBA: yes; KBA: yes.

Description:

- Area characterized by steep valleys and ravines with flowing streams, vegetated by mixed forests of broadleaf tree species, with very dispersed Hispaniola pines.
- Areas of invasive fern thickets in forest patches damaged by fires.
- Few farming communities are present in the area, with currently a low level of encroachment. Encroachment occured in the past, with intensive cash-crop farming near nesting areas.

Highest Threats:

- **Predation by introduced mammals is a High ongoing threat**:
    - Cats have not been recorded at this site, but likely occur.
    - Mongoose are not abundant but regularly observed. Predation by mongoose was observed.
    - Rats are extremely abundant.
- **Grounding due to light attraction is rated as a Medium ongoing threat** because of villages and lighted roads on flyway; however, data gaps on its impacts may temper this assessment.
- **Other threats** include: Degradation of habitat by invasive ferns: Medium; Fire mortality: Medium; Groundings from Light Pollution: Medium; Fire damage to habitat: Medium; Agricultural expansion: Low in current nesting habitat (based on past incursions in the area).

Existing Research and Monitoring:

- Visited annually since 2017, with all known nests visually inspected throughout the breeding season.
- Camera traps are placed at the site and most nests are being monitored.
- Predator control has been trialed and is planned for future years (mongoose and rats).

Existing Conservation Interventions:

No conservation interventions are ongoing but solutions to control invasive ferns from affecting petrel habitat are being discussed.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites
- S4: Reduce predator pressure
- S5: Reduce flight hazards
- S8: Engage with DR government to plan and strengthen oversight of parks
- S8c: Habitat restoration

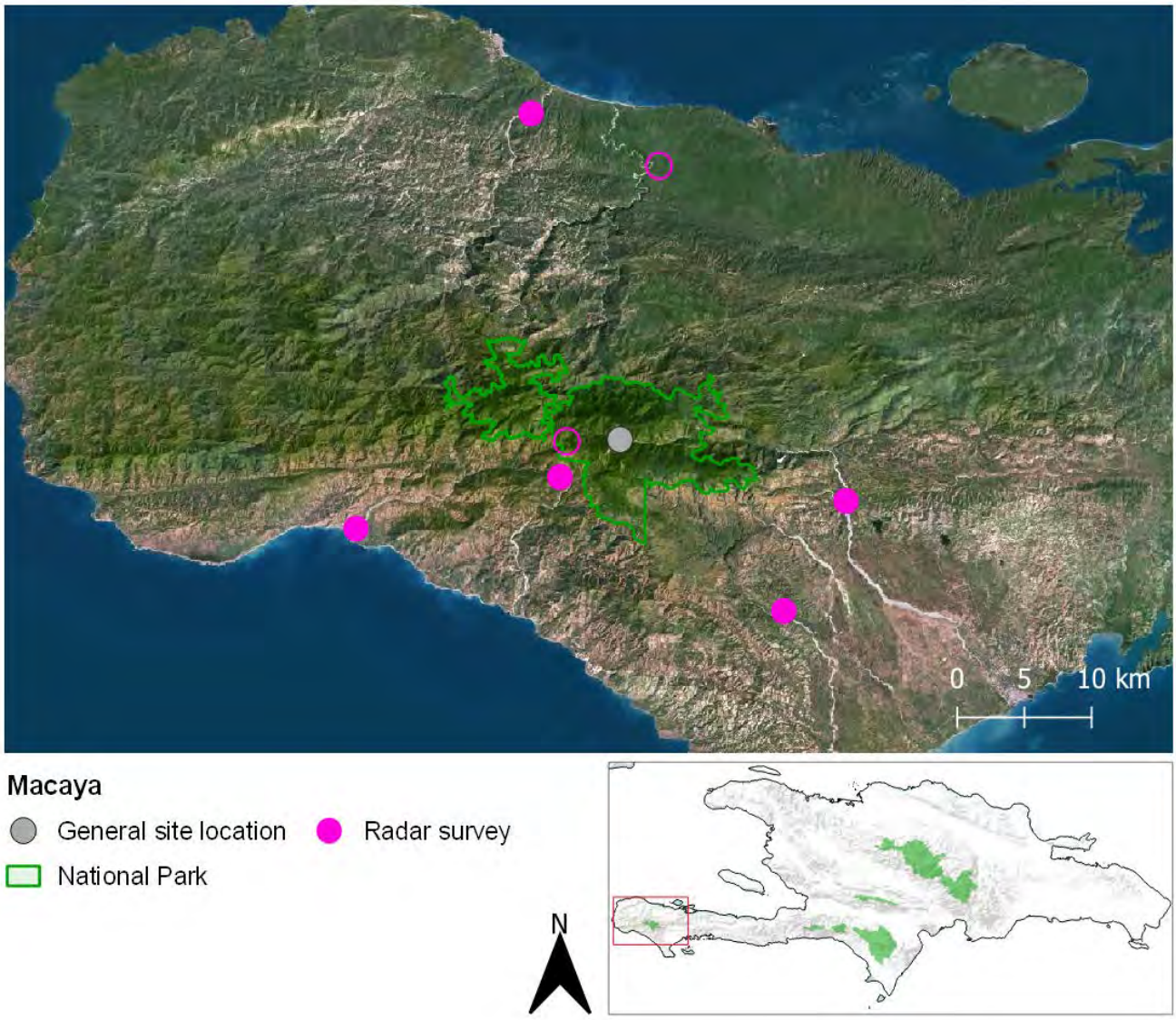
Critical Information Needs:

- Continued monitoring of the site for indicators of Key Ecological Attributes.
- Impact of introduced mammals.
- Impact of strandings due to light attraction to populated areas along flyways.
- Impact of invasive ferns.

MACAYA - Haiti

Probable nesting

Site map (see map notes on page 72):



Vitals:

- Located in the Massif de la Hotte, at the tip of the southwestern peninsula of Haiti. Altitude: 1600-2300 m above sea level.
- Area partially covered by radar in 2014; scarce audio, visual surveys and ground searches (Goetz 2009).
- Nesting is probable based on recent evidence from radar surveys in flyways leading to Pic Macaya (2014), from observations of petrels flying and vocalizing (Goetz 2009), and from habitat modeling.
- Protected Area: Macaya National Park, 99 km2.
- Protected Area hosts large swaths of suitable nesting habitat: 31.4 km2, based on modeling.
- Nearest confirmed nesting area: La Visite - Tet Opak, Haiti, is located 190 km to the east.
- IBA: no; KBA: yes. Within UNESCO's La Hotte Biosphere Reserve.

Description:

- This area is composed of the parallel east-west ridgelines of twin peaks Pic Macaya (to the north) and Pic Formont (to the south).
- The terrain is characterized by steep valleys and ravines in a dry, karstic environment. A relatively well preserved forest of Hispaniola pines covers the summit and adjacent slopes.

Highest Threats:

- **Expansion of agriculture is a Very High ongoing threat**, with farming occurring at the bottom of the peaks and encroaching upwards. Fires used to clear land have also damaged nesting habitat.
- **Predation by introduced mammals is a High ongoing threat**, with a confirmed presence of:
    - Cats are abundant and regularly observed.
    - Rats are extremely abundant.
    - Feral pigs reported, but not abundant.
    - Mongoose have not been recorded, but likely occur.

Research and Monitoring:
No research or monitoring currently occurring.

Conservation Interventions:
No conservation interventions currently ongoing.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites

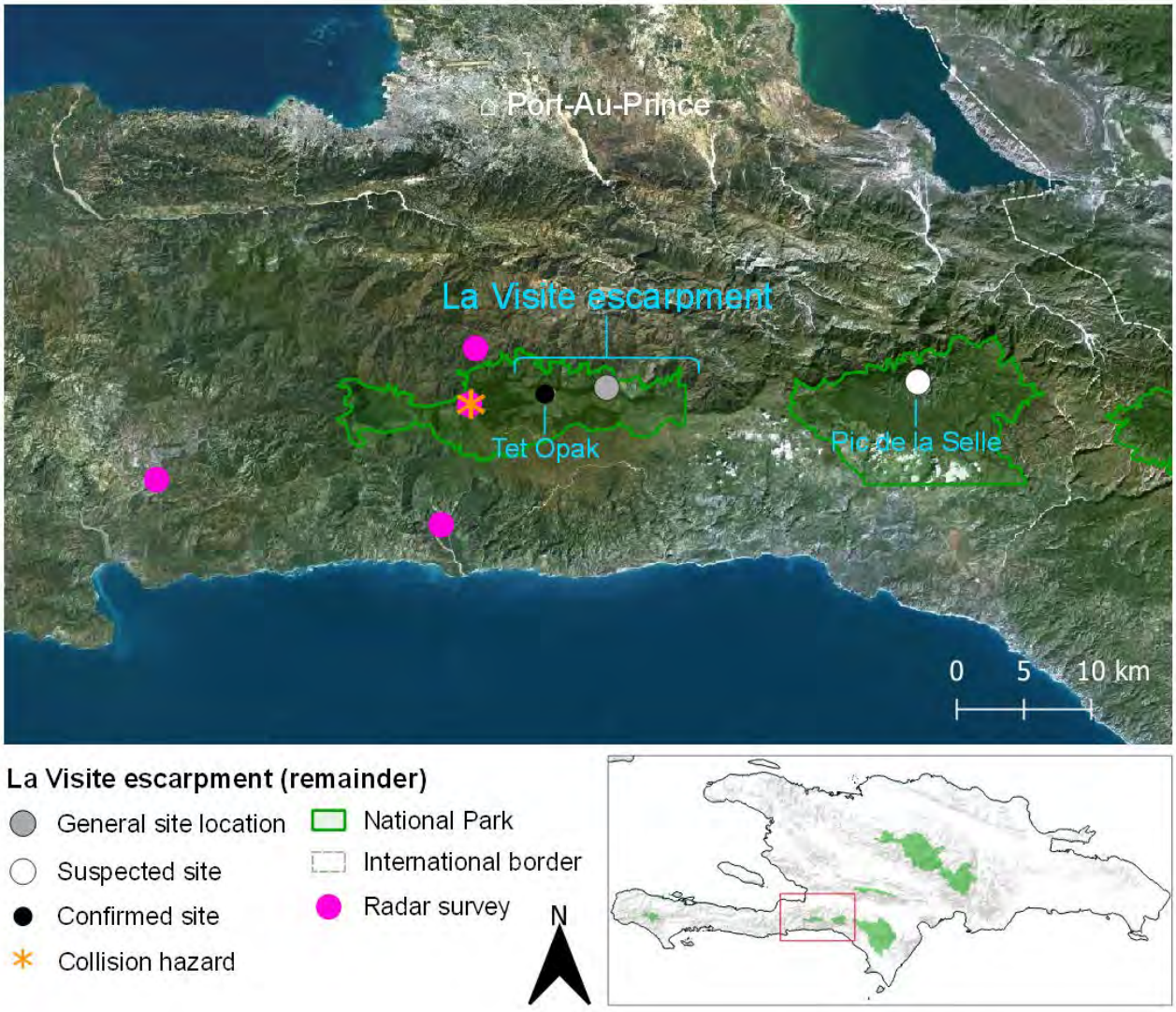
Critical Information Needs:

- Locate and characterize nest sites.
- Assess and characterize threats.

LA VISITE - REMAINDER OF ESCARPMENT - Haiti

Probable nesting

Site map (see map notes on page 72):



Vitals:

- Located at the western end of Massif de la Selle, in southcentral Haiti. Altitude: 1600-2200m above sea level.
- Area thoroughly surveyed with radar (2013, 2014, 2017). Occasional audio and visual surveys (2008, 2009, 2011 reported by Goetz); no ground searches.
- Nesting is probable based on recent evidence from radar surveys in flyways leading to the escarpment, from observations of petrels flying and vocalizing, and from habitat modeling.
- Protected Area: La Visite National Park, 114.3 km2, lacks effective protection enforcement.
- 25.6 km2 of suitable nesting habitat available in Protected Area, based on modeling.
- Nearest confirmed nesting area: La Visite - Tet Opak, on the western end of the escarpment.
- IBA: no; KBA: yes. Within UNESCO's La Selle - Jaragua-Bahoruco-Enriquillo Transboundary Biosphere Reserve.

Description:

- La Visite National Park is characterized by a dry, karstic environment with large swaths of remaining broadleaf

and Hispaniola Pine forests surrounded by numerous farming communities.
- The La Visite escarpment is an area of steep north-facing slopes, with a remnant broadleaf forest that is 7 km long and ranges from 40-500 m wide.
- The presence of farming communities, which have been using the area before the creation of the park, is tolerated within park boundaries though illegal.

Highest threats:
- **Expansion of agriculture is a Very High ongoing** threat fueled by non-sustainable, low-yield farming practices in communities above and below the escarpment.
- **Livestock grazing is a High ongoing threat** as it is a step towards full vegetation clearing for row crop farming.
- **Fires** started in pine forests to expand nearby farming land have caused fatal attraction of breeding petrels and also **pose a High ongoing threat**.
- **Predation by introduced mammals**, fostered by the nearby presence of human settlements, **is a High ongoing threat**.
    - Cats are abundant.
    - Mongoose have not been reported, but likely occur.
    - Rats are extremely abundant.
- Collision with lighted telecommunication towers was formerly a High threat but alteration of its lighting system has decreased its impact to Low.

Research and Monitoring: No research or monitoring currently occurring in the remainder of the escarpment.

Existing Conservation Interventions: No conservation interventions currently ongoing. Conservation work by IBPCG has been challenged by the remoteness of the area and the lack of an established presence there.

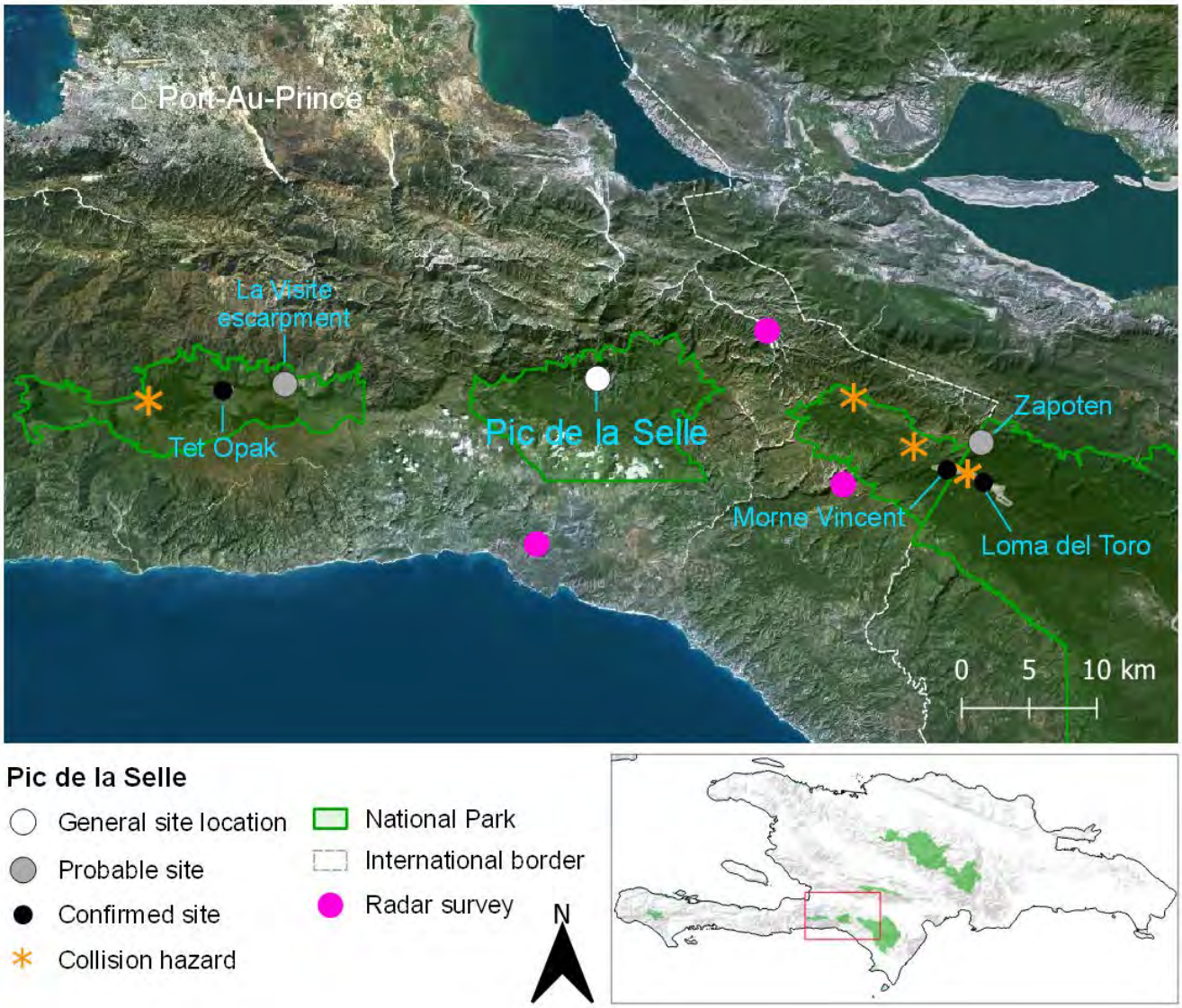
Planned Strategies
- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites
- S5: Reduce flight hazards
- S7: Scoping study of socio-economic drivers of the threats at La Visite

Critical Information Needs:
- Locate and characterize nest sites.
- Assess and characterize threats.
- A better understanding of the socioeconomics of communities living in the La Visite National Park is needed to propose relevant strategies**.**

PIC DE LA SELLE - Haiti

Probable nesting

Site map (see map notes on page 72):



Vitals:

- Located at the eastern end of Massif de la Selle, in southeast Haiti. Altitude: 2000-2600m above sea level. Pic de la Selle is the highest peak in Haiti (2680m)
- Area partially surveyed with radar (2013, 2017). No audio and visual surveys; occasional ground searches (limited scope).
- Nesting is probable based on recent evidence from radar surveys in flyways leading to the escarpment, from observations of petrels vocalizing (Jean et al. 2011), and from habitat modeling.
- Protected Area: Foret de Pins II National Park, 140.0 km2, lacks effective protection enforcement.
- 21.4 km2 of suitable nesting habitat available in Protected Area, based on modeling.
- Nearest confirmed nesting area: La Visite - Tet Opak (to the west) and Morne Vincent (to the east) are both located 25 km away from Pic de la Selle.
- IBA: no; KBA: yes. Within UNESCO's La Selle - Jaragua-Bahoruco-Enriquillo Transboundary Biosphere Reserve.

Description:

- Pic de la Selle is characterized by a dry, karstic environment. Western slopes host high altitude forests of Hispaniola pine, while the highest areas and the eastern slopes are characterized by shrub-like, scattered vegetation.
- Habitat modeling locates suitable nesting habitat in the forests west and southwest of the peak.
- The area is surrounded by numerous farming communities but the arid environment prevents much further ingress.

Highest Threats:

Threats are similar to those in the remainder of the La Visite escarpment:

- **Expansion of agriculture** (including livestock grazing) into the remaining pine forest.
- **Predation by introduced mammals**, including cats and rats.
- **Fires** started to expand nearby farming land.

Research and Monitoring:

Occasional ground searches but no research or monitoring currently occurring.

Conservation Interventions:

No conservation interventions currently ongoing.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites
- S5: Reduce flight hazards

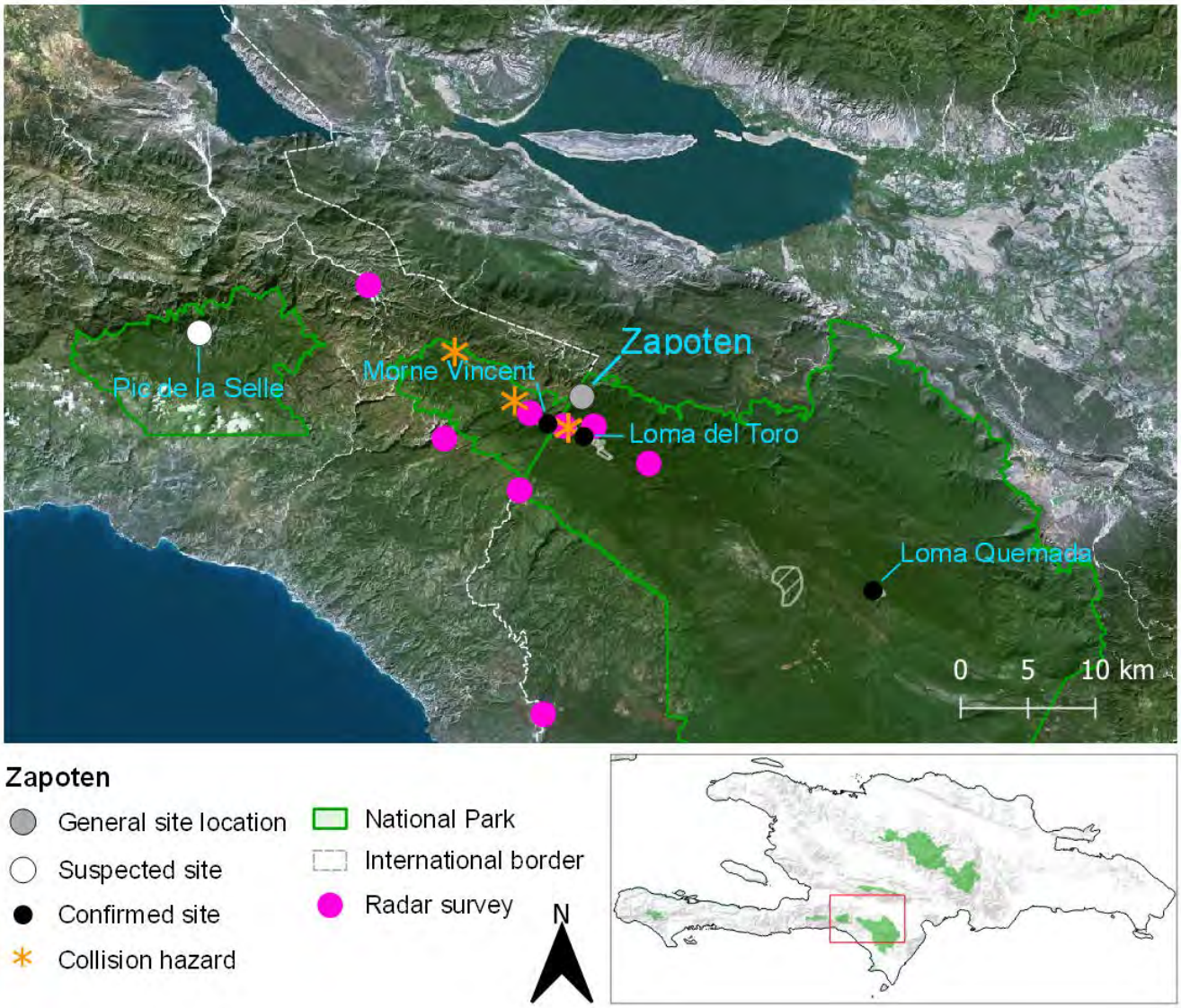
Critical Information Needs:

- Locate and characterize nest sites.
- Assess and characterize threats.

ZAPOTEN - Dominican Republic

Probable nesting

Site map (see map notes on page 72):



Vitals:

- Located at the western end of Sierra de Bahoruco, on the Dominican Republic's western border with Haiti. North and below Loma del Toro. Altitude: 1300-1500 m above sea level.
- Area surveyed with radar as part of surveys at Loma del Toro (2012-2014, 2017). Some audio and visual surveys, ground searches (2019).
- Nesting is probable based on recent evidence from radar surveys near the area (2012-2014, 2017), on hearing vocalizing petrels in the distance (2019), on the discovery of a lost petrel chick (2020), and from habitat modeling.
- Protected Area: Sierra de Bahoruco National Park, 1092 km2.
- Protected Area hosts large swaths of suitable nesting habitat: 57 km2, based on modeling.
- Nearest confirmed nesting area: Also in the Sierra de Bahoruco mountain range, Loma del Toro, Dominican Republic, is located 2 km to the south.
- IBA: yes; KBA: yes. Within UNESCO's La Selle - Jaragua-Bahoruco-Enriquillo Transboundary Biosphere Reserve.

Description:

- Zapoten is located at medium altitude on the north-facing slope of the Sierra de Bahoruco range. The vegetation is characterized by broadleaved evergreen trees (cloudforest) with close canopy.
- The area is abutted to the north and west by farming communities in Haiti.

Highest Threats: Threats have not been rated for this site but suspected threats include:

- **Expansion of agriculture** (including livestock grazing) from the Haitian side of the border.
- **Predation by introduced mammals**, including cats and rats.
- **Collision with lighted structures** on the Loma del Toro peak and nearby Foret de Pins.

Research and Monitoring:

No research or monitoring currently occurring but plans exist to deploy acoustic recording units.

Conservation Interventions:

No conservation interventions currently ongoing.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites
- ES3: Restore or create nest sites
- S5: Reduce flight hazards
- S6: Strategies of community development in Boukan Chat
- S8: Engage with DR government to plan and strengthen oversight of parks

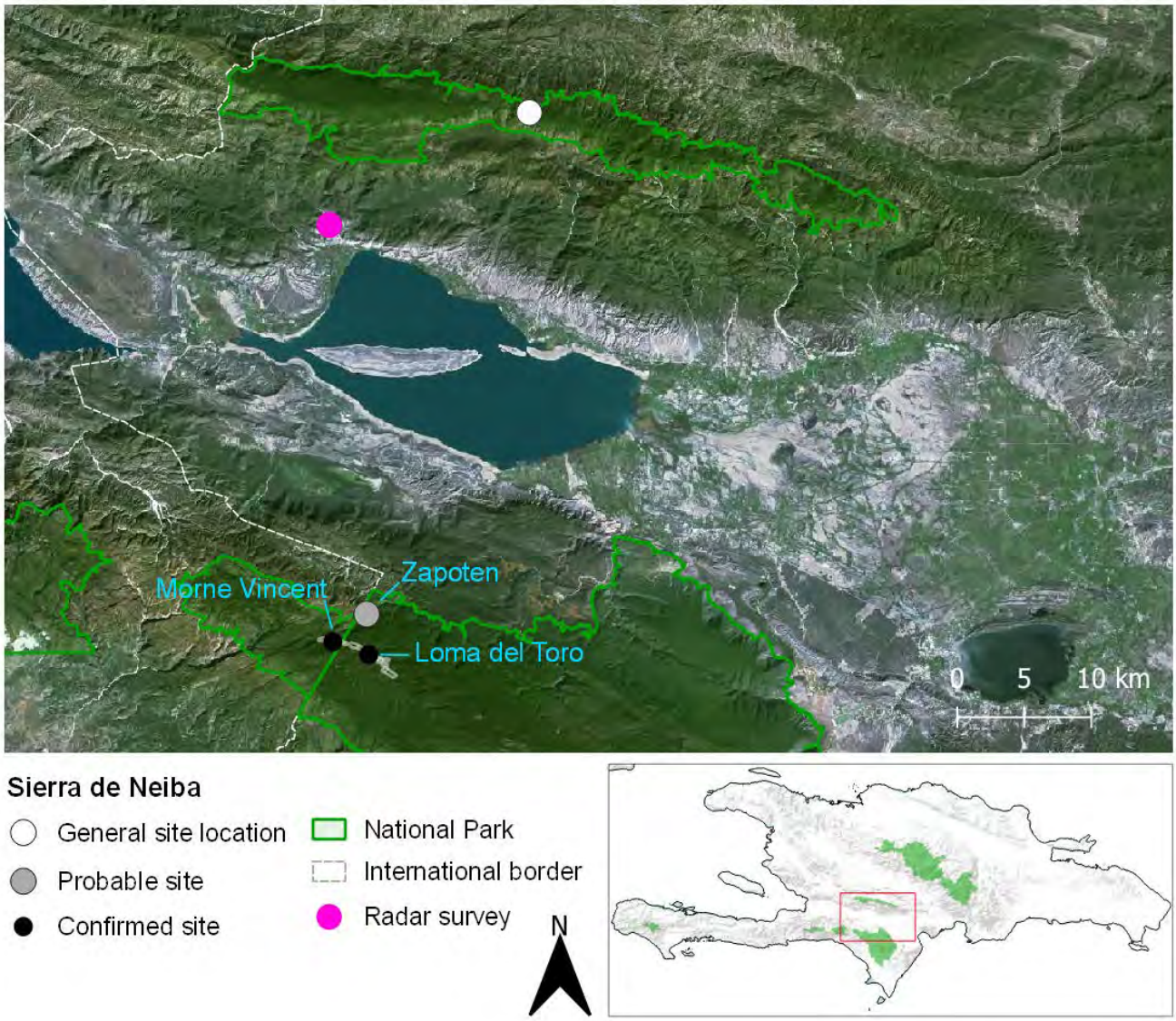
Critical Information Needs:

- Locate and characterize nest sites.
- Assess and characterize threats.

SIERRA DE NEIBA - Dominican Republic

Suspected nesting

Site map (see map notes on page 72):



Vitals:

- High mountain range located in western Dominican Republic, shared with Haiti (¼ of the area). Altitude: 1700-2300 m above sea level.
- Area surveyed with radar once in 2013. No audio and visual surveys; no ground searches.
- Nesting is suspected based on recent evidence from radar surveys near the area (14 petrel-like targets; Brown 2014) but habitat modeling does not highlight this area as suitable for nesting.
- Protected Area: Sierra de Neiba National Park, 183 km2.
- Protected Area does not appear to host suitable nesting habitat based on modeling.
- Nearest confirmed nesting area: Loma del Toro, Dominican Republic, is located 40 km to the south.
- IBA: yes; KBA: yes.

Description:

- Sierra de Neiba forms a long (ca 80 km) elevated east-west ridge. It is separated from the Sierra de Bahoruco range by the drainage basin of Lago Enriquillo. The vegetation is characterized by broadleaved evergreen trees (cloudforest) with close canopy.
- Lower elevations have been deforested for farming (up to 1300 - 1700 m above sea level).

Highest Threats: Threats have not been rated for this site but are suspected to include:

- **Predation by introduced mammals**, including cats, mongoose and rats.
- **Expansion of agriculture** (including livestock grazing) into the lower extents of forests.

Research and Monitoring:

No research or monitoring currently occurring.

Conservation Interventions:

No conservation interventions currently ongoing.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites

No other strategies are planned for this site.

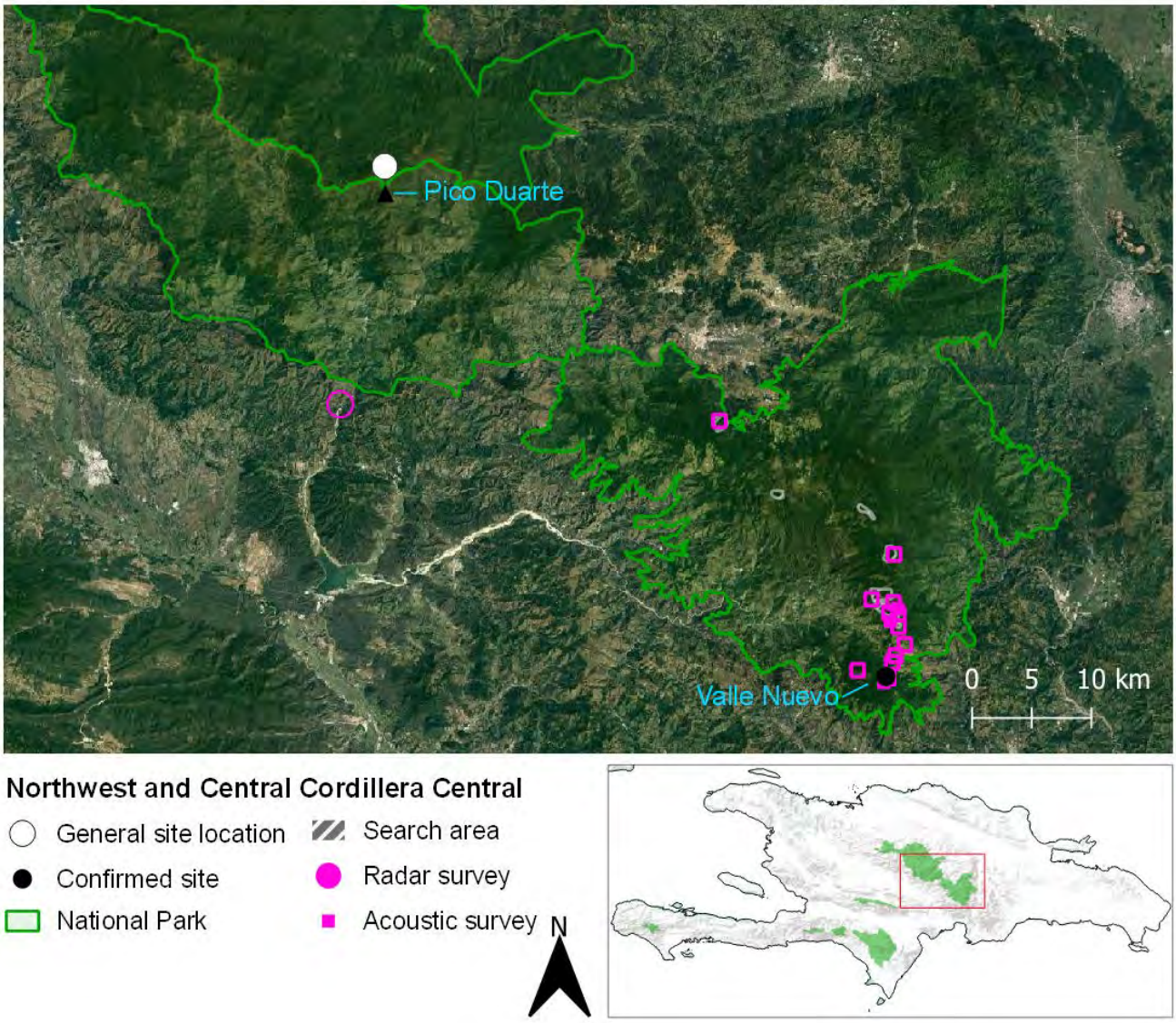
Critical Information Needs:

- Assess and characterize threats.

NORTHWEST and CENTRAL CORDILLERA CENTRAL - Dominican Republic

Suspected nesting

Site map (see map notes on page 72):



Vitals:

- High mountain range located in central Dominican Republic. Altitude: 1400-3000 m above sea level. Pico Duarte, 3098 m is the highest point in the country.
- Surveyed once by radar (no petrel targets recorded; 2014). No audio and visual surveys; no ground searches.
- Nesting is possible based on proximity to confirmed nesting sites in eastern Cordillera Central and Sierra de Bahoruco - but habitat modeling does not highlight this area as suitable for nesting.
- Protected Areas: Armando Bermúdez National Park, 803 km2; José del Carmen Ramírez, 750 km2.
- Protected Area does not appear to host suitable nesting habitat based on modeling.
- Nearest confirmed nesting area: Valle Nuevo, Dominican Republic, is located 50 km to the southeast.
- IBA: yes; KBA: yes.

Description:

- The Cordillera central has a crescent-shape ridgeline from the northwest to the southeast, ca 100km in length. The vegetation is characterized by broadleaved evergreen trees mixed with various levels of Hispaniola pines. Higher altitudes around Pico Duarte are characterized by shrub-like open vegetation.
- The southeastern part of the mountain range is home to Valle Nuevo National Park, where petrel nesting has been confirmed.

Highest Threats: Threats have not been rated for this site but are suspected to include:

- **Predation by introduced mammals**, including cats, mongoose and rats.
- **Expansion of agriculture** (including livestock grazing) into the lower extents of forests.

Research and Monitoring:

No research or monitoring currently occurring.

Conservation Interventions:

No conservation interventions currently ongoing.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites

No other strategies are planned for this site.

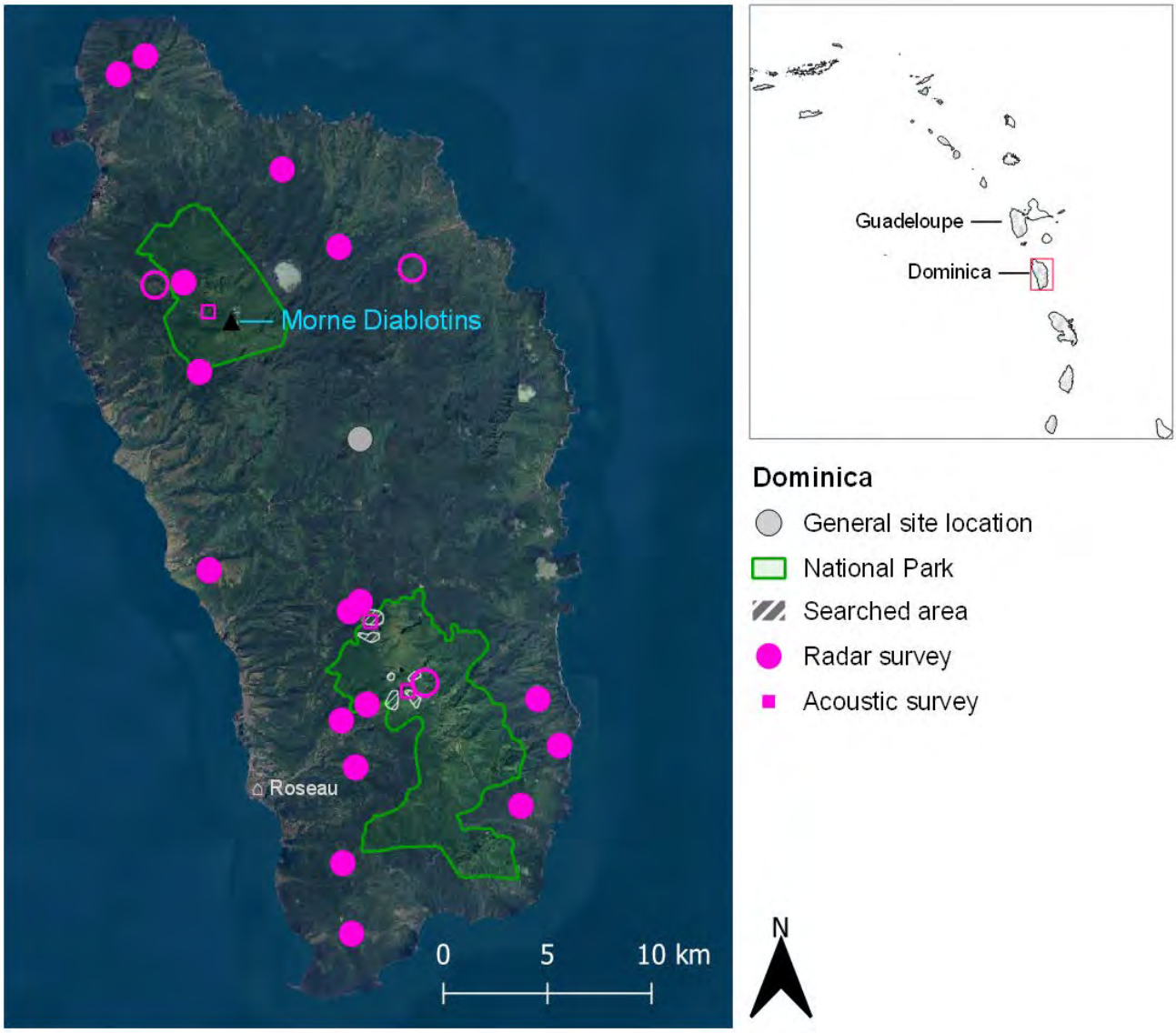
Critical Information Needs:

- Assess and characterize threats.

DOMINICA

Probable nesting

Site map (see map notes on page 72):



Vitals:

- Various peaks on Dominica, including Morne Diablotins (to the north) and Morne Trois Pitons (to the south). Altitude: 1000-1500 m above sea level. Morne Diablotins (1447 m) is the highest point on Dominica.
- Area thoroughly surveyed with radar in 2015 and 2020. Localized audio surveys and ground searches during technical exchange (Morne Trois Pitons, 2016).
- Nesting is probable based on recent evidence from radar surveys in the area, direct observation of flying petrels, recovery of grounded birds in urban areas, and from habitat modeling. **Morne Diablotins**: up to 204 petrel-like targets observed in adjacent flyways (Brown 2015, Brown 2020); **Morne Trois Pitons**: up to 168 petrel-like targets observed in adjacent flyways (Brown 2015, Brown 2020), and up to 3 flying petrels observed. Areas were searched but nests have yet to be located (Rupp et al. 2016).
- Protected Areas: Morne Diablotins National Park, 36 km2; Northern Forest Reserve: 59 km2; Morne Trois Pitons National Park, 69 km2.
- Suitable nesting habitat available in Protected Areas but not quantified.
- IBA: yes; KBA: yes.

Description: Dominica is a mountainous volcanic island characterized by steep slopes covered by broadleaf vegetation in relatively closed canopy. The area is well preserved, with 22% of the land area in protected areas. Recent hurricanes have damaged large portions of suitable nesting habitat.

Highest Threats: Threats have not been rated for this area but are suspected to include:

- **Predation by introduced mammals**, including cats, mongoose, rats, and pigs.
- **Light attraction and grounding** into urban areas located on flyways, and Morne Micotrin.

Research and Monitoring: Recent monitoring includes radar surveys (2015 and 2020), and deployment of automated acoustic recording units. Thorough ground searches in localized areas of Morne Microtin and Morne Trois Pitons.

Conservation Interventions: No conservation interventions currently ongoing. Technical exchange between Dominican Republic (Grupo Jaragua) and Dominica (Forestry, Wildlife and National Parks Division).

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites

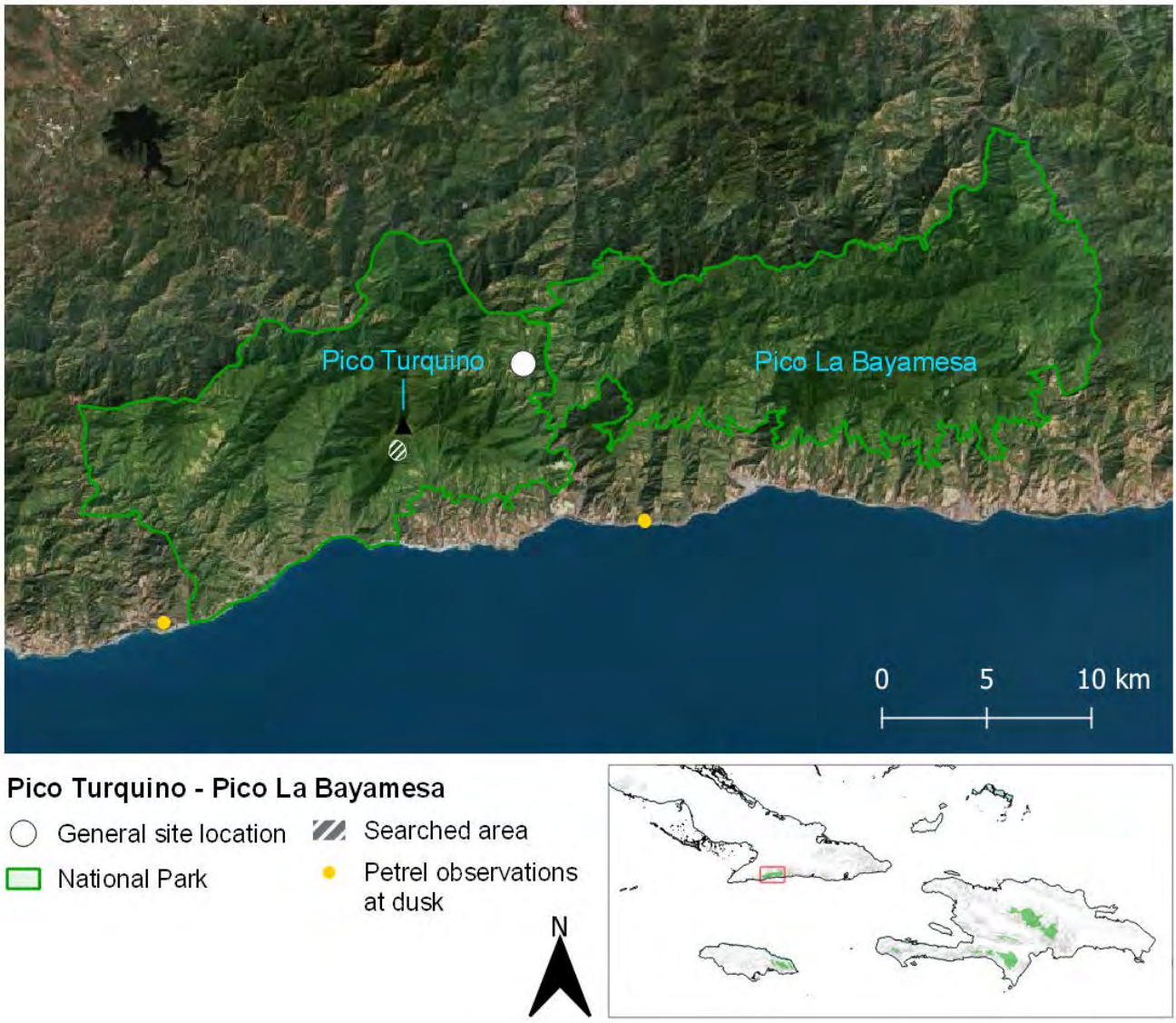
Critical Information Needs:

- Locate and characterize nest sites.
- Assess and characterize threats.

PICO TURQUINO and PICO LA BAYAMESA - Cuba

Suspected nesting

Site map (see map notes on page 72):



Vitals:

- Two distinct mountainous areas (within 25 km of each other) located in the western Sierra Maestra, in southeastern Cuba. Altitude: 1600-2000 m above sea level. Pico Turquino (1974m) is the highest point in Cuba.
- No radar survey; some audio and visual surveys (2006); some ground searches (2006).
- Pico Turquino: Nesting is suspected based on recent observations of petrels from the coast at dusk (Pointon et al. in March 2019, and Plasencia Leon et al. in February 2020), and from habitat modeling. Pico la Bayamesa: Nesting is suspected based on habitat modeling.
- Protected Areas: Pico Turquino National Park, 232 km2. Pico La Bayamesa National Park, 242 km2.
- Suitable nesting habitat available in Protected Areas but not quantified.
- IBA: yes; KBA: yes.

Description: Both areas are characterized by steep mountainous slopes covered by broadleaf deciduous vegetation, with shrub-like broadleaf vegetation at the highest altitudes. The areas are well preserved and forest loss is only occurring in a few localized areas at lower elevations.

Highest Threats: Threats have not been rated for this area but are suspected to include:

- **Predation by introduced mammals,** including cats, mongoose and rats.

Research and Monitoring: No research or monitoring currently occurring.

Conservation Interventions: No conservation interventions currently ongoing.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites

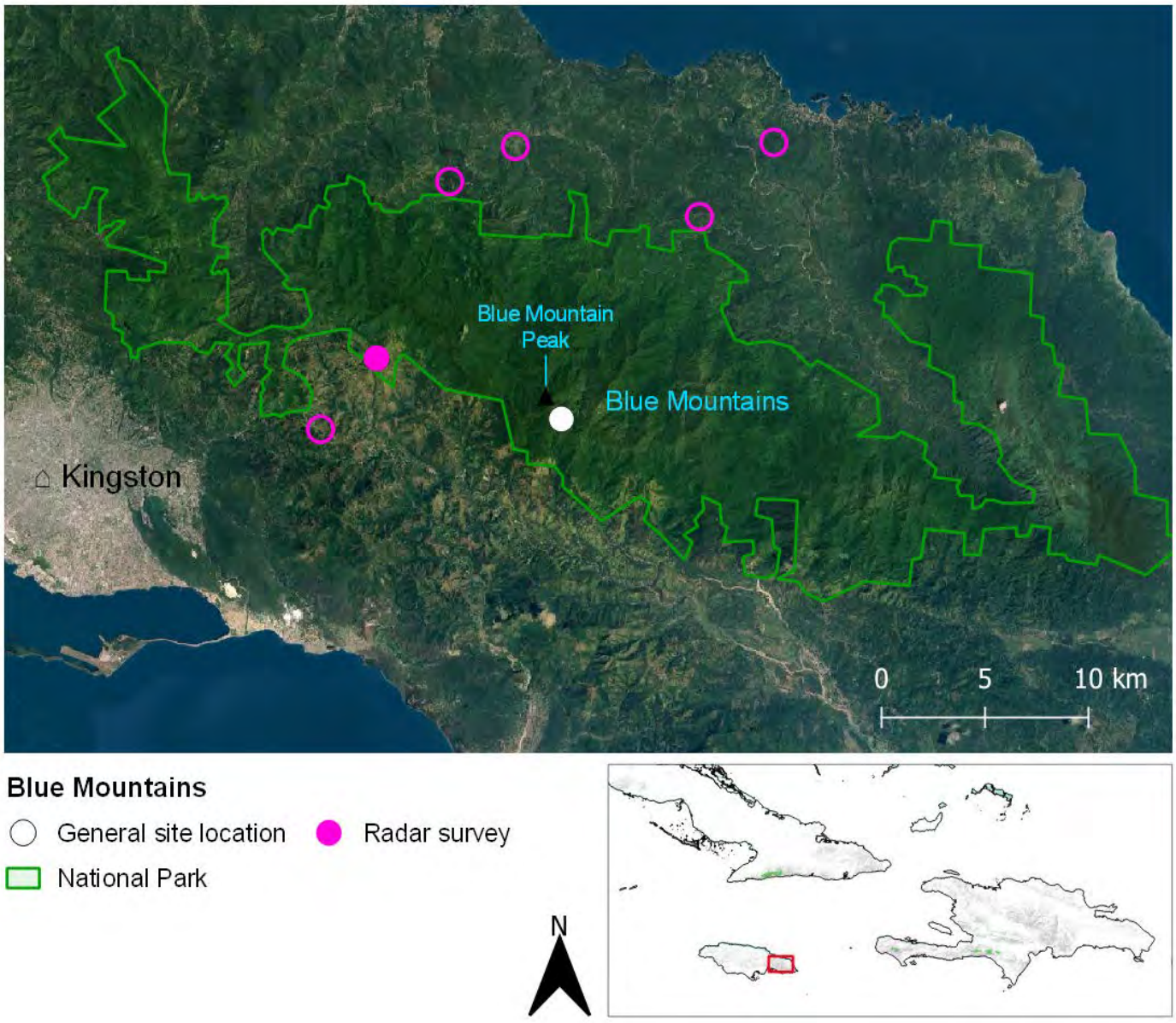
Critical Information Needs:

- Locate and characterize nest sites.
- Assess and characterize threats.

BLUE MOUNTAINS - Jamaica

Suspected nesting

Site map (see map notes on page 72):



Vitals:

- Highest mountain range in the country, the Blue Mountains form an east-west ridge located in eastern Jamaica. Altitude: 1500-2250 m above sea level. The Blue Mountain peak (2256 m) is the highest point in Jamaica.
- Area surveyed with radar in 2016. No audio and visual surveys; no ground searches.
- Nesting is suspected based on recent evidence from radar surveys near the area (6 petrel-like targets; Brown 2016), and from habitat modeling (higher elevations of Blue Mountains).
- Protected Areas: Blue and John Crow Mountains National Park, 1224 km2.
- Suitable nesting habitat available in Protected Areas but not quantified.
- IBA: yes; KBA: yes.

Description: Characterized by steep mountainous slopes covered by broadleaf vegetation in relatively closed canopy. The area is relatively well preserved but forest loss is occurring at lower elevations on the southwestern slopes.

Highest Threats: Threats have not been rated for this area but are suspected to include:

- **Predation by introduced mammals**, including cats, mongoose and rats.
- **Expansion of agriculture** into the lower extents of forests on the south-facing slopes in the northwest of the range
- **Light attraction and grounding** into the nearby major urban area of Jamaica's capital, Kingston.

Research and Monitoring: No research or monitoring currently occurring.

Conservation Interventions: No conservation interventions currently ongoing.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites

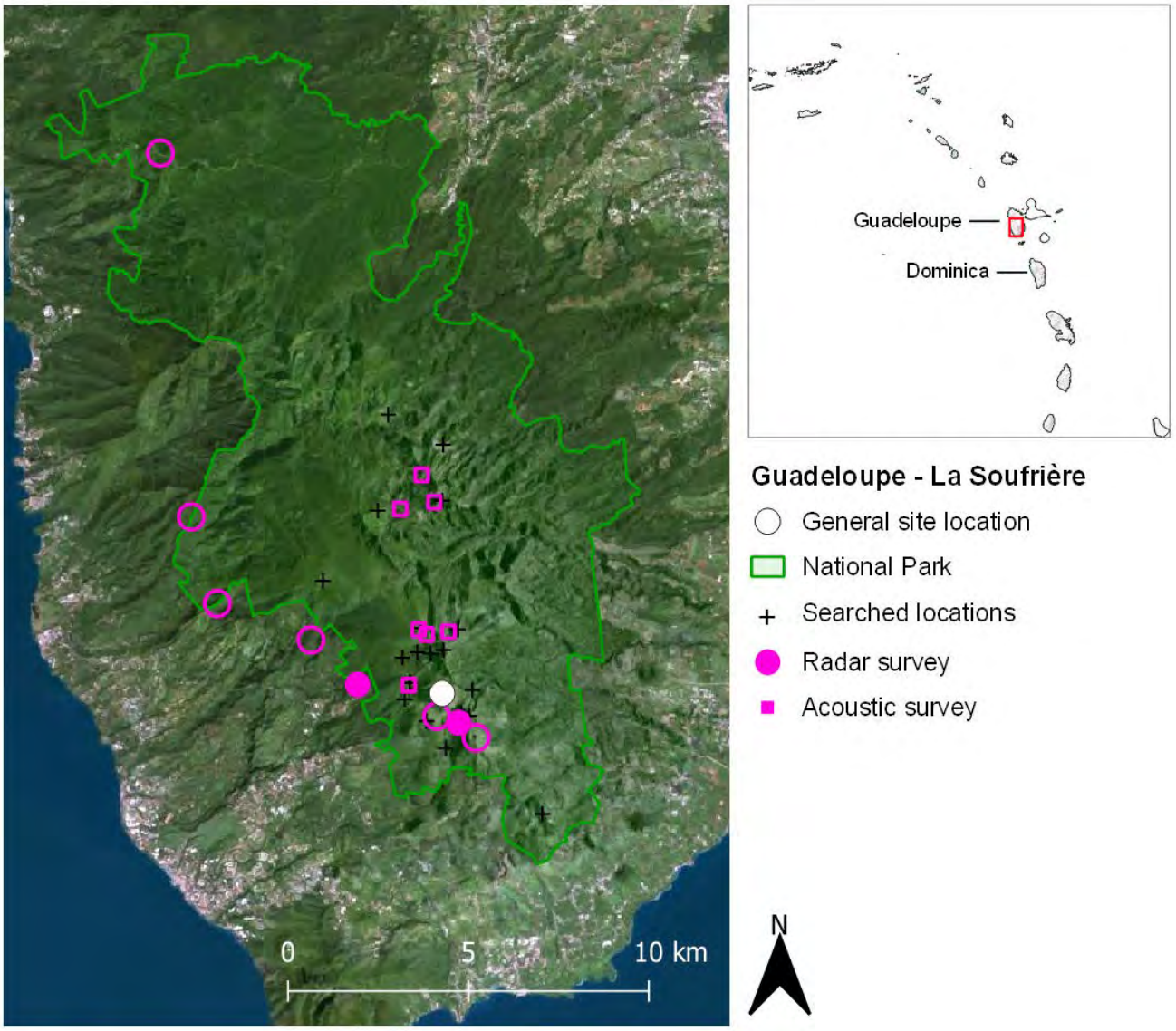
Critical Information Needs:

- Locate and characterize nest sites.
- Assess and characterize threats.

GUADELOUPE

Suspected nesting

Site map (see map notes on page 72):



Vitals:

- Slopes of Pic de la Soufrière (1467 m, highest point in Guadeloupe). Altitude: 900-1500 m above sea level.
- Area surveyed with radar (Brown and Chabrolle in 2020). One audio survey (Chabrolle 2016-2017); localized ground searches (Chabrolle in 2017).
- Nesting is suspected based on recent evidence from radar surveys in the area (13 petrel-like targets, 2020), and from habitat modeling. An audio and visual observation between December 1991 and January 1992 (Lorvelec) is promising (20-30 individual procellariiformes flying and vocalizing at dusk on a ridge below Pic de la Soufrière) but did not confirm the species to be Black-capped Petrel (cited in Chabrolle et al. 2020).
- Protected Areas: La Guadeloupe National Park, 218 km2.
- Suitable nesting habitat available in Protected Areas but not quantified.
- IBA: yes; KBA: yes.

Description: The mountains of La Soufrière are characterized by steep mountainous slopes covered by broadleaf evergreen trees, with shrub-like broadleaf vegetation at the highest altitudes. The area is well preserved.
Highest Threats: Threats have not been rated for this area but are suspected to include:

- **Predation by introduced mammals**, including cats, mongoose, rats and raccoons.

Research and Monitoring: Recent monitoring was supported by Parc National de la Guadeloupe and included the deployment of automated acoustic recording units (2016-2017) and a radar survey (2020). Visual surveys are planned for the end of 2021.

Conservation Interventions: No conservation interventions currently ongoing.

Planned Strategies:

- ES1: Build in-country capacity
- ES2: Locate & characterize nesting sites

Critical Information Needs:

- Locate and characterize nest sites.
- Assess and characterize threats.

MAIN USE AREAS AT SEA

Notes on marine profiles

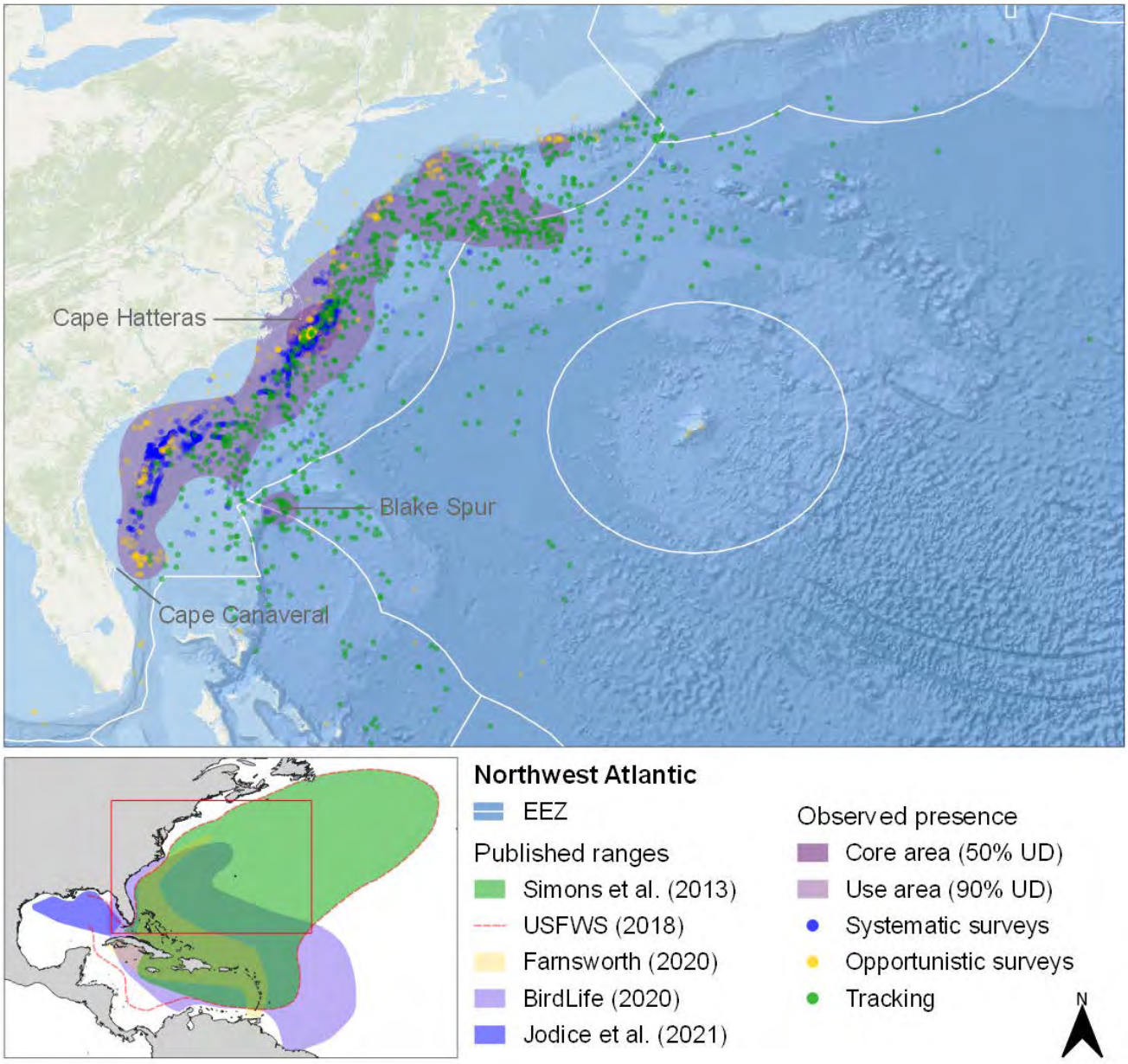
Vitals:

- **Use assessment:** To estimate use areas, we calculated utilization distributions (UD) using the kernel density methodology on the basis of the following sources**:**
    - Ship-based observations:
        - Systematic surveys: Atlantic Offshore Seabird Dataset Catalog (Sussman and USGS 2014; Atlantic); Gulf of Mexico Marine Assessment Program for Protected Species (Jodice et al. 2021; Gulf of Mexico).
        - Opportunistic observations: Leopold et al. (2019; Caribbean Sea); eBird (2020; Atlantic, Caribbean Sea, Gulf of Mexico; with records already used in Leopold et al. 2019 removed); Texas pelagics data (cited in Jodice et al. 2021).
    - Individual-based tracking data: Jodice et al. (2015; Atlantic and Caribbean); Satgé et al. (2019; Atlantic and Caribbean); Satgé et al. (in prep.; Atlantic and Caribbean).

    To compensate for the effects of a larger number of locations in the tracking dataset despite few individuals tracked (n = 16), we limited the tracking data to one location per individual per day, calculated as the centroid of all locations for that individual for that day. When mentioned, core areas refer to the 50% UD.
- **Marine ecoregions:** We estimated overlap between UD and marine ecoregions (Spalding et al. 2007). We report the proportion of the overall range (90% UD) in each of the overlapping ecoregions, including Pelagic Waters.
- **Exclusive Economic Zones:** We estimated overlap between UD and exclusive economic zones (EEZ). Unless mentioned otherwise, we report the proportion of the overall range (90% UD) in each of the overlapping EEZ, including High Seas. Particularly in the Caribbean Sea, these values are subject to change as our understanding of the use of marine areas by Black-capped Petrels improves.

NORTHWEST ATLANTIC

Site map (see map notes on page 102):



Vitals:

- **Primary range**: South Atlantic Bight, Gulf Stream, and mixed pelagic waters between the latitudes of Cape Canaveral, Florida, USA to the south (ca 28.5°N), and New Jersey, USA to the north (ca. 38°N). Extends eastward from the outer continental shelf to ca. 74°W.
- **Core area:** limited in size along the outer continental shelf offshore Cape Hatteras, North Carolina, USA. From Cape Lookout to the south (ca. 34.2°N) and Nags Head to the north (ca. 35.8°N).
- Area assessed via systematic ship-based surveys, opportunistic ship-based observations, and individual-based tracking.
- **Marine ecoregions**: Carolinian (52.5%), Virginian (36.5%), Pelagic Waters (8.5%), Bahamian (1.5%), Floridian (0.5%), Gulf of Maine/Bay of Fundy (0.5%).
- **EEZ**: U.S.A. (92.0%), High Seas (7.0%), Bahamas (1.0%). The core use area is entirely in the U.S. EEZ.
- **Period of use**: Estimated as mostly during non-breeding (adults class: inter-nuptial period; fledging to subadult classes: all year) with forays into area by breeding birds.

Description:

- Numerous observations have been recorded at sea in the area, starting in the late 1970's. To date, > 5,500 records have been confirmed.
- Petrels are present in highest concentrations around the latitude of Cape Hatteras, a boundary area between warmer waters of the Gulf Stream and colder, denser waters from the northerly Labrador Current. Tracked individuals have forayed into Canadian waters (Satgé et al. in prep).
- In the South Atlantic Bight from North Carolina to Florida, Black-capped Petrels are more abundant along the strongly defined western edge of the Gulf Stream, which is bound to the outer continental shelf. To the east, as the southerly current diffuses into the Sargasso Sea, petrels make use of the upwelling induced by the Blake Spur, a prominent underwater feature.
- Vagrants have been recorded in Macaronesia, and as far as coastal Morocco (13 records). Two historical records in England (likely from birds blown off course by storms).
- Density modeling predicts a limited use during March-May, with a higher use post-breeding (June-August) and into the winter (Winship et al. 2018).
- Preliminary results from satellite tracking suggest that color morphs use distinct areas in the Atlantic, with light-morph petrels using more northern waters than dark-morph birds (Satgé et al. in prep).

Highest Threats: Suspected threats include:

- **Exposure to Plastics**, rated as High, and **Mercury and Other Contaminants**, rated as Medium.
- **Reduced Prey Availability** because of climate change, rated as Medium.
- **Exposure to Oil Spills** from shipping and oil and gas exploration, rated as Medium.
- **Attraction/Collision with Marine Infrastructure**, rated as Medium.

Research and Monitoring: Recent research in the area includes:

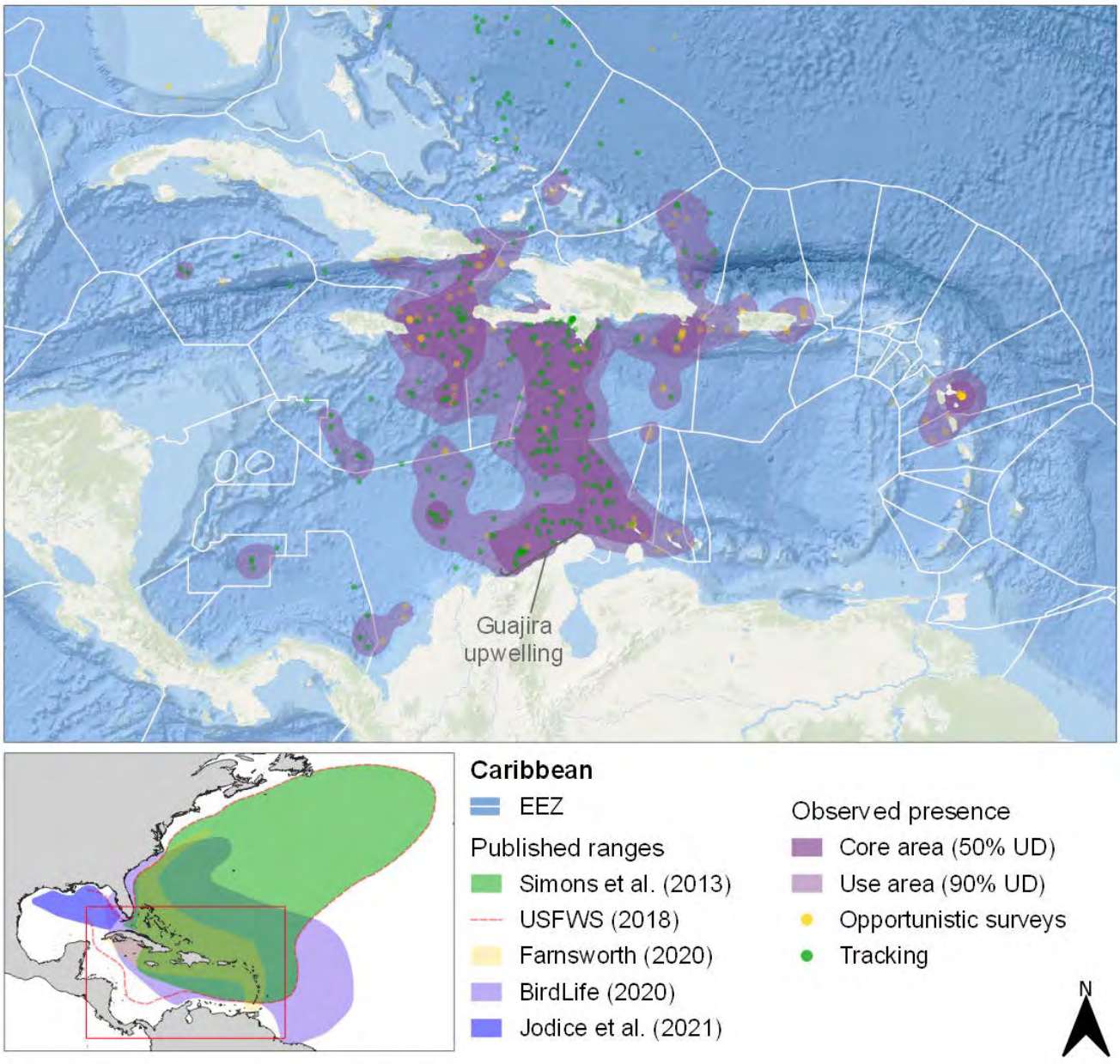
- Satellite tracking 3 post-breeding adults captured at nest sites in Loma del Toro, Dominican Republic (Jodice et al. 2015), and 10 non-breeding adults captured in Gulf Stream waters off Cape Hatteras (Satgé et al. in prep).
- Modeling of petrel density in the Northwest Atlantic using observations from systematic surveys (Winship et al. 2018).

Studies of diet and mercury levels of petrels captured at sea are ongoing.

Critical Information Needs: Include degree of impact of climate change on prey availability, in particular as related to changes in Gulf Stream regime; degree and impact of exposure to mercury, plastic and other contaminants; exposure to mortality in trawling fishery.

CARIBBEAN SEA

Site map (see map notes on page 102):



Use areas include areas used during active prey search and foraging, but also those used during migration and commuting to and from nesting sites. In this map, we have also included coastal observations made from land (e.g. in Guadeloupe and Cuba). Use areas are subject to change as our understanding of the marine ecology of Black-capped Petrels continues to improve.

Vitals:

- **Primary range**: Central Caribbean Sea, between 67°W and 77°W. Regularly observed in the eastern Caribbean Sea, and present in western Caribbean Sea.
- **Core area:** Guajira upwelling, off Colombia and Gulf of Venezuela; mixed waters between Cuba, Jamaica and Hispaniola.
- Area assessed via individual-based tracking and opportunistic ship-based observations.
- **Marine ecoregions**: Greater Antilles (51.0%), Southern Caribbean (22.5%), Southwestern Caribbean (16.0%), Bahamian (6.0%), Eastern Caribbean (4.5%).
- **EEZ[1*]:** Colombia (23.5%), Dominican Republic (23.0%), Haiti (14.5%), Jamaica (12.0%), Venezuela (5.5%), Cuba

[1] These values are subject to change as our understanding of the use of marine areas by Black-capped Petrels improves.

(5.0%), Puerto Rico (4.0%), Guadeloupe (3%); Aruba, Bonaire, Curaçao, Nicaragua, Dominica, Panama, Turks and Caicos Islands, Bahamas, Cayman Islands: each ≤ 2%.

- **Period of use**: Estimated as mostly during and around breeding season (breeding adults, prospecting subadults).

Description:

- Despite suspected use of the Caribbean basin, information is limited to < 100 observation records since 1953 (summarized in Leopold et al. 2019), and 6 individuals tracked.
- During the breeding season, petrels appear to consistently commute to upwelling waters off the Guajira peninsula, in the southern Caribbean Sea. They also use the area between Jamaica, Cuba and Haiti, an area of seamounts where waters from the Caribbean and Atlantic basins converge.
- Our understanding for the rest of the Caribbean basin is incomplete. Records are scattered in the western Caribbean Sea, in particular in the Darien Gulf off Panama and Colombia. In the eastern Caribbean Sea, repeated observations off Guadeloupe and other at-sea observations in the area suggest a regular presence (consistent with probable nesting on Dominica, and with suspected nesting in Guadeloupe).

Highest Threats: Suspected threats include:

- **Exposure to Plastics**, rated as High, and **Exposure to Mercury** and **Other Contaminants**, rated as Medium.
- **Reduced Prey Availability** because of climate change, rated as Medium.
- **Exposure to Oil Spills** from shipping and oil and gas exploration, rated as Medium, though oil and gas exploration and extraction off Colombia and Venezuela may elevate that threat.
- **Attraction/Collision with Marine Infrastructure,** rated as Medium

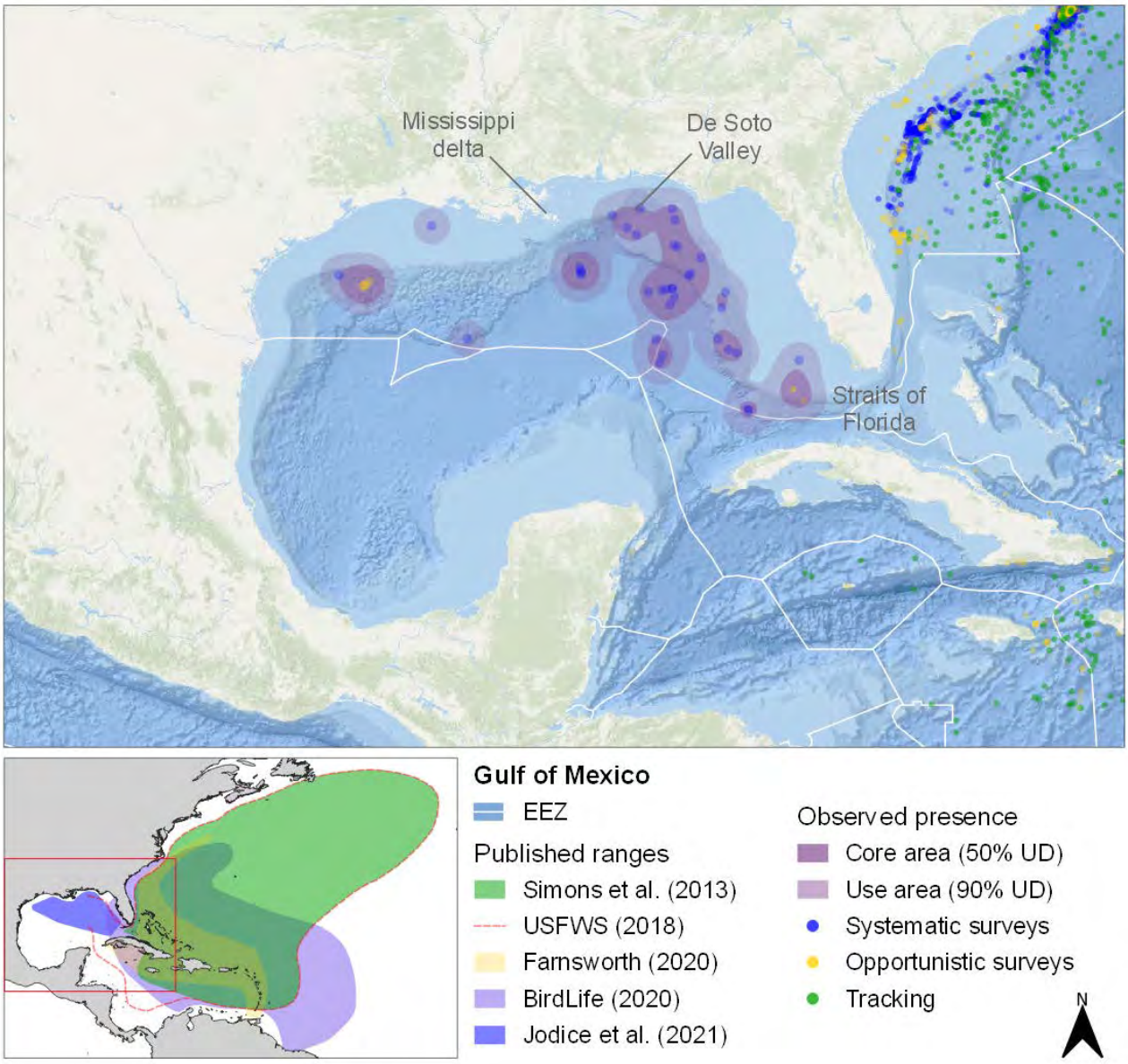
Research and Monitoring: Recent research in the area includes:

- Satellite tracking 6 breeding adults captured at nest sites in Loma del Toro, Dominican Republic (Jodice et al. 2015, Satgé et al. 2019).
- Studies of diet and mercury levels of breeding petrels are ongoing.

Critical Information Needs: Include degree of impact of climate change on prey availability, in particular as related to changes in upwelling regimes; degree and impact of exposure to oil and gas activity; degree and impact of exposure to mercury, plastic and other contaminants; exposure to mortality in trawling fishery, and bycatch in squid longline fishery (in particular lighted fishery).

GULF OF MEXICO

Site map (see map notes on page 102):



Vitals:

- Primary range: Eastern Gulf of Mexico, from Straits of Florida to the east, to Mississippi delta to the west (ca. 89°W). Present in central and western parts of the northern Gulf.
- Core area: Waters along the continental shelf and slope, from Florida Keys to the southeast, to De Soto Valley to the northwest.
- Area assessed via systematic ship-based surveys, and opportunistic ship-based observations.
- Marine ecoregions: Northern Gulf of Mexico (53.5%), Floridian (28.5%), Southern Gulf of Mexico (10.5%), Greater Antilles (7.5%).
- EEZ[2*]: U.S.A. (92%), High Seas (4%), Cuba (4%), Mexico (<0.5%).
- Period of use: Estimated as mostly during post-breeding (July-September), with forays into area during spring (Jodice et al. 2021). Age-class unknown.

[2*] These values are subject to change as our understanding of the use of marine areas by Black-capped Petrels improves.

Description:

- Rarely recorded in the area (9 records between 1900-1990) until systematic seabird surveys were organized in 2010-2011 and 2017-2019. Since, ca. 40 additional observations have been recorded.
- Highest numbers of petrels have been located along the West Florida escarpment, in areas associated with dynamic waters of the Loop Current. Like petrels using the Gulf Stream in the Atlantic Ocean, petrels in the Gulf of Mexico make use of edges along current systems.
- Habitat modeling predicts the occurrence of the species in the western Gulf but with a patchy distribution (Jodice et al. 2021).

Highest Threats: Suspected threats include:

- **Exposure to Plastics**, rated as High, and **Mercury** and **Other Contaminants**, rated as Medium.
- **Reduced Prey Availability** because of climate change, rated as Medium.
- **Exposure to Oil Spills** from shipping and oil and gas exploration, rated as Medium for the overall population, but likely elevated in the Gulf of Mexico.
- **Attraction/Collision with Marine Infrastructure**, rated as Medium overall, though the number of oil and gas platforms in the Gulf of Mexico likely elevates this threat.

Research and Monitoring: No dedicated research or monitoring currently occurring.

Critical Information Needs: Origin and age class of individuals using the area; degree of impact of climate change on prey availability, in particular as related to changes in the Loop current; degree and impact of exposure to oil and gas activity; degree and impact of exposure to mercury, plastic and other contaminants.

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Members of the field team navigate the steep cliffs of Morne Vincent. Rob Ronconi

APPENDIX 3: THREATS ASSESSMENT

Threat rating is a method for making an implicit assessment of threats more explicit and more objective. It involves determining and defining a set of criteria and then applying those criteria systematically to the direct threats to conservation targets so that conservation actions can be directed where they are most needed (FOS 2009). It is desirable to have a systematic and repeatable threat assessment, which may be updated as new information becomes available. Many tools for threats rating assess the extent of the threat and the level of its impacts on the conservation targets (CMP 2020). We used the **Simple Threat Rating** system build into the Miradi (Version 4.5). This system involves assigning a category of the relative magnitude and impact of each direct threat to a target with a four-point qualitative scale (very high, high, medium, or low) using three criteria: scope, severity and irreversibility.

We applied the three criteria to threat-to-target threat combinations for all confirmed nesting sites and birds at sea. We relied on local or on-the-ground knowledge based on field observations or camera trap photographs, reports of grounded birds, or notes regarding towers or other hazards in the area. In the case of probable or suspected sites (no confirmation of nesting), threats rating is complicated because exact nesting sites are not characterized. However, scope and severity can be estimated in a general sense based on conditions of the island, the particular mountain ranges or even peaks where sites would most likely occur.

CRITERIA

Scope

Most commonly defined spatially as the proportion of the target population that can reasonably be expected to be affected by the threat **within ten years** given the continuation of current circumstances and trends. The criteria for rating scope are as follows:

- Very High, affecting most or all of the target (e.g., 71-100%);
- High, affecting much of the target (e.g., 31-70%);
- Medium, affecting some of the target (e.g., 11-30%); or
- Low, affecting just a small percent of the target (e.g., 1-10%).

Severity

Within the scope, the level of damage to the target from the threat that can reasonably be expected given the continuation of current circumstances and trends. For ecosystems and ecological communities, typically measured as the degree of destruction or degradation of the target within the scope. For species, usually measured as the degree of reduction of the target population within the scope. Seabirds based on general life parameters (long-lived, slow to reproduce) we know that threats affecting adult and subadult survival have greater impact than those affecting egg and small chick success and first year survival.

- Very High: Within the scope, the threat is likely to destroy or eliminate the target, or reduce its population by 71-100% within ten years or three generations.
- High: Within the scope, the threat is likely to seriously degrade/reduce the target or reduce its population by 31-70% within ten years or three generations.
- Medium: Within the scope, the threat is likely to moderately degrade/reduce the target or reduce its population by 11-30% within ten years or three generations.
- Low: Within the scope, the threat is likely to only slightly degrade/reduce the target or reduce its population by 1-10% within ten years or three generations.

Irreversibility

The degree to which the effects of a threat can be reversed and the target affected by the threat restored, if the threat no longer existed.

- Very High: The effects of the threat cannot be reversed and it is very unlikely the target can be restored, and/ or it would take more than 100 years to achieve this.

- High: The effects of the threat can technically be reversed and the target restored, but it is not practically affordable and/or it would take 21-100 years to achieve this.
- Medium: The effects of the threat can be reversed and the target restored with a reasonable commitment of resources and/or within 6-20 years.
- Low: The effects of the threat are easily reversible and the target can be easily restored at a relatively low cost and/or within 0-5 years.

COMBINING CRITERIA AND SUMMARIZING ACROSS THREATS

Once assigned, the ratings for scope, severity and irreversibility were combined using established rule sets (an automated process in Miradi) to give an overall rating for each threat-target combination, which are then summarized across all threats and across all targets.

The rule sets for combining criteria involve first combining the Scope and Severity variables to assess magnitude, then combining that with Irreversibility to derive the threat-target rating:

		Scope			
		Very High	High	Medium	Low
Severity	Very High	Very High	High	Medium	Low
	High	High	High	Medium	Low
	Medium	Medium	Medium	Medium	Low
	Low	Low	Low	Low	Low

		Irreversibility			
		Very High	High	Medium	Low
Magnitude	Very High	Very High	Very High	Very High	High
	High	Very High	High	High	Low
	Medium	High	Medium	Medium	Low
	Low	Medium	Low	Low	Low

Miradi also provides a combination of rules for rolling up ratings across targets and threats, and for the project as a whole. We chose not to present roll-ups because of the varying level of uncertainty in threats at sites.
Tables A3-1 and A3-2 present the ratings and justifications for threats by target.

Table A3-1 On-Land Threat Ratings and Justifications

Threat	Overall Miradi	Scope	Severity	Irreversibility
Site: Loma del Toro		**Justifications based on interviews with Ernst Rupp and Adam Brown, April 21 and 22, 2020 with supplemental comments inserted June 24, 2020.**		
Agriculture (meaning planted crops farming)		Not Occurring (N/O) and unlikely to occur. Currently, agriculture into this part of park is very hypothetical as are other incursions.	N/O	N/O
Fire (damaging habitat, but also some mortality in nests or adults)	Low	MEDIUM: Fires have been sweeping through, but only every few years. Conceivably up to a third of nests affected in an event.	MEDIUM: Damage depends on timing (birds in burrows) and severity of fire. "On average," effects could be moderate degradation of target.	LOW: Habitat typically heals pretty quickly e.g., big pines survive, if seed bank present, vegetation back within a few years. Fire may actually be part of ecosystem/ germination.
Livestock grazing		N/O. Not occurring and unlikely to occur.	N/O	N/O
Non-timber Forest Product collection		N/O. Not occurring and unlikely to occur.	N/O	N/O
Harvest by humans		N/O. Not occurring and unlikely to occur.	N/O	N/O
Predation by introduced mammals - cats	High	HIGH: Cats are present but not abundant (usually one cat at a time). No mongoose yet seen; no pigs probably because of human presence.	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species (Rodríguez et al. 2019)	MEDIUM: Reversibility depends on petrel productivity, which is generally slow; moreover, cats known to take older age classes (Le Corre 2008).
Predation by introduced mammals - rats	High	VERY HIGH: *Rattus rattus* is everywhere, potentially visiting every nest.	HIGH: Observations so far indicate that the effects are low, but collecting data now with camera traps. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species.	LOW: Reversibility depends on petrel productivity, which is generally slow. Chicks replaced more easily than adults.
Strandings in populated areas due to light attraction	Medium	All transiting birds are exposed to lights on the coasts; how much depends on exact route (e.g., Pederenales, DR (well lit up) or Belle Anse (not producing much light).	MEDIUM: Severity hard to know as all reporting is incidental. Expect that there are more downed birds than are found.	MEDIUM: Losses believed mostly to fledglings, which have a lower survival rate generally (losses are likely compensatory). (Rodríguez et al. 2017)
Towers/structures mortality	High	HIGH: Site has a lighted tower that majority of the birds must navigate.	HIGH: In fogs and winds, 1 - 3 downed birds each year.	MEDIUM: Adult losses might be rarer (occurring mostly during foul weather) than for fledglings. Fledglings have a lower survival rate generally (losses are likely compensatory).
Wood harvest		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Site: Morne Vincent		**Justifications based on interviews with Ernst Rupp and Adam Brown, April 21 and 22, 2020 with supplemental comments inserted June 24, 2020.**		
Agriculture - Current	Low	LOW: Activities and conditions of the last 10 years have stopped agricultural movement in monitored area. With intervention, threat greatly reduced and the number of occupied nests seems stable.	MEDIUM: Farming practices generally very destructive, if it occurred, would affect excavated nests (in soil, not stone) particularly.	MEDIUM: The decreased quality of nesting habitat could be reversed, but with soil quality damaged and vegetation removed, restoration would take 6-20 years.

Agriculture with no intervention 10 years ago	Very high	HIGH: Without intervention, likely agriculture would have spread and been very destructive in the monitored area. In a nearby area: looking back the last 9 years, Rupp estimates the loss of 20 to 50 nests on what was likely former petrel habitat. (Basically, the amount lost equal to the amount remaining).	VERY HIGH: Nests can hold on in grazed areas (just grassy cover) but eventually these burrows won't persist in areas overrun by agricultural effort (row crops).	VERY HIGH: Once the area is severely degraded, it would take a lot of effort to restore it to any kind of ecological function. The nesting site is "lost." Adults could attempt to find new locations, but unknown amount of energy to re-nest.
Fire (damaging habitat, mortality in nests)	Low	MEDIUM: Fires have been sweeping through, but only every few years. Conceivably up to a third of nests affected in an event.	MEDIUM: Damage depends on timing (birds in burrows) and severity of fire. "On average," effects could be moderate degradation of target.	LOW: Habitat typically heals pretty quickly e.g., big pines survive, if seed bank present, vegetation back within a few years. Fire may actually be part of ecosystem/ germination.
Livestock grazing	Low	LOW: Some grazing, but livestock don't seem to be going in the steepest part where nests are.	LOW: Grazing not on itself damaging but could be a step towards full clearing.	MEDIUM: The decreased quality of nesting habitat could be reversed, but with soil quality damaged and vegetation removed, restoration would take 6-20 years.
Non-timber Forest Product collection	Low	HIGH: Wild tubers gathered.	LOW: No direct effects on petrels' needs, unless actual burrow damaged.	MEDIUM: Damaged burrow may be unused for years.
Harvest by humans		Not occurring (N/O). In the past, people went looking for petrels, but this stopped some time ago. Haven't really seen it happening 10 years.	N/O	N/O
Predation by introduced mammals - cats	High	HIGH: Cats are present but not abundant (usually one cat at a time). No mongoose yet seen; no pigs probably because of human presence.	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species (Rodríguez et al. 2019)	MEDIUM: Reversibility depends on petrel productivity, which is generally slow; moreover, cats known to take older age classes (Le Corre 2008).
Predation by introduced mammals - rats	High	VERY HIGH: *Rattus rattus* is everywhere, potentially visiting every nest.	HIGH: Observations so far indicate that the effects are low, but collecting data now with camera traps. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species.	LOW: Reversibility depends on petrel productivity, which is generally slow. Chicks replaced more easily than adults.
Strandings in populated areas due to light attraction	Medium	HIGH: All transiting birds are exposed to lights on the coasts; how much depends on exact route (e.g., Pedernales, DR (well lit up) or Belle Anse (not producing much light).	MEDIUM: Severity hard to know as all reporting is incidental. Expect that there are more downed birds than are found.	MEDIUM: Losses believed mostly to fledglings, which have a lower survival rate generally (losses are likely compensatory). (Rodríguez et al. 2017)
Towers/structures mortality	High	HIGH: Site has a lighted tower that majority of the birds must navigate.	HIGH: In fog and wind, 1 - 3 downed birds each year.	MEDIUM: Adult losses might be rarer (occurring mostly during foul weather) than for fledglings. Fledglings have a lower survival rate generally (losses are likely compensatory).
Wood harvest	Low	HIGH: Wood harvest here is primarily women and children collecting deadwood, axing down some bushes, chipping on the pine trees for fire starting. It's widespread.	LOW: Will ultimately kill trees, but does not directly harm the petrel habitat requirements. (Danger is if people are accompanied by dog.)	MEDIUM: Damaged woody growth takes a while to recover and collectors aren't likely to ease up. Growth of new trees is slow.
Site: Loma Quemada		**Justifications based on interviews with Ernst Rupp and Adam Brown, April 21 and 22, 2020 with supplemental comments inserted June 24, 2020.**		
Agriculture		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Livestock grazing (in this case, feral pigs).	High	VERY HIGH: Wild pigs -- rooting up large areas the soil looking for yams, insects, etc. Human presence in park is mostly pig hunters	HIGH: May have limited petrel populations in the past. Lack of data about severity of pig rooting damage; defaulted to "high" in Miradi.	MEDIUM: The decreased quality of nesting habitat could be reversed, but with soil quality damaged and vegetation removed, restoration would take 6-20 years. Legal pig hunting is feasible and would prob. be effective.
Harvest by humans		Not Occurring (N/O) and unlikely to occur.	N/O	N/O

Fire (damaging habitat, mortality in nests)	Medium	MEDIUM: Fires popping up - fire risk similar to Loma del Toro, maybe less.	MEDIUM: Damage depends on nature of fire.	MEDIUM: Broadleaf takes longer to recover. (Based on observations from nearby fire 15 years ago).
Non-timber Forest Product collection		Not Occurring (N/O) and unlikely to occur.	*n/a*	n/a
Predation by introduced mammals - cats	High	HIGH: Higher frequency of cats than Loma del Toro, but abundance unknown (usually see one cat at a time).	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species (Rodríguez et al. 2019)	MEDIUM: Reversibility depends on petrel productivity, which is generally slow; moreover, cats known to take older age classes (Le Corre 2008).
Predation by introduced mammals - rats	High	VERY HIGH: *Rattus rattus* is everywhere, potentially visiting every nest.	HIGH: Observations so far indicate that the effects are low, but collecting data now with camera traps. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species.	LOW: Reversibility depends on petrel productivity, which is generally slow. Chicks replaced more easily than adults.
Strandings in populated areas due to light attraction	Medium	HIGH: Transiting birds encounter wind farm at base of flyway, coming over towns with lights.	MEDIUM: Severity hard to know as all reporting is incidental. Expect that there are more downed birds than are found.	MEDIUM: Losses believed mostly to fledglings, which have a lower survival rate generally (losses are likely compensatory). (Rodríguez et al. 2017)
Towers/structures mortality		Not Occurring (N/O) and unlikely to occur. No lights/towers in breeding area.	*n/a*	n/a
Wood harvest		Not Occurring (N/O) and unlikely to occur.	*n/a*	n/a
Site: Valle Nuevo		**Justifications based on interviews with Ernst Rupp and Adam Brown, April 21 and 22, 2020 with supplemental comments inserted June 24, 2020.**		
Invasive fern species (unique to Valle Nuevo)	Low	LOW: Guess - low. Spatial extent not mapped.	HIGH: Heavy thickets, sticky paste, out-compete other plants, bad for petrels. Spread with fire.	MEDIUM: Petrels who have left might return; immatures might come to prospect?
Agriculture	Low	LOW: Farming close (not as close as Morne Vincent, but is going on.) Intensive strawberry, root crops farming in the past, could come back.	MEDIUM: Agriculture may have reduced nests nearby; terrain may provide some protection for remaining nests. June: Valle Nuevo is more difficult to judge, since there should be more active nesting sites than presently known.	MEDIUM: The decreased quality of nesting habitat could be reversed, but with soil quality damaged and vegetation removed, restoration would take 6-20 years.
Harvest by humans		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Fire (damaging habitat, mortality in nests)	Medium	LOW: Fire speeds fern invasion, which affects petrel habitat requirement (access to ground). So guess of low, based on spatial extent of ferns.	HIGH: Heavy thickets, sticky paste, out-compete other plants, bad for petrels. Spread with fire.	MEDIUM: Based on fern eradication, above.
Livestock grazing		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Non-timber Forest Product collection	Low	LOW: Complex situation - when commercial farms are active, rely on migrant workers, who may extract from forest. Commercial farms not currently active.	LOW: Will ultimately thin vegetation or cause other damage, but does not directly harm the petrel habitat requirements. (Danger is if people are accompanied by dog.)	MEDIUM: Damaged broadleaf takes a while to recover.
Predation by introduced mammals - mongoose	High	HIGH: Mongoose seen, documented. Maybe cats, but not seen. No pig sign.	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species.	MEDIUM: Reversibility depends on petrel productivity, which is generally slow; moreover, mongoose known to take older age classes.
Predation by introduced mammals - rats	Medium	VERY HIGH: Rattus rattus is everywhere, potentially visiting every nest.	HIGH: Observations so far indicate that the effects are low, but collecting data now with camera traps. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species.	LOW: Reversibility depends on petrel productivity, which is generally slow. Chicks replaced more easily than adults.

Strandings in populated areas due to light attraction	Medium	HIGH: Most pass Ocoa (bigger town of 82,000) to big bay. Big highway, lots of disturbance on coast.	MEDIUM: Severity hard to know as all reporting is incidental. Expect that there are more downed birds than are found.	MEDIUM: Losses believed mostly to fledglings, which have a lower survival rate generally (losses are likely compensatory). (Rodríguez et al. 2017)
Towers/structures mortality		HIGH: Abandoned towers/antennas. 2600-m peak with antennas, no lights. No nests up that high. Not likely to come back on line.	N/O	N/O
Wood harvest	Low	LOW: Complex situation - when farms are active, rely on migrant workers, who may extract from forest.	LOW: Will ultimately kill trees, but does not directly harm the petrel habitat requirements. (Danger is if people are accompanied by dog.)	MEDIUM: Damaged woody growth takes a while to recover and collectors aren't likely to ease up. Growth of new trees is slow.
Site: LaVisite - Tet Opak specifically		**Justifications based on interviews with Ernst Rupp and Adam Brown, April 21 and 22, 2020 with supplemental comments inserted June 24, 2020.**		
Agriculture	Very high	HIGH: Based on 3 years evidence, estimate is 10 out of 42 nests have been severely impacted by encroachment.	VERY HIGH: Actually, nests holding on farmed areas (just grassy cover). Accompanying disturbance prob. low. However, eventually these burrows won't persist in areas overrun by agricultural effort (row crops).	VERY HIGH: Once the area is severely degraded, it would take a lot of effort to restore it to any kind of ecological function. The nesting site is "lost." Adults could attempt to find new locations, but unknown amount of energy to re-nest.
Fire on habitat.	Low	LOW: Yet to see a fire on the escarpment; no signs of fire.	MEDIUM: No data on this yet so rating is an estimate	HIGH: Damaging to broadleaf vegetation, and recovery efforts require a number of factors to converge (i.e. restoration could work if people re-located, there was adequate seed bank remaining in the soil, precipitation patterns were conducive.)
Livestock grazing	High	HIGH: On upper part of colony now but creeping down slope and up slope	HIGH: Grazing is a step towards full clearing. Exposes burrows.	HIGH: Once the area is degraded down to pasture, it would take a lot of effort to restore it to any kind of ecological function. The nesting site might be "lost." Adults could attempt to find new locations, but unknown amount of energy to re-nest.
Non-timber Forest Product collection	Medium	MEDIUM: Tree fern harvest identified as primary reason for entry - stumps and stacks.	LOW: Can cause mortality by blocking nests. Ratings based on guesses, three years data.	MEDIUM: Effects depends if chick or adults trapped and die. Restoration of degraded habitat could happen if tree fern nurseries, replanting.
Fatal fire Attraction (fires to expand agriculture; community celebrations)	High	VERY HIGH: Incidents of adults attracted to fires right near nesting areas.	HIGH: Mortality event in 2019; 110 adults burned. 5 nests were abandoned after. Fires are in pine areas within a kilometer of nesting area.	MEDIUM: Reversing this threat is based on behavior change in human populations (seasonal clearing technique). Over time, maybe sustainable agriculture could be put in place to prevent lighting of fires in farmed areas.
Harvest by humans	Low	LOW: Haven't documented this but humans are farming in colony	MEDIUM: No education so people likely to take a petrel encountered.	LOW: Recovery extended if adults lost.
Predation by introduced mammals	High	VERY HIGH: Predators documented by camera trap at all nests monitored: cats, mongoose, black rats.	HIGH: Defaulted to high.	MEDIUM: Recovery depends on age class. Note: Is it possible this is a more manageable area, being more confined?
Strandings in populated areas due to light attraction	Medium	HIGH: Pass over Marigot, HT (estimate lesser light problem), Port-au-Prince (estimate larger light problem)	MEDIUM: Severity hard to know as all reporting is incidental. Expect that there are more downed birds than are found.	MEDIUM: Losses believed mostly to fledglings, which have a lower survival rate generally (losses are likely compensatory). (Rodríguez et al. 2017)
Towers/structures mortality	Low	LOW: Towers at Tet Kay Jak ~1km west from Tet Opak. Tower strikes documented at these towers in the past. Light altered.	MEDIUM: Mostly fledglings	LOW: Most egregious spotlight now removed.
Wood harvest	Medium	MEDIUM: Haven't seen yet but probably happening around because seeing charcoal piles	HIGH: Removal of woody vegetation is a step towards greater clearing.	MEDIUM: Damaged woody growth takes a while to recover and collectors aren't likely to ease up. Growth of new trees is slow.
Site: Macaya		**Interview with Anderson Jean, May 14, 2020**		

Agricultural encroachment	Very high	HIGH: No real farming up in petrel area now, but farming at the bottom of hill. Fires for clearing. Definitely getting closer.	VERY HIGH: Eventually burrows won't persist in areas overrun by agricultural effort (row crops).	VERY HIGH: Once the area is severely degraded, it would take a lot of effort to restore it to any kind of ecological function. The nesting site is "lost." Adults could attempt to find new locations, but unknown amount of energy to re-nest.
Harvest by humans		Not Occurring (N/O) and unlikely to occur. Not many people even know about the petrel; no one is seeking them out.	N/O	N/O
Fire (damaging habitat, mortality in nests)	Low	LOW: Most common fires are human activities, burn during dry season. Rain starts May and June. June and July will burn and plant beans, during fledging. But no evidence of wildfires up in suspected nest area.	MEDIUM: Guess. Damage depends on nature of fire.	HIGH: Guess. Broadleaf takes longer to recover.
Livestock grazing		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Non-timber Forest Product collection		Not occurring (N/O) No ferns or other non-timber products known to be collected.	N/O	N/O
Pig Damage	High	VERY HIGH: Now there are pigs (not mentioned in 1980s). Last visit, saw where they were rooting in the ground.	HIGH: May have limited petrel populations in the past. Severity of pig rooting damage unknown; defaulted to "high".	MEDIUM: The decreased quality of nesting habitat could be reversed, but with soil quality damaged and vegetation removed, restoration would take 6-20 years. Note: Legal pig hunting is feasible and would prob. be effective.
Predation by introduced mammals - cats	High	HIGH: Abundant, can see cats on walks at night.	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species (Rodríguez et al. 2019)	MEDIUM: Reversibility depends on petrel productivity, which is generally slow; moreover, cats known to take older age classes (Le Corre 2008).
Predation by introduced mammals - rats	High	VERY HIGH: Full suite of introduced predators there... high abundance of rats in Macaya, can see them swarming your camp. On trails up Pic Formon and La Selle... easy to see.	HIGH: Observations so far indicate that the effects are low, but collecting data now with camera traps. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species.	LOW: Reversibility depends on petrel productivity, which is generally slow. Chicks replaced more easily than adults.
Strandings in populated areas due to light attraction	Medium	HIGH: No strandings reported in nearby communities, the smaller towns at either end of the flyway have lights (though not like coming down from Massif la Selle... Jacmel and Port au Prince are dense population centers), buildings, towers.	MEDIUM: Severity hard to know as all reporting is incidental. Expect that there are more downed birds than are found.	MEDIUM: Losses believed mostly to fledglings, which have a lower survival rate generally (losses are likely compensatory). (Rodríguez et al. 2017)
Towers/structures mortality	Low	LOW: Towers and antennas are a great distance from Macaya, 15-20 km away. In general, this area has less technological development than other Haitian sites.	MEDIUM: Guessing mostly fledglings.	LOW: Recovery based on age class. Resources for recovery: Not as many hazards to deal with.
Wood harvest	High	VERY HIGH: Firewood, people cut trees for construction, housing, cooking/starter every day. Hardwood is the focus. In the past, there was a project with park rangers to mitigate number of trees cut; now, rangers not paid.	HIGH: Removal of woody vegetation is a step towards greater clearing.	MEDIUM: Damaged woody growth takes a while to recover and collectors aren't likely to ease up. Growth of new trees is slow.

Site: Dominica		**Interview with Adam Brown, May 13, 2020**		
Agriculture (meaning planted crops farming)		Not Occurring (N/O) and unlikely to occur. All on peaks; all in Park	N/O	N/O
Barn Owl		Information gap	n/a	n/a
Fire (damaging habitat, but also some mortality in nests or adults)		Not Occurring (N/O) and unlikely to occur. All on peaks; all in Park	N/O	N/O
Livestock grazing		Not Occurring (N/O) and unlikely to occur. All on peaks; all in Park	N/O	N/O
Non-timber Forest Product collection		Not Occurring (N/O) and unlikely to occur. All on peaks; all in Park	N/O	N/O
Pig rooting	Low	HIGH: Pigs definitely overlap with petrels; but people pig hunt already so density maybe not that high	MEDIUM: Pigs damage burrows and cause mortality.	LOW: Recovery depends on degree of damage to burrow.
Predation by humans		Not Occurring (N/O) and unlikely to occur. All on peaks; all in Park	N/O	N/O
Predation by introduced mammals - cats	High	VERY HIGH: No mongoose. All areas subject to these introduced animals.	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species (Rodríguez et al. 2019)	MEDIUM: Reversibility depends on petrel productivity, which is generally slow; moreover, cats known to take older age classes (Le Corre 2008).
Predation by introduced mammals - rats	High	VERY HIGH: No mongoose. All areas subject to these introduced animals.	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species.	MEDIUM: Reversibility depends on petrel productivity, which is generally slow. Chicks replaced more easily than adults.
Strandings in populated areas due to light attraction	Medium	HIGH: Documented but not often. Enough awareness that word would get out. Varied level of coastal development around island, but Roseau is at the head of lots of flyways.	MEDIUM: Severity hard to know as all reporting is incidental. Expect that there are more downed birds than are found.	MEDIUM: Losses believed mostly to fledglings, which have a lower survival rate generally (losses are likely compensatory). (Rodríguez et al. 2017)
Towers/structures mortality	Low	MEDIUM: 2015- towers mapped. On Flyways. Morne Micotrin has array. Near Morne Anglais. Below Morne Trois Piton. Estimated that 30% of population is exposed.	LOW: Birds rarely found.	LOW: Recovery depends on age classes harmed.
Wood harvest		Not Occurring (N/O) and unlikely to occur. All on peaks; all in Park	N/O	N/O
Site: Guadeloupe		**Interview with Adam Brown, May 13, 2020**		
Agriculture (meaning planted crops farming)		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Barn Owl		Wondering about their presence/effect	n/a	n/a
Fire (damaging habitat, but also some mortality in nests or adults)		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Livestock grazing		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Non-timber Forest Product collection		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Pig rooting	Low	HIGH: Guess - Ask Parc staff/Antoine	MEDIUM: A guess	LOW. Guess

Harvest by humans		Not Occurring (N/O) There is bird hunting in parks, but certainly not petrels.	n/a	n/a
Predation by introduced mammals – mongoose, other	High	VERY HIGH: Overrun by mongoose. Raccoons are also widespread	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species (Rodríguez et al. 2019)	MEDIUM: Reversibility depends on petrel productivity, which is generally slow; moreover, cats known to take older age classes (Le Corre 2008).
Predation by introduced mammals - cats	High	VERY HIGH: All areas subject to these introduced animals, so assuming all nests.	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species (Rodríguez et al. 2019)	MEDIUM: Reversibility depends on petrel productivity, which is generally slow; moreover, cats known to take older age classes (Le Corre 2008).
Predation by introduced mammals - rats	High	VERY HIGH: All areas subject to these introduced animals, so assuming all nests.	HIGH: Impact being studied... presence has been linked to complete loss at other sites. Lack of data about severity of predation; defaulted to "high" based on studies of other petrel species.	LOW: Reversibility depends on petrel productivity, which is generally slow. Chicks replaced more easily than adults.
Strandings in populated areas due to light attraction	Medium	HIGH: Big city on routes out to sea; no record of groundings (but very few birds).	MEDIUM: Severity hard to know as all reporting is incidental. Expect that there are more downed birds than are found.	MEDIUM: Losses believed mostly to fledglings, which have a lower survival rate generally (losses are likely compensatory). (Rodríguez et al. 2017)
Towers/structures mortality	Low	MEDIUM: Not mapped, but exist on flanks on flyways	LOW: Birds rarely found.	LOW: Recovery depends on age classes harmed.
Wood harvest		Not Occurring (N/O) and unlikely to occur.	N/O	N/O
Notes		**MIRADI/Conservation Standards Definitions:**		
Overall rating for introduced predators ultimately set at worst-case scenario (scope Very High, severity High, irreversibility Medium) regardless of site (which may differ in density of various predators).		Notes on Scope (used criteria in Miradi): Ranges of 1-10%, 11-30%, 31-70% and 71-%100.	Notes on Severity (used criteria in Miradi): Ranges of 1-10%, 11-30%, 31-70% and 71-%100.	Notes on Irreversiblity (used criteria in Miradi, which is intended to look at reversibility of the effects, not the threat): Ranges of 1-5 years/low cost, 6-20 years/ reasonable cost, 21-100 years/not affordable, 100+ years/can't be done.

Table A3-2 At-Sea Threat Ratings and Justifications

Threat	Overall Miradi	Scope	Severity	Irreversibility	Uncertainty
Target: Breeding adults (spatial use: 70% Caribbean Sea, 30% Gulf Stream)					
Reduced prey availability *^	Medium	MEDIUM: The foraging areas for breeding adults (mostly southern Caribbean Sea) are limited in size (available habitat) and location (central-place foraging); upwelling processes in the southern Caribbean Sea are negatively impacted by climate change and show reduced upwelled nutrient, and fishery collapse (Taylor et al 2012).	MEDIUM: Petrels may adjust to other prey if they are available, and be moderately affected by the threat. Under extreme scenario, death of breeding adults may occur as changes in prey quality can have substantial effects on body condition (e.g. shearwater die offs). Other effects of the threat may include decreased fitness, potentially decreased life expectancy. Reduced reproductive success is a consequence but does not directly affect the target.	HIGH: The threat is pervasive and its effects (decreased life expectancy, potential mortality) cannot affectively be reversed by compensation measures at nest sites.	High
Plastic *	High	HIGH: Plastic pollution is diffuse and widespread in the marine environment. Relative debris density is low in the Caribbean Sea but higher in the western north Atlantic and enclosed Gulf of Mexico (Wilcox et al. 2015).	MEDIUM: The effects of the threat are likely sublethal for self-feeding birds (here, breeding adults) but may result in reduced body condition, decreased fitness, reduced survival and shorter life expectancy. The threat is cumulative and irreversible, and high exposure can be lethal. Reduced reproductive success is a consequence but does not directly affect the target.	VERY HIGH: The effect of the threat (decreased survival and life expectancy) cannot be reversed. Increased survival at nest sites could compensate the decreased survival due to the threat but with difficulty and over several generations. Other compensation measures at nest sites (higher nest site availability, predator control) could compensate reduced fitness and early loss of breeding adults by increasing recruitment but with difficulty and over several generations. Rate of improved recruitment may not compensate reduced survival.	Medium
Mercury *	Medium	HIGH: Breeding adults are expected to be spatially affected by mercury and methylmercury in the Caribbean Sea and Gulf Stream.	LOW: Concentrations of mercury in the southern Caribbean Sea are estimated to be on the lower spectrum (Semeniuk and Dastoor 2016). Bioaccumulation may occur in other areas such as Gulf Stream waters. The effects of the threat are likely sublethal for the target population (reduced fitness, reduced survival and shorter life expectancy) but high exposure can be lethal. Reduced reproductive success is a consequence but does not directly affect the target.	VERY HIGH: The effect of the threat (decreased survival and life expectancy) cannot be reversed. Increased survival at nest sites could compensate the decreased survival due to the threat but with difficulty and over several generations. Other compensation measures at nest sites (higher nest site availability, predator control) could compensate reduced fitness and early loss of breeding adults by increasing recruitment but with difficulty and over several generations. Rate of improved recruitment may not compensate reduced survival.	High

Other contaminants *	Medium	HIGH: In the southern Caribbean Sea, sources include O&G, shipping and agricultural runoff. We suspect that most breeding adults use the Caribbean Sea for foraging, hence scope affecting >70% of population.	LOW: The threat has likely sublethal effects on the target population but high exposure can be lethal (impact on survival in the lower spectrum). Other impacts may include decreased fitness. Reduced reproductive success is a consequence but does not directly affect the target.	VERY HIGH: The effect of the threat (decreased survival) cannot be reversed. Increased survival at nest sites could compensate the decreased survival due to the threat but with difficulty and over several generations. Other compensation measures at nest sites (higher nest site availability, predator control) could compensate reduced fitness and early loss of breeding adults by increasing recruitment but with difficulty and over several generations. Rate of improved recruitment may not compensate reduced survival.	Medium
Oil spills (O&G, shipping) *	High	MEDIUM: The most likely area for breeding adults to encounter oil spills is discrete areas of the south Caribbean Sea, during foraging. If most breeders use the same foraging areas in the south Caribbean Sea, diffuse oil spills may potentially impact a medium proportion of breeding adults (11-30% in Miradi).	MEDIUM: The target population will be impacted through direct mortality. Sudden death of breeding adults will impact the population over several generations but proportion of reduction is difficult to estimate. Proportion of individuals affected is difficult to estimate but seems reasonable to expect 11-30% of population to be impacted. The number of oil platforms in foraging areas is limited (2-3 in extraction and <5 in exploration) but could increase in the future (Agencia Nacional de Hidrocarburos 2020).	VERY HIGH: The effect of the threat (acute mortality) cannot be reversed by compensation measures at nest sites. Increased fledging success could compensate early loss of breeding adults but with difficulty and over several generations. If low numbers of individuals are affected, improved adult survival at nest sites (predation control) and/or improved fledging success could compensate for early loss of breeding adults but it could take 20-100yrs to achieve this at the population level.	Medium
Attraction and/or Collisions with infrastructure *	Medium	MEDIUM: This is a discrete, point-source threat: in the south Caribbean Sea, 3 O&G platforms are in active extraction in areas used by petrels. More exploration platforms or ships are located in the area (<10). Lighted squid fishery present in that area could attract petrels. Collisions with lighted ships such as cargo or tanker ships have occurred.	MEDIUM: The target population will be impacted through direct mortality. Sudden death of breeding adults will impact the population over several generations but proportion of reduction is difficult to estimate. Proportion of individuals affected is difficult to estimate but seems reasonable to expect 1-10% of population to be impacted. The number of oil platforms in foraging areas is limited (2-3 in extraction and <5 in exploration; although it could increase in the future).	HIGH: The effect of the threat (direct mortality) cannot be reversed by compensation measures at nest sites. Increased fledging success could compensate early loss of breeding adults but with difficulty and over several generations. Low numbers of individuals affected suggest that improved adult survival at nest sites (predation control) and/or improved fledging success could compensate for early loss of breeding adults but it could take 20-100yrs to achieve this at the population level.	Medium
Fisheries bycatch *	Low	MEDIUM: Active international fisheries (including squid and longline) are present in the southern Caribbean Sea and overlaps somewhat with petrel foraging areas there. Local fisheries also present but unquantified. A medium scope can be expected.	LOW: No bycatch of petrels has been observed in US Atlantic fisheries. Pterodroma petrels are usually surface feeders and are not usually subject to bycatch in hook fisheries. Even considering differences in fisheries between Atlantic and Caribbean, it is reasonable to expect a low severity. The target population would be impacted through direct mortality.	HIGH: The effect of the threat (direct mortality) cannot be reversed by compensation measures at nest sites. Increased fledging success could compensate early loss of breeding adults but with difficulty and over several generations. Low numbers of individuals affected suggest that improved adult survival at nest sites (predation control) and/or improved fledging success could compensate for early loss of breeding adults but it could take 20-100yrs to achieve this at the population level.	Medium
Hurricane fallout *^	NA	Not Occurring (N/O) during the breeding season	N/O	N/O	NA

Target: Offspring: eggs to fledglings (spatial "use": same as their parents, unless specified otherwise)					
Reduced prey availability *^	Medium	MEDIUM: Similar to that of Breeding Adults.	MEDIUM: Depleted prey base may affect chicks more than adults: under feeding stress, adults may abandon chick. There may also be decreases in the provisioning rate or decreases in meal quality that can impact growth and survival.	HIGH: The threat is pervasive and, although some of its effects (decreased fledging success) may be temporarily reversed, compensation measures will likely not be effective or be too expensive (supplemental feeding).	High
Plastic *	High	HIGH: Similar to that of Breeding Adults.	MEDIUM: The effects of the threat can be lethal for juveniles. Sublethal effects include reduced body condition, which is linked to lower fledging success.	VERY HIGH: Similar to that of Breeding Adults. The effects of the threat (decreased fledging success) may be temporarily reversed by compensation measures but long-term effects on the population will not be compensated.	Low
Mercury *	Medium	HIGH: Similar to that of Breeding Adults - or higher, if pre-breeding females use contaminated areas outside the considered scope for Breeding Adults.	MEDIUM: Mercury in offspring may impact fetal development, reduce hatching success, reduce development success and impact fledging success. Rate and extent unknown. Developmental effects are difficult to quantify and failure to hatch or fledge may be due to other factors but 10-20% of the population affected seems reasonable.	HIGH: Similar to that of Breeding Adults. The effects of the threat (decreased fledging success) may be temporarily reversed by compensation measures but long-term effects on the population will not be compensated.	High
Other contaminants *	Medium	HIGH: Similar to that of Breeding Adults. Similar to that of Breeding Adults - or higher, if pre-breeding females use contaminated areas outside the considered scope for Breeding Adults.	MEDIUM: Developmental effects are difficult to quantify and failure to hatch or fledge may be due to other factors but 10-20% of the population affected seems reasonable.	HIGH: Similar to that of Breeding Adults. The effects of the threat (decreased fledging success) may be temporarily reversed by compensation measures but long-term effects on the population will not be compensated.	Medium
Oil spills (O&G, shipping) *	Medium	MEDIUM: Similar to that of Breeding Adults.	HIGH: Similar to that of Breeding Adults. Direct mortality of adults may induce the death of their offsprings: if parent(s) die, then chick mortality is probable (e.g., chicks may fledge if near to fledging age and single parent can provision final meal(s)). With one offspring per pair, the size of the offspring population is half the size of the adult population, therefore the proportion of offsprings being affected is higher. Also, the reduction of population of breeding adults will impact the subsequent populations of offsprings (number of offsprings produced) at a higher rate until breeding adult population is regenerated.	MEDIUM: The effects of the threat (acute mortality in population) may be temporarily reversed by compensation measures.	Low

Attraction and/or Collisions with infrastructure *	Medium	MEDIUM: Similar to that of Breeding Adults.	MEDIUM: Direct mortality of adults may induce the death of their offsprings: if parent(s) die, then chick mortality is probable (e.g., chicks may fledge if near to fledging age and single parent can provision final meal(s)). With one offspring per pair, the size of the offspring population is half the size of the adult population, therefore the proportion of offsprings being affected is higher. Also, the reduction of population of breeding adults will impact the subsequent populations of offsprings (number of offsprings produced) at a higher rate until breeding adult population is regenerated.	HIGH: Similar to that of Breeding Adults. The effects of the threat (chronic mortality in population) may be temporarily reversed by compensation measures but long-term effects on the population will not be compensated.	Medium
Fisheries bycatch *	Medium	MEDIUM: Similar to that of Breeding Adults.	MEDIUM: Direct mortality of adults may induce the death of their offsprings: if parent(s) die, then chick mortality is probable (e.g., chicks may fledge if near to fledging age and single parent can provision final meal(s)). With one offspring per pair, the size of the offspring population is half the size of the adult population, therefore the proportion of offsprings being affected is higher. Also, the reduction of population of breeding adults will impact the subsequent populations of offsprings (number of offsprings produced) at a higher rate until breeding adult population is regenerated.	HIGH: Similar to that of Breeding Adults. The effects of the threat (chronic mortality in population) may be temporarily reversed by compensation measures but long-term effects on the population will not be compensated.	Medium
Hurricane fallout *^	NA	Not Occurring (N/O) during the breeding season	N/O	N/O	NA
Target: Non-breeding adults; immatures (spatial use: 90% Gulf Stream, 10% Gulf of Mexico)					
Reduced prey availability *^	Medium	MEDIUM: Some future scenarios for climate change show possible change in Gulf Stream regimes (Yang et al. 2016). Since they are not constrained by central-place foraging (as breeding adults are), individuals in the target population may be able to spatially adjust their distribution to follow geographic changes in prey availability.	MEDIUM: Petrels in the target population may be able to adjust to other prey and, depending on the characteristics of available prey, may be moderately affected by the threat. Under extreme scenario, death of breeding adults may occur as changes in prey quality can have substantial effects on body condition (e.g. shearwater die offs). Other effects of the threat may include decreased fitness and lower reproductive success, potentially decreased life expectancy.	HIGH: The threat is pervasive and its effects (decreased life expectancy, potential mortality) cannot affectively be reversed by compensation measures at nest sites.	High

Plastic *	High	HIGH: Similar to that of Breeding Adults. Plastic pollution is diffuse and widespread in the marine environment. Relative debris density is low in the Caribbean Sea but higher in the western north Atlantic and enclosed Gulf of Mexico (Wilcox et al. 2015).	MEDIUM: The effects of the threat are sublethal for self-feeding birds but may result in reduced body condition, decreased fitness, and shorter life expectancy. The threat is cumulative and irreversible, and high exposure can be lethal.	VERY HIGH: The effect of the threat (decreased survival and life expectancy) cannot be reversed. Increased survival at nest sites could compensate the decreased survival due to the threat but with difficulty and over several generations. Other compensation measures at nest sites (higher nest site availability, predator control) could compensate reduced fitness and early loss of breeding adults by increasing recruitment but with difficulty and over several generations. Rate of improved recruitment may not compensate reduced survival.	Low
Mercury *	Medium	VERY HIGH: The target population is spatially impacted in the Atlantic (where its distribution is largely near-pelagic) and Gulf of Mexico. Concentrations of mercury are higher in the Atlantic, due to the ingress of the southern Labrador Current carrying artic waters with high mercury concentrations (Semeniuk and Dastoor 2016). Note that mercury accumulates, so the distinction between breeding and non-breeding adults may be irrelevant.	LOW: The threat has sublethal effects on the target population, with an impact on survival in the lower spectrum.	VERY HIGH: The effect of the threat (decreased survival and life expectancy) cannot be reversed. Increased survival at nest sites could compensate the decreased survival due to the threat but with difficulty and over several generations. Other compensation measures at nest sites (higher nest site availability, predator control) could compensate reduced fitness and early loss of breeding adults by increasing recruitment but with difficulty and over several generations. Rate of improved recruitment may not compensate reduced survival.	High
Other contaminants *	Medium	MEDIUM: Non-breeding and dispersal areas include western north Atlantic and Gulf of Mexico, which are areas with medium to high pollution.	LOW: The threat has sublethal effects on the target population, with an impact on survival in the lower spectrum.	VERY HIGH: The effect of the threat (decreased survival) cannot be reversed. Increased survival at nest sites could compensate the decreased survival due to the threat but with difficulty and over several generations. Other compensation measures at nest sites (higher nest site availability, predator control) could compensate reduced fitness and early loss of breeding adults by increasing recruitment but with difficulty and over several generations. Rate of improved recruitment may not compensate reduced survival.	Medium
Oil spills (O&G, shipping) *	Medium	MEDIUM: The most likely areas for non-breeding adults and immatures to encounter oil spills are the Gulf of Mexico and shipping channels in the Atlantic. O&G activity may occur in Canadian waters in the future but we did not include it in this threat rating. Because the threat is relatively discrete, only a portion of the population will be affected at a time by an oil spill. The worst area for a spill would be off Cape Hatteras and could spatially affect up to 30% of the population.	HIGH: Similar to that of Breeding Adults. The target population will be impacted through direct mortality. This threat could impact both adults and immatures (as compared to only adults in the Breeding Adults target). Dead immatures will not recruit into the target population therefore the proportion of the target population that is impacted should be higher than in Breeding Adults (into which immatures will recruit - if a spill affects Breeding Adults, it does not affect immatures).	HIGH: Similar to that of Breeding Adults. The effect of the threat (acute mortality) cannot be reversed by compensation measures at nest sites. Increased fledging success could compensate early loss of breeding adults but with difficulty and over several generations. If low number of individuals are affected, improved adult survival at nest sites (predation control) and/or improved fledging success could compensate for early loss of breeding adults but it could take 20-100yrs to achieve this at the population level.	Low

Attraction and/or Collisions with infrastructure *	Medium	MEDIUM: There are no marine infrastructures in the western north Atlantic (though Canada may authorize O&G exploration in areas used by petrels). Wind farms proposed in the US are currently too coastal to impact the target. O&G infrastructure are widespread in the Gulf of Mexico and petrels have been observed as close to O&G platforms as 10km; however, the proportion of petrels using the Gulf of Mexico appears to be low. If occurring, attraction to lighted fishing vessels is low because lighted fisheries are uncommon in the areas of interest. However, collisions with lighted ships such as cargo or tanker ships have occurred.	MEDIUM: The target population will be impacted through direct mortality. Impact on population is difficult to estimate. The Gulf of Mexico is an area with very dense concentration of lighted O&G platforms so it seems reasonable to expect that 1-10% of the target population could be impacted.	HIGH: Similar to that of Breeding Adults. The effect of the threat (direct mortality) cannot be reversed by compensation measures at nest sites. Increased fledging success could compensate early loss of breeding adults but with difficulty and over several generations. Low number of individuals affected suggest that improved adult survival at nest sites (predation control) and/or improved fledging success could compensate for early loss of breeding adults but it could take 20-100yrs to achieve this at the population level.	Low
Fisheries bycatch *	Low	LOW: Pelagic fisheries occur in the Atlantic and Gulf of Mexico but their overlap with petrel distribution are limited. Therefore it is reasonable to assume a low scope.	LOW: No bycatch of petrels has been observed in US Atlantic fisheries. Pterodroma petrels are usually surface scavengers and are not usually subject to bycatch in hook fisheries.	HIGH: Similar to that of Breeding Adults. The effect of the threat (direct mortality) cannot be reversed by compensation measures at nest sites. Increased fledging success could compensate early loss of breeding adults but with difficulty and over several generations. Low number of individuals affected suggest that improved adult survival at nest sites (predation control) and/or improved fledging success could compensate for early loss of breeding adults but it could take 20-100yrs to achieve this at the population level.	Low
Hurricane fallout *^	Low	MEDIUM: Most of the target population from the Gulf of Mexico to Cape Hatteras is subject to hurricanes but not all at the same time. Therefore, it is reasonable to assume the maximum scope to be medium, for the individuals in the path of a hurricane.	MEDIUM: Satellite tracking has shown that petrels can avoid, precede or follow a storm. Therefore, individuals may have the capacity to avoid being blown on land. At most, it is reasonable to expect a maximum severity at medium. Hass et al. model 100s of groundings, which is 5<<10% of the population i.e. low-medium severity.	HIGH: Similar to that of Breeding Adults. Given the low number of individuals affected, the effects of the threat (acute mortality) could be reversed by compensation measures at nest sites but with difficulty and over several generations.	Low

* = data gap; ^ = impacted by climate change

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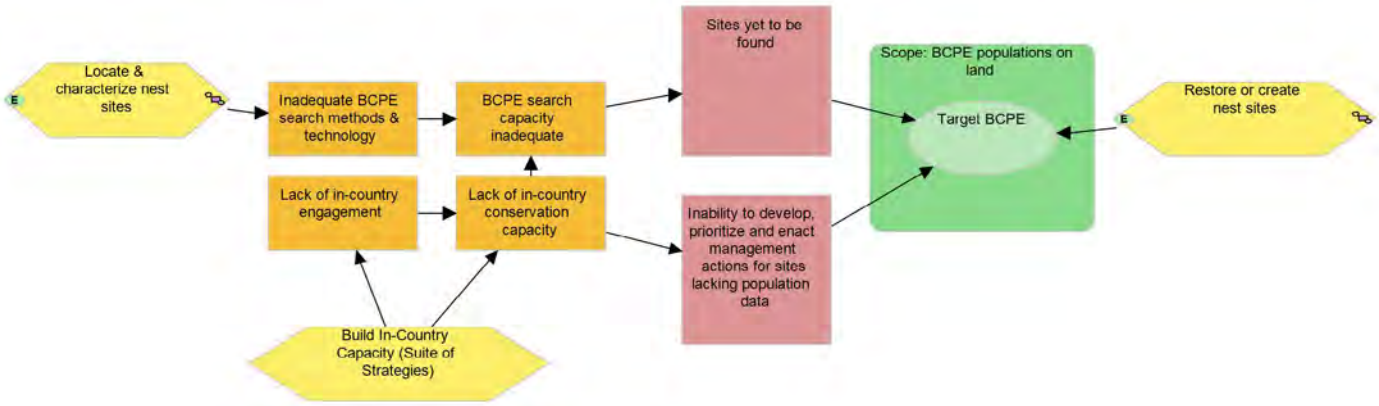
APPENDIX 4: SITUATIONAL ANALYSIS/CONCEPTUAL MODELS

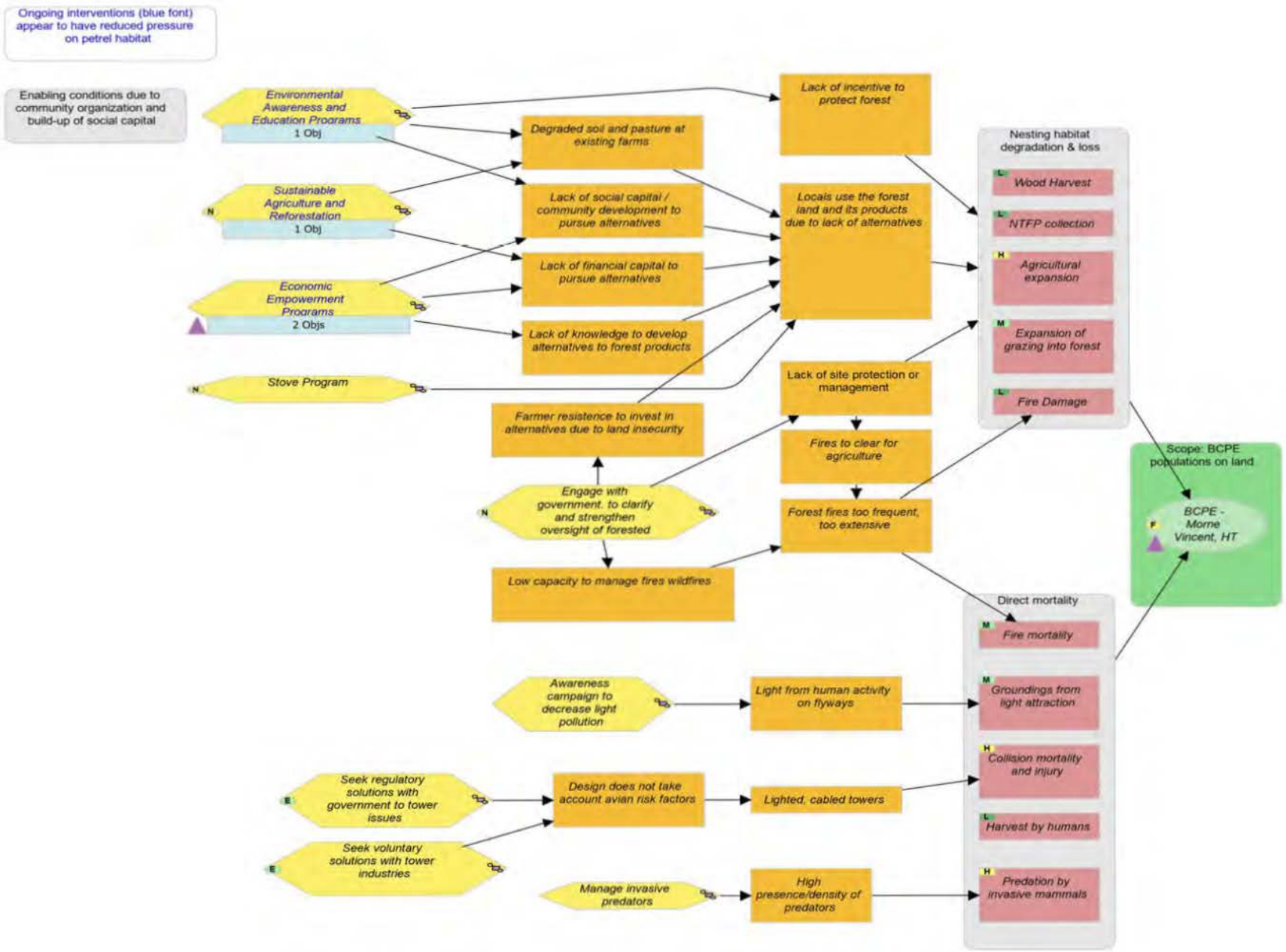
Conceptual models are intended to depict the links between targets, their direct threats, the factors contributing to these threats, and the possible strategies to ultimately reduce the threats.

Key

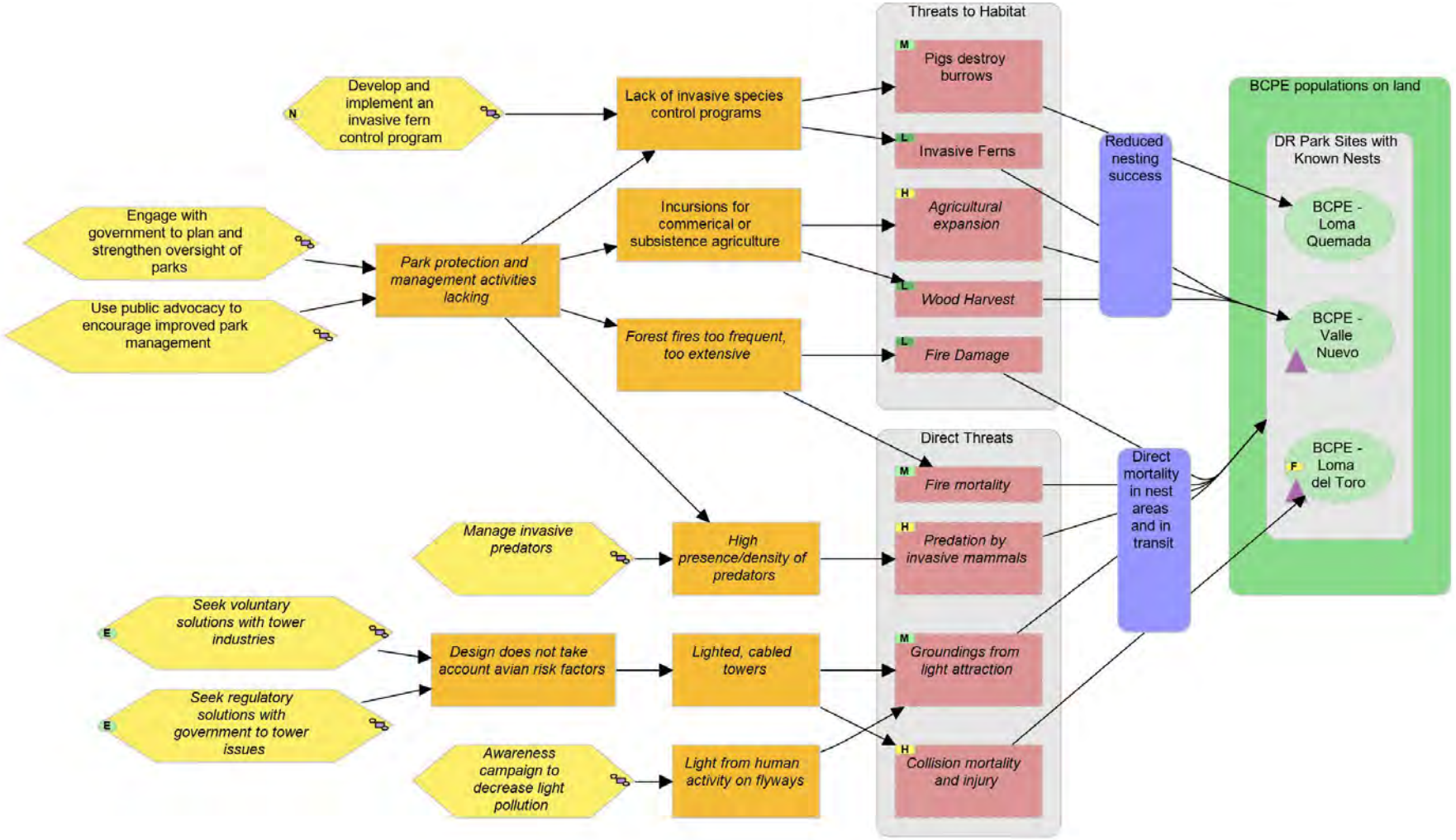
Enabling Conditions



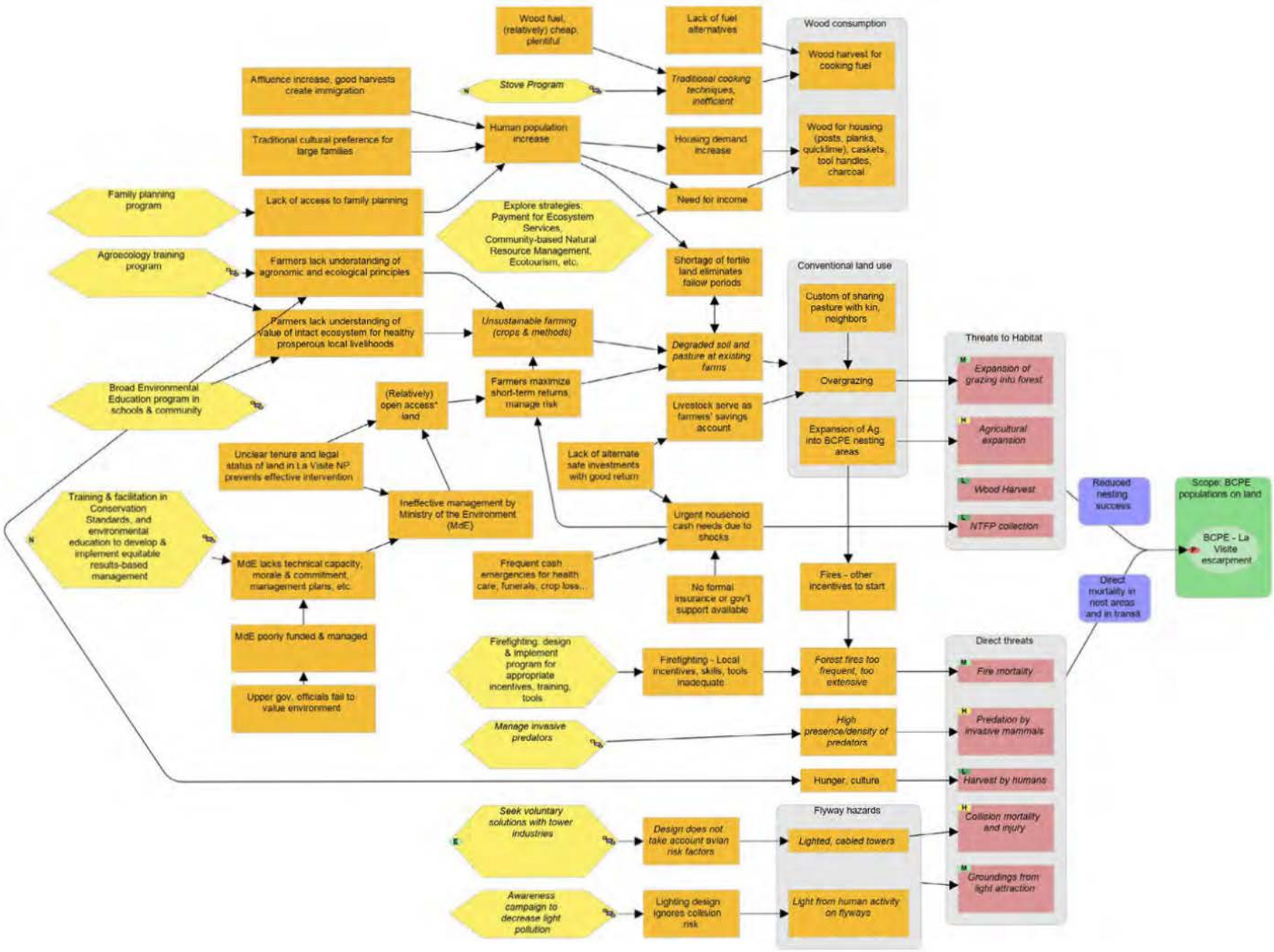
Morne Vincent



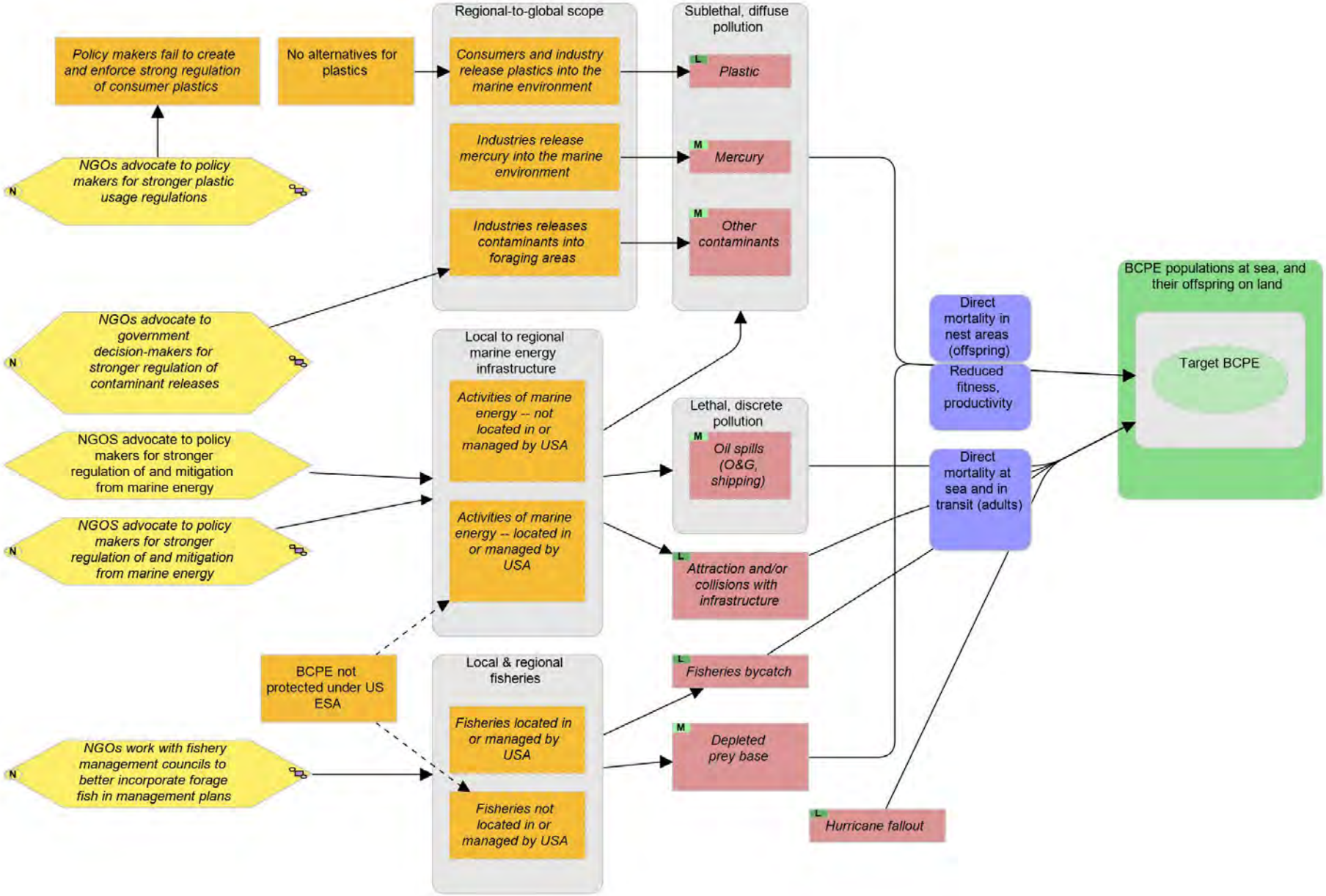
Dominican Republic Parks



La Visite


Wood fuel, (relatively) cheap, plentiful
Lack of fuel alternatives
Wood consumption
Wood harvest for cooking fuel
Affluence increase, good harvests create immigration
Stove Program
Traditional cooking techniques, inefficient
Human population increase
Traditional cultural preference for large families
Housing demand increase
Wood for housing (posts, planks, quicklime), caskets, tool handles, charcoal
Family planning program
Lack of access to family planning
Need for income
Explore strategies: Payment for Ecosystem Services, Community-based Natural Resource Management, Ecotourism, etc.
Agroecology training program
Farmers lack understanding of agronomic and ecological principles
Shortage of fertile land eliminates fallow periods
Conventional land use
Custom of sharing pasture with kin, neighbors
Farmers lack understanding of value of intact ecosystem for healthy prosperous local livelihoods
Unsustainable farming (crops & methods)
Degraded soil and pasture at existing farms
Threats to Habitat
Broad Environmental Education program in schools & community
(Relatively) open access* land
Farmers maximize short-term returns, manage risk
Overgrazing
Expansion of grazing into forest
Livestock serve as farmers' savings account
Expansion of Ag. into BCPE nesting areas
Agricultural expansion
Unclear tenure and legal status of land in La Visite NP prevents effective intervention
Lack of alternate safe investments with good return
Wood Harvest
Reduced nesting success
Scope: BCPE populations on land
Training & facilitation in Conservation Standards, and environmental education to develop & implement equitable results-based management
Ineffective management by Ministry of the Environment (MdE)
Urgent household cash needs due to shocks
NTFP collection
BCPE - La Visite escarpment
MdE lacks technical capacity, morale & commitment, management plans, etc.
Frequent cash emergencies for health care, funerals, crop loss...
No formal insurance or gov't support available
Fires - other incentives to start
Direct mortality in nest areas and in transit
MdE poorly funded & managed
Firefighting: design & implement program for appropriate incentives, training, tools
Firefighting - Local incentives, skills, tools inadequate
Forest fires too frequent, too extensive
Direct threats
Fire mortality
Upper gov. officials fail to value environment
Manage invasive predators
High presence/density of predators
Predation by invasive mammals
Hunger, culture
Harvest by humans
Flyway hazards
Seek voluntary solutions with tower industries
Design does not take account avian risk factors
Lighted, cabled towers
Collision mortality and injury
Awareness campaign to decrease light pollution
Lighting design ignores collision risk
Light from human activity on flyways
Groundings from light attraction

At-Sea

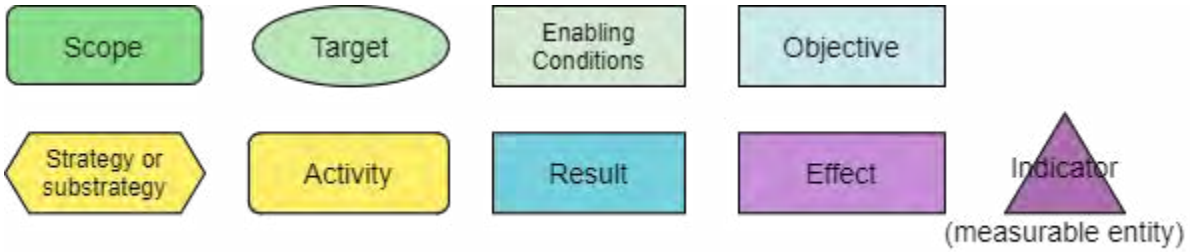

Regional-to-global scope
Sublethal, diffuse pollution
Policy makers fail to create and enforce strong regulation of consumer plastics
No alternatives for plastics
Consumers and industry release plastics into the marine environment
L
Plastic
NGOs advocate to policy makers for stronger plastic usage regulations
N
Industries release mercury into the marine environment
M
Mercury
Industries releases contaminants into foraging areas
M
Other contaminants
BCPE populations at sea, and their offspring on land
Direct mortality in nest areas (offspring)
NGOs advocate to government decision-makers for stronger regulation of contaminant releases
N
Local to regional marine energy infrastructure
Target BCPE
Reduced fitness, productivity
Activities of marine energy -- not located in or managed by USA
Lethal, discrete pollution
M
Oil spills (O&G, shipping)
NGOS advocate to policy makers for stronger regulation of and mitigation from marine energy
Direct mortality at sea and in transit (adults)
Activities of marine energy -- located in or managed by USA
NGOS advocate to policy makers for stronger regulation of and mitigation from marine energy
N
L
Attraction and/or collisions with infrastructure
BCPE not protected under US ESA
Local & regional fisheries
L
Fisheries bycatch
Fisheries located in or managed by USA
M
Depleted prey base
NGOs work with fishery management councils to better incorporate forage fish in management plans
N
Fisheries not located in or managed by USA
L
Hurricane fallout


Kate Sutherland

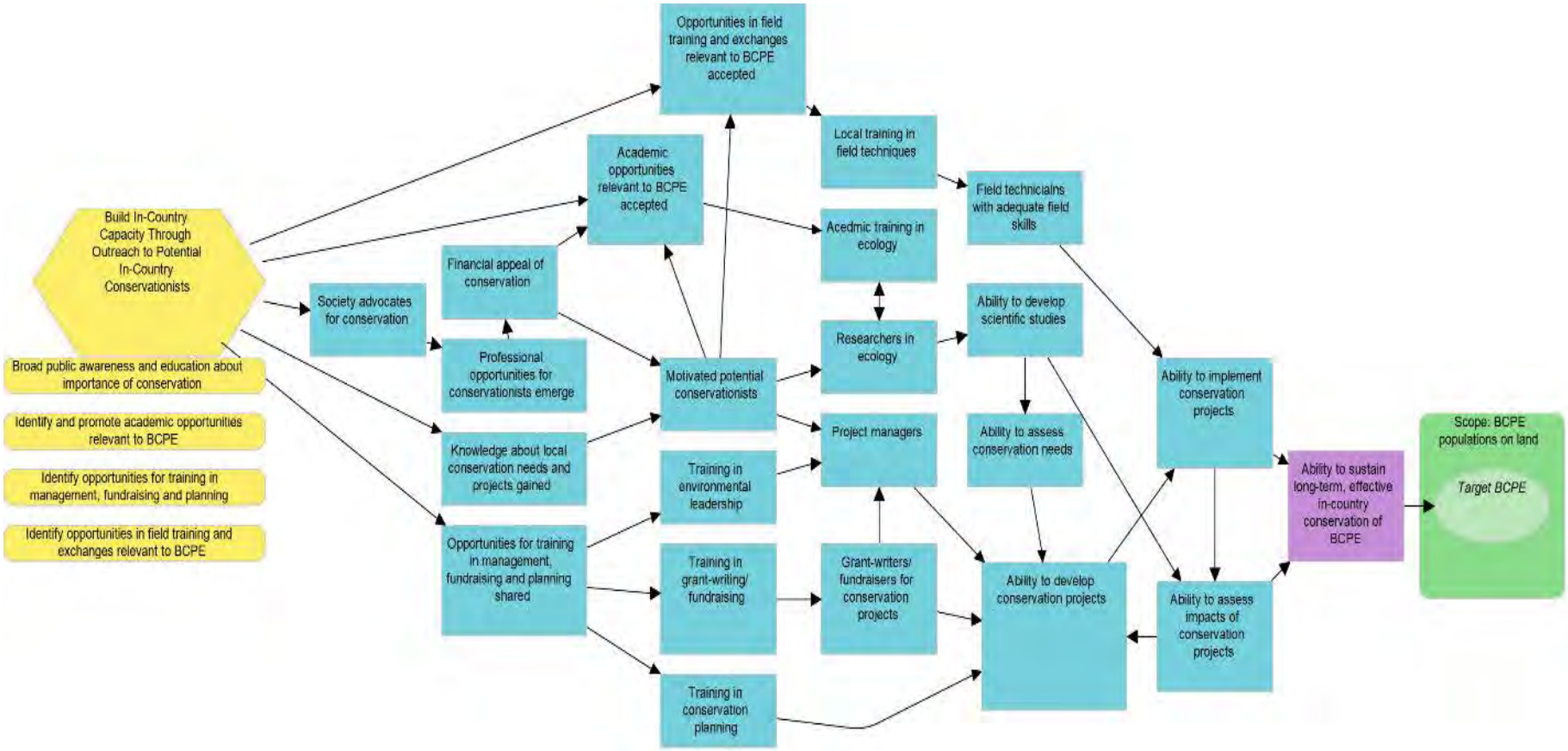
APPENDIX 5: THEORY OF CHANGE - RESULTS CHAINS

A theory of change is defined as a series of causally linked assumptions about how strategies lead to the achievement of both intermediate results and longer term conservation goals. We created a chain of results that flows from each strategy to a target.
These diagrams were greatly simplified for presentation in the main text.

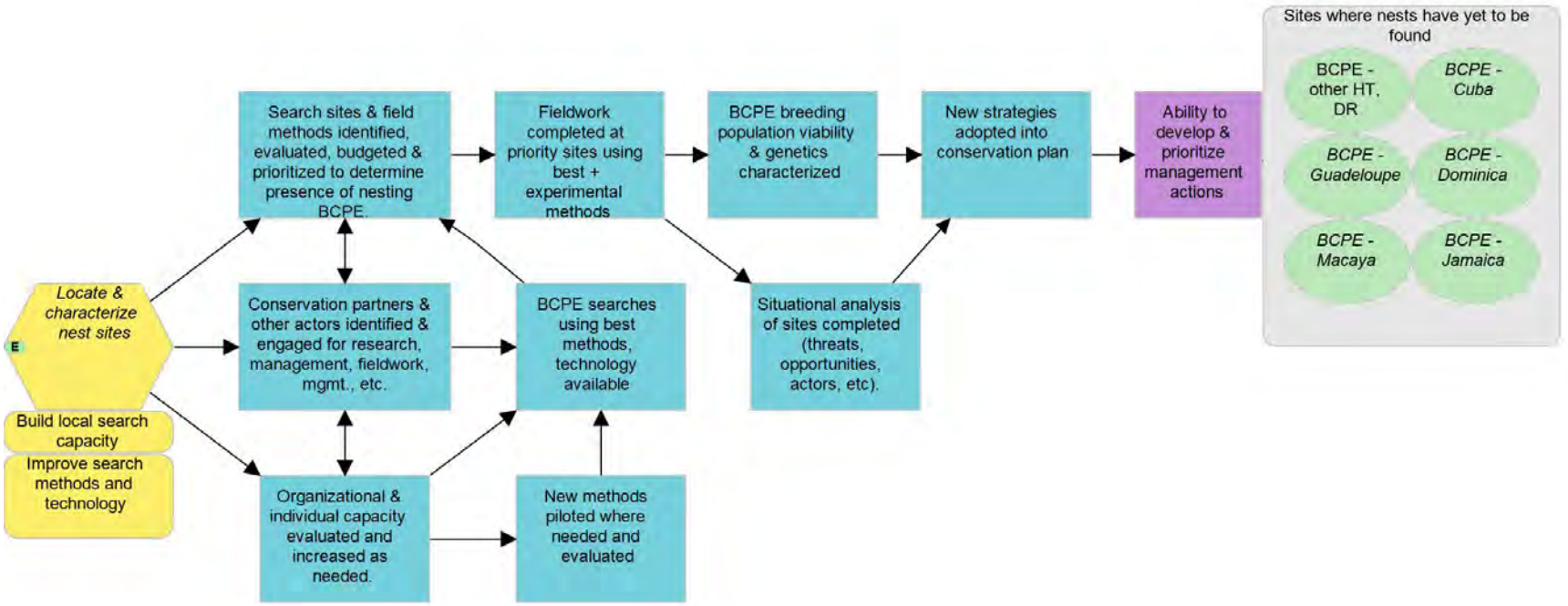
Key



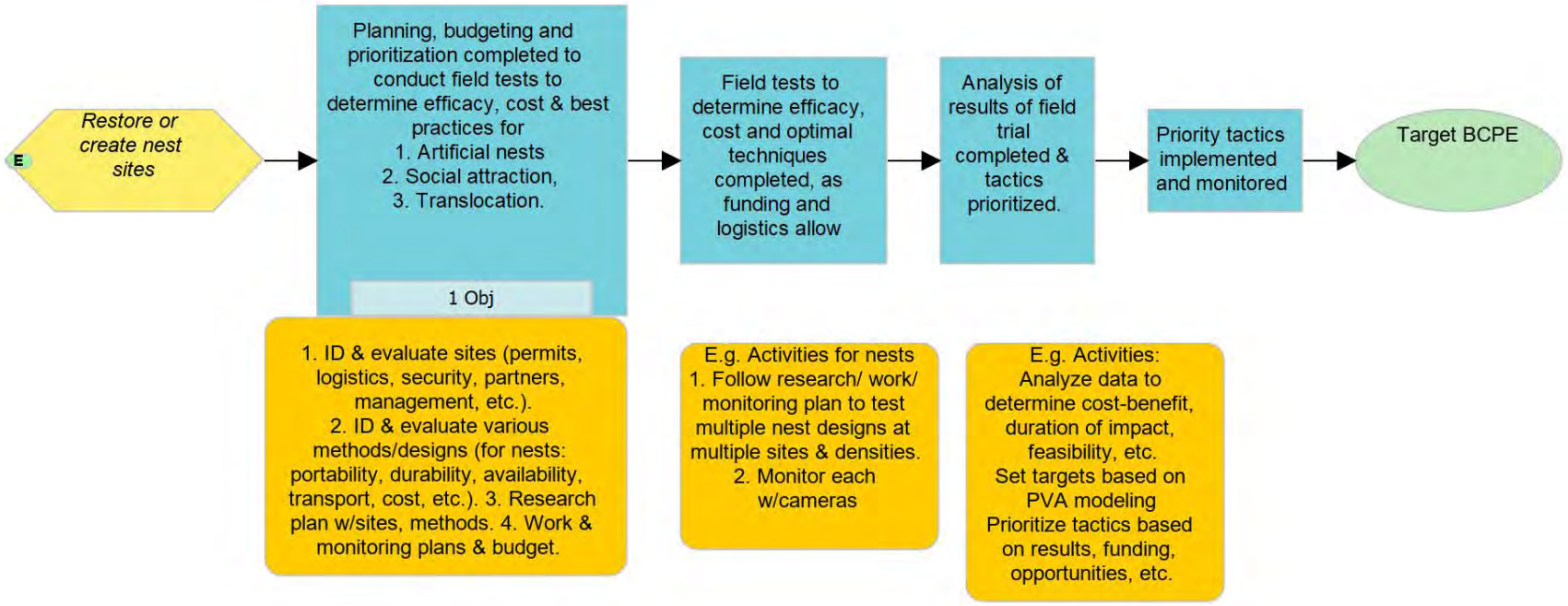
Strategy 1: Build In-Country Capacity



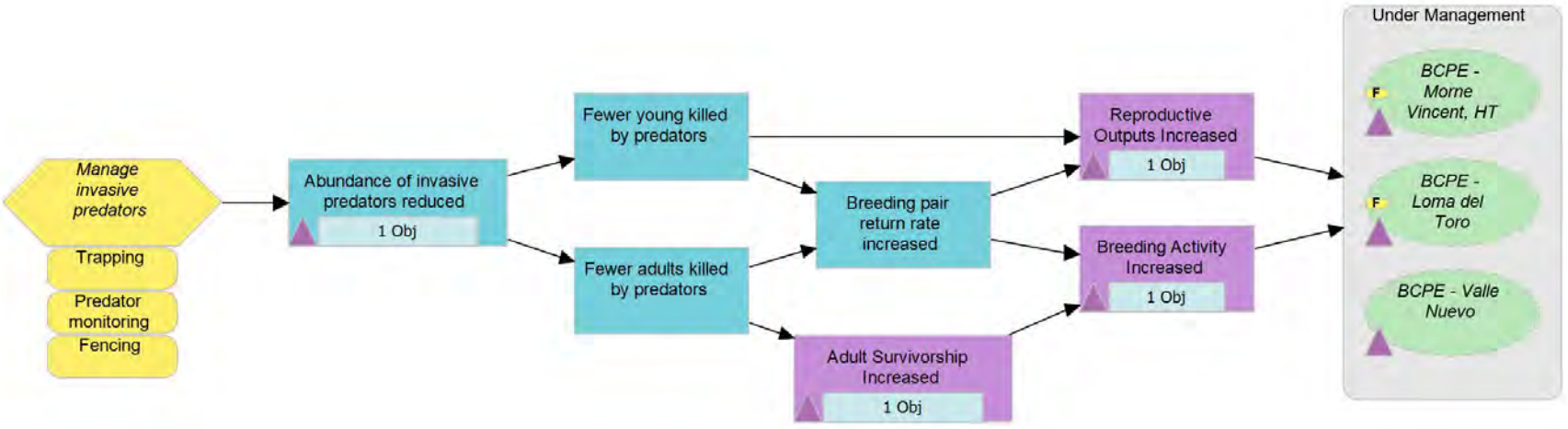
Strategy 2: Locate and Characterize Nest Sites



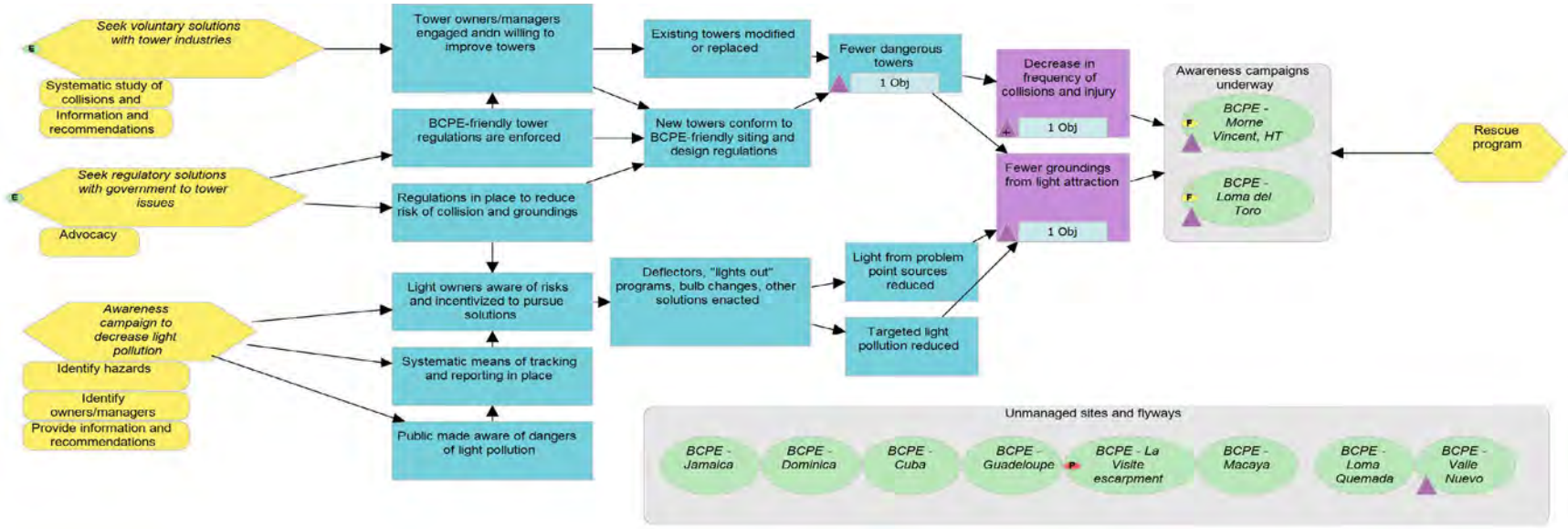
Strategy 3: Explore Restoration Methods



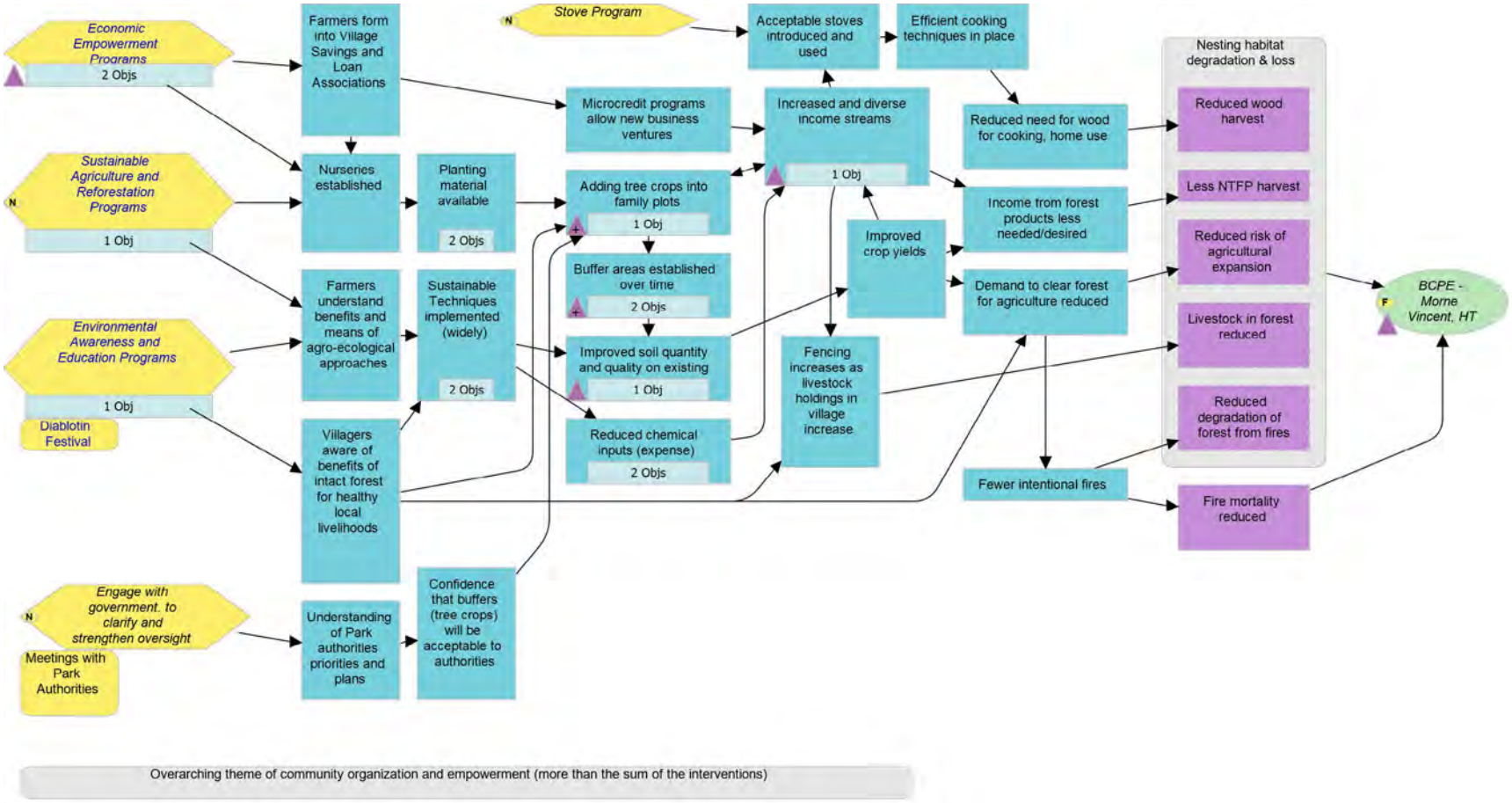
Strategy 4: Reduce Predator Pressure



Strategy 5: Reduce Collisions and Groundings

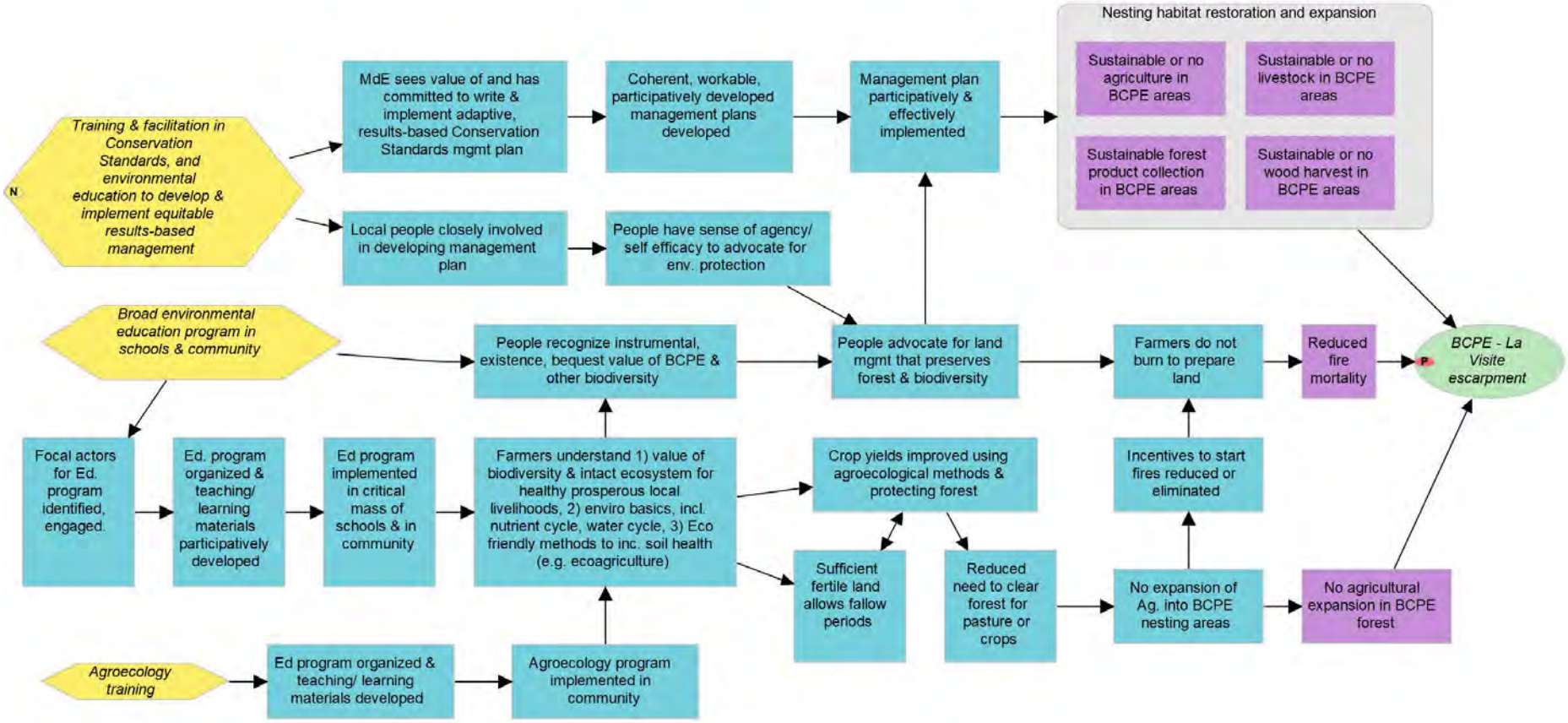


Strategy 6: Support of Community Development at Boukan Chat

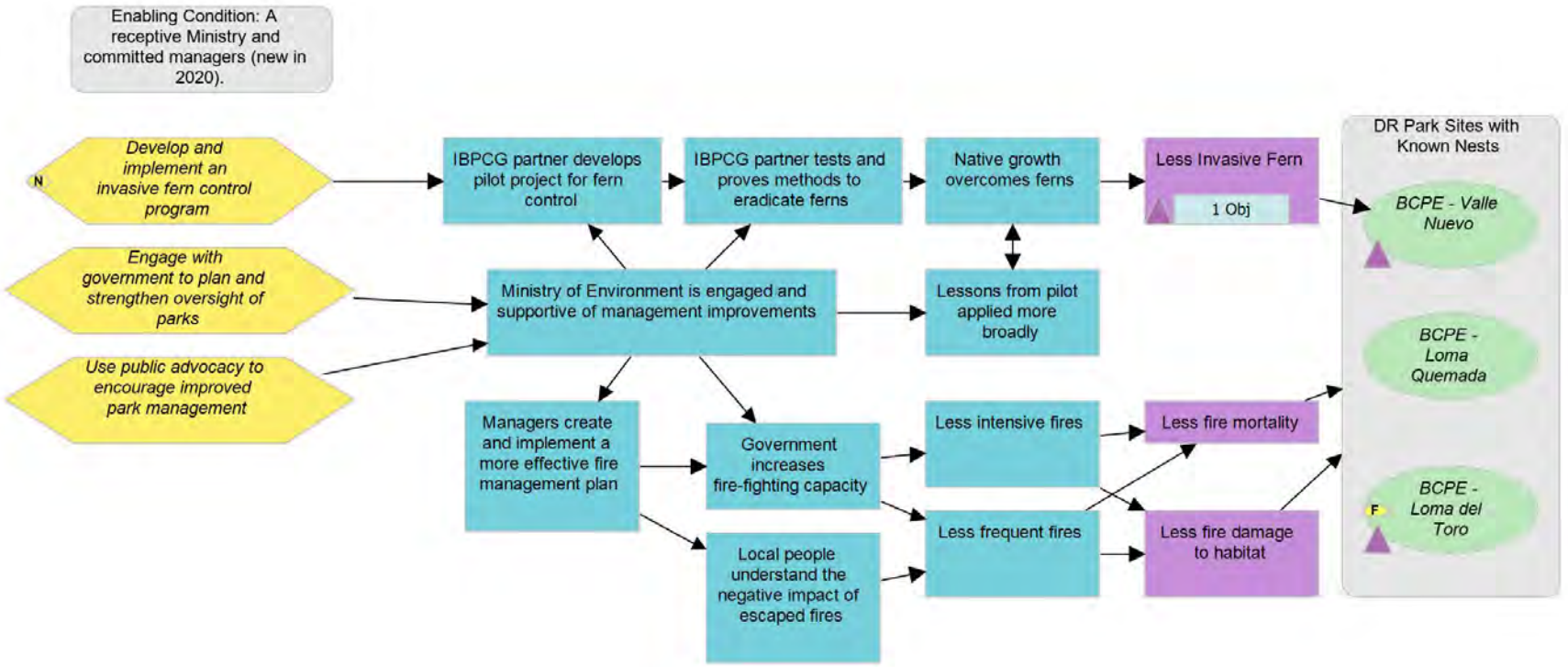


Strategy 7: Draft Strategies for La Visite

Deferred in favor of Strategy to Undertake a scoping study of socio-economic drivers of threats at La Visite



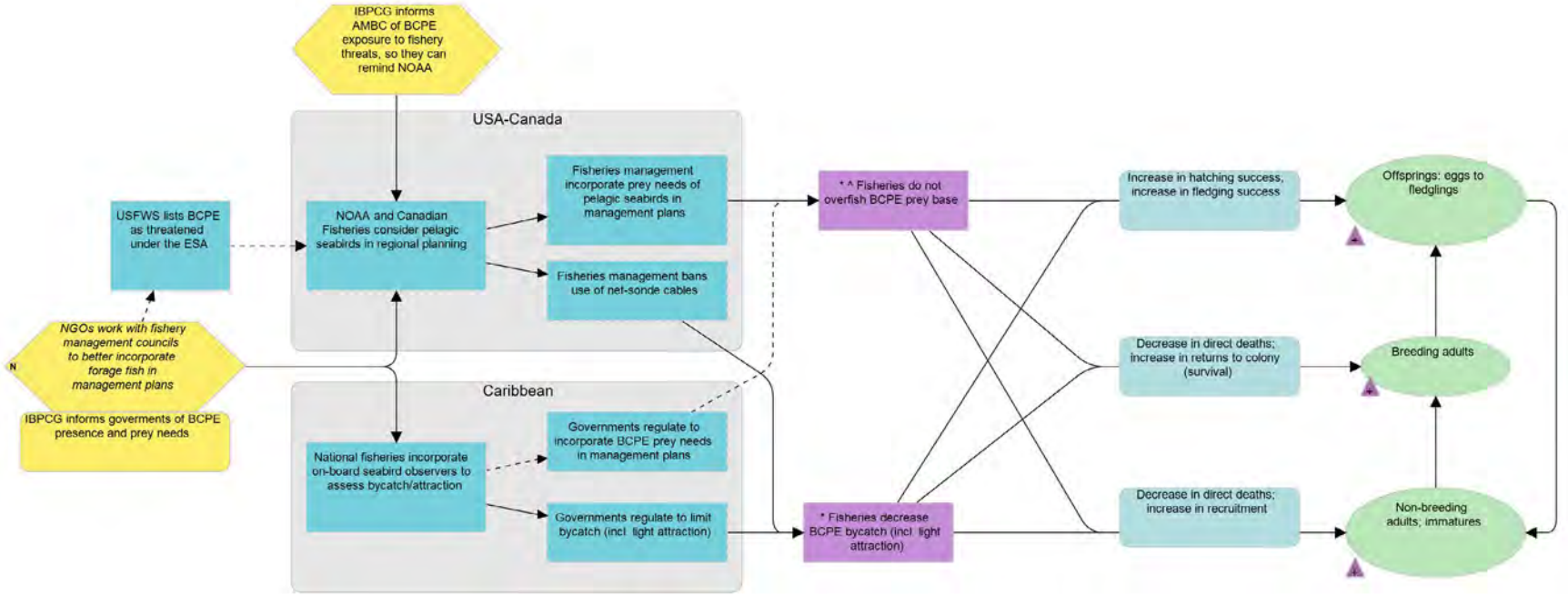
Strategy 8: Engage Dominican Republic to plan and strengthen oversight of parks



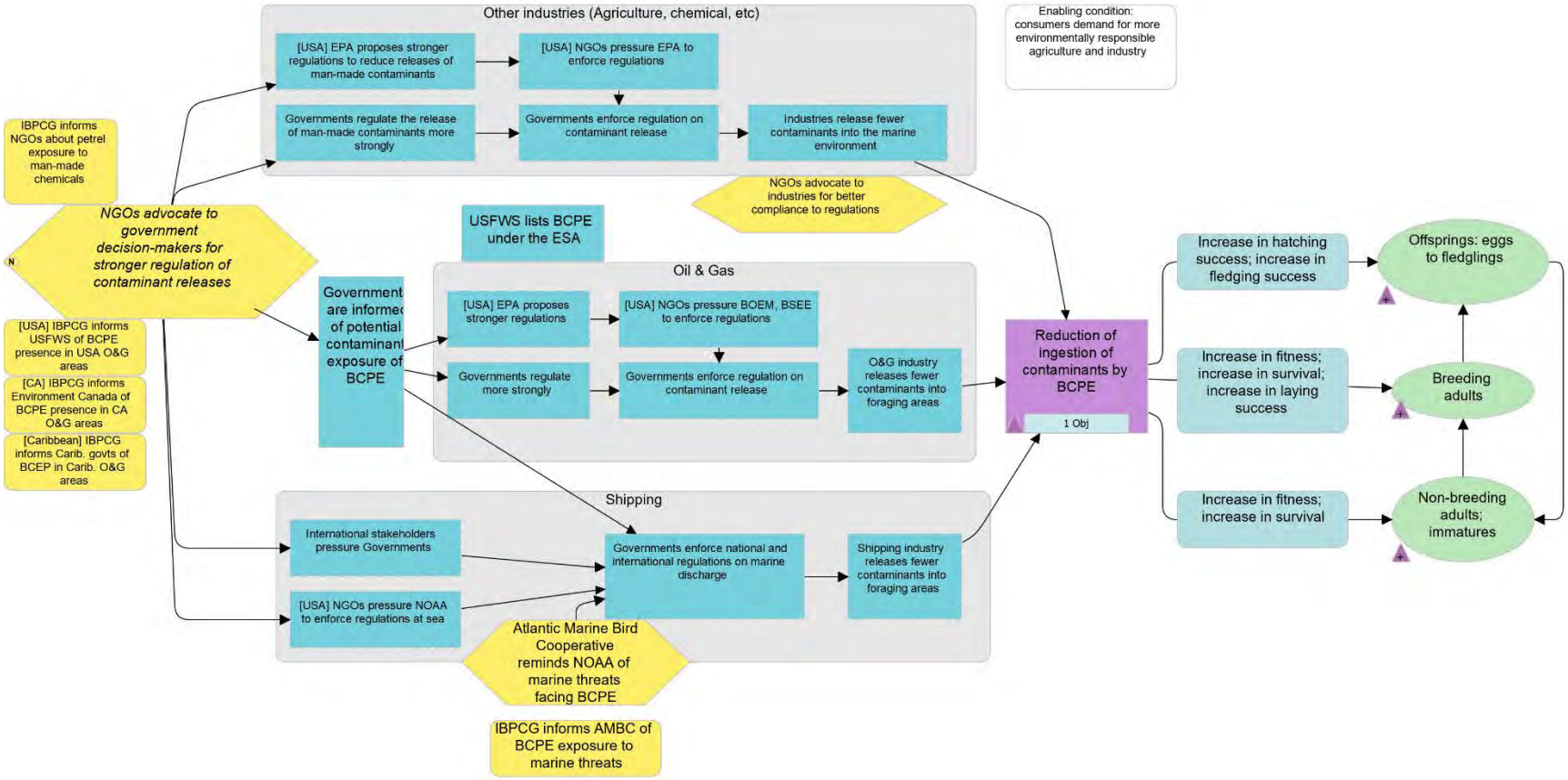
Strategy 9: Address Threats at Sea Through Advocacy

The following four diagrams were combined into one in the main text of the plan.

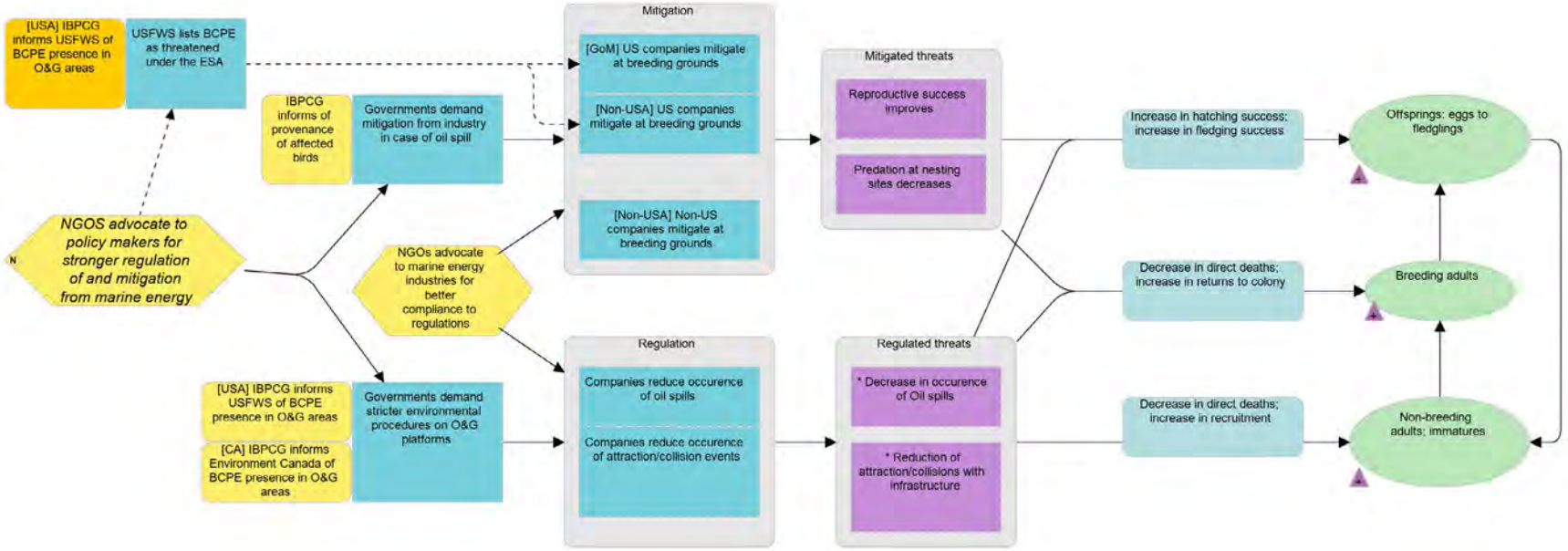
Fisheries



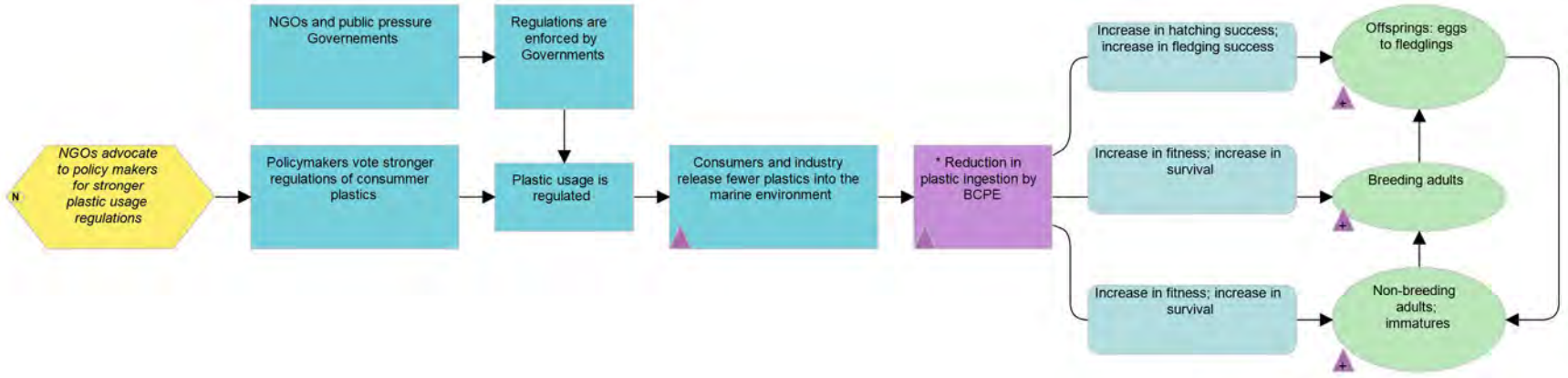
Contaminants



Marine Energy



Plastics



EPIC

APPENDIX 6: STRATEGY RATING

Method

After we had assembled the strategies that were most important and relevant, and developed theory of change results chains, we undertook a criteria-based comparison in order to further differentiate between strategies.

Each strategy was scored on a four-point scale for several criteria. Scores were averaged across team members involved in the rating, then averages combined to generate ratings of overall impact and feasibility.

Impact Criteria
To assess impact, we asked the question "If implemented, will the strategy lead to desired changes in the situation at the project site, that is, meaningfully reducing a threat or the effects of a threat?" considering probability and duration of impact.

Probability of impact, using qualitative descriptions,

4. "this will make all the difference!"
3. "yes, this will make a difference"
2. "maybe this will help"
1. "this won't help"

Estimated **duration** of change:

4. 100-plus years
3. 21 to 100 years
2. 6 to 20 years
1. 1 to 5 years

Note that duration in this case relates to change in threat conditions (e.g., reduced predation) not duration of effect on the target status (e.g., alterations in the population curve).

Feasibility Criteria
Overall feasibility was based on the ratings for four criteria.

Financial feasibility had raters considering the cost (of the full strategy, not just a single activity).

4: ≤$50,000
3. ≤$100,000
2. ≤$1,000,000
1. Millions of dollars

Technical feasibility, referring to existing know-how within the field of conservation biology.

4. Has been done here or elsewhere, seems ready to go
3. This has been done elsewhere, but many site-specific details have to be worked out
2. There are few precedents for this strategy
1. Possible only in theory, very difficult, or experimental

Organizational capacity of the planning team or collaborators was considered.

4. Capable and in place
3. Good and building
2. Prospects exist
1. Partners not established

Ethical/social feasibility, considering the range of stakeholders, and challenges or barriers to implementation.

4: "Likely to be acceptable to all stakeholders"
3. "May be some issues"
2. "A lot of issues"
1. "Strategy won't be accepted"

Table A6-1 shows the overall feasibility and impact scores for each strategy.

ID		Enabling Strategies	Impact Score	Concerns	Feasibility Score	Concerns
1		Build In-country capacity	not rated as considered essential	systemic lack of opportunities	not rated as considered essential	conservation careers not competitive
2		Locate & characterize nesting sites throughout Caribbean	4	(no concerns)	3	expense and expanse of searches
3		Explore Restoration Methods	3	information needs	3	information needs
		Strategies to Address Threats				
4		Reduce predator pressure	3	control not lasting	3	expense
5		Reduce flight hazards (collisions and groundings)				
	5a	Voluntary solutions with tower industries	3	resistance	4	
	5b	Regulatory solutions with government to tower issues	3	government turnover	4	
	5c	Awareness campaign to decrease light pollution	3	won't change behavior	3	pollution too spread out
6		Undertake strategies of community development in Boukan Chat				
	6a	Sustainable agriculture and reforestation programs	3	too slow	3	overwhelming challenges
	6b	Environmental awareness and education programs	3	won't change behavior	3	overwhelming challenges
	6c	Economic empowerment - VSLA facilitation	2	no direct effect	3	lacking expertise
	6d	Economic empowerment - livelihood training	2	unintended consequences	3	lacking expertise
	6e	Engage with government to clarify and strengthen oversight of forested areas	2	government not responsive	3	government not functional
	6f	Stove Program	2	petrel gain low	3	may not be accepted
7		Scoping study of socio-economic drivers of the threats at La Visite	Not rated. This is an enabling strategy created when we recognized that information was insufficient to focus interventions or select among community development strategies			
8		Engage with DR government to plan and strengthen park management for the benefit of petrels				
	8a	Direct Engagement	3	fire risk not manageable	3	govt connections
	8b	Public Advocacy	2	fire risk not manageable	3	too political
	8c	Habitat Restoration	3	petrel gain low	3	fire/hurricanes threaten success
9		Advocate for reduction of threats at sea				
	9a	Better incorporation of pelagic seabirds in fishery management plans	2	petrel gain low	3	fisheries resistance, international
	9b	Stronger regulation of and mitigation from marine energy	3	slow change	3	powerful sector to challenge
	9c	Better compliance of marine energy industries to regulations	3	petrel gain low	3	powerful sector to challenge
	9d	Stronger regulation of contaminant releases	2	risk too diffuse	2	no capacity to regulate
	9e	Stronger regulations of plastic usage regionally	2	too slow, damage done	3	Enforcement

Strategy Limitations/Risks

Table A6-1 presents brief notes about the concerns raised during ratings. Team members have varying levels of familiarity with the strategies and different experiences with similar strategies in other parts of the world. The rating exercise was helpful in allowing us to raise questions and air concerns within the group. The rating exercise also allowed us to express varying levels of optimism about the cause-and-effect assumptions in the theory of change models. Where there are significant information gaps, we may lack confidence in the situational analyses underpinning our strategies. Even when confident in our understanding of the situation, we may feel strategies are not realistic given the difficulty of achieving some results and the influences of other factors. Indeed, we may be concerned that strategies carry the risk of unintended consequences that may harm, rather than help the target.

Concerns about limitations and risks are detailed below by strategy.

Strategy #1: Build In-Country Capacity: Community outreach provides a necessary introduction to petrels and conservation principles to villagers; however, increased awareness, interest and concern may not change behaviors driven by overwhelming socioeconomic needs. Proposed additions to secondary or undergraduate programs may be difficult to implement since curriculums in Haiti and the Dominican Republic are more generally geared towards agriculture science and forestry than ecology or conservation. Even when made available, students may not choose to enter an ecology/conservation curriculum because of the limited prospects and salaries offered in these branches.

Strategy #2: Locate and Characterize Nest Sites: Nest searches have been ongoing on Hispaniola since the 2010s and some searches have recently occurred in Dominica and Guadeloupe. Despite the relatively limited size of the areas to cover, these efforts are thwarted by the roughness of the terrain that needs to be searched and the attendant logistical challenges. In Cuba and Jamaica, there are very large geographical expanses that need to be searched, as we lack evidence to refine searches. Other urgent, actionable conservation projects often take priority over searches for “lost” species; organizations only have so much staff and resources to deploy. Loss of species “champions” due to turnover in personnel can stall initiatives.

Strategy #3: Explore Restoration Methods: Although restoration strategies have limits of their own (which should be investigated and identified), even to begin exploring restoration methods requires knowledge of Black-capped Petrel biology and natural history. Most of this information is still unknown and will need to be gathered before accurate recommendations on restoration can be made.

Strategy #4: Reduce Predator Pressure: Introduced predators are widespread at confirmed, probable and suspected petrel nest sites and cannot be entirely eradicated. Therefore, control efforts must be established and ongoing, and at a level of effectiveness that improves the population viability of slow-reproducing Black-capped Petrel. Such “permanent control” – as well as the construction of exclosures -- requires substantial financial input not available within most of the Caribbean countries hosting Black-capped Petrels.

Strategy #5: Reduce Collisions and Groundings: Until regulations are in place, we expect resistance from some tower owners to make changes, particularly if these changes incur expenses. Turnover of government personnel after changes in administration will slow down efforts to find regulatory solutions. Awareness campaign to decrease light pollution may have little effect on behaviors, which are driven by societal needs (e.g. prevent burglary) and convictions (e.g. light represents progress; lack of light represents poverty); that is, concerns over safety and economics might override concerns over wildlife. Light pollution may also be too spread out, particularly in Haiti’s capital Port-au-Prince, which is on a radar documented flight corridor and may be on a fledging corridor from the La Visite nesting area. Finally, major electrification projects may annihilate all efforts to reduce anthropogenic light.

Strategy #6: Undertake Strategies of Community Development in Boukan Chat: As is often the case with the implementation of sustainable agriculture programs, impacts on yields and habitat may take several years to take effect, which may reduce faith in agro-ecological practices. Environmental awareness and reforestation programs may not necessarily change behaviors, which are driven by socio-economic needs. Economic empowerment may have unintended consequences such as increasing immigration and demand for land in the area, and will not have direct effects on habitat

conservation. Recent governments have not been functional enough to oversee forested areas; it is assumed that future government may equally fail to clarify and strengthen oversight of forested areas, thus resulting in the ineffective *status quo* that has been the norm for the last decades. A stove improvement program, if implemented, may only have small impact on petrel habitat, and may not be accepted by villagers. Overall, despite increasing goodwill from Boukan Chat community members, strategies of community development will face overwhelming challenges resulting from the state of poverty in which the community is found.

Strategy #7: Scoping study of socio-economic drivers of threats at La Visite: Limitations were not rated for this strategy: we created this strategy as a "pre-requisite" when we recognized that information was insufficient to focus interventions, or select among community development strategies for La Visite.

Strategy #8: Engage with Dominican Republic government to plan and strengthen oversight of parks: In the pine forests characteristic of Dominican parks where petrels nest, fires are mostly due to natural causes and fire risk may not be manageable. Moreover, engaging with the government requires connections which may be severed after each change in administration. Using public advocacy to encourage the government to manage threats to petrels may become too political and damage relationships. Finally, habitat restoration will only have limited impact on petrel habitat, and success may be threatened by hurricanes and fires.

Strategy #9: Address marine threats through advocacy: The spatiotemporal scale of the threats affecting petrels at sea limits our ability to meaningfully influence them. Fisheries: The industry may express resistance to changes in their management of stocks given economic concerns. Also, some fisheries in the Caribbean Sea are from foreign fleets outside the range of Black-capped Petrel (e.g. Japanese squid fishery in the Guajira upwelling zone of Colombia, Global Fishing Watch 2020) and not responsive to petrel advocacy. Finally, even fisheries management that fully considers the needs of seabirds won't prevent the overarching ecosystem disturbances expected from climate change.
Marine Energy: Strategies to address threats related marine energy will face a powerful industrial sector that is generally inert to environmentally-driven changes. The need for energy independence may lead Caribbean nations to favor offshore windfarms over wildlife conservation. If any regulations can be implemented, changes will occur slowly thus limiting gains for petrel populations. Pollution: Our capacity to act towards the reduction of pollution from heavy metals, chemicals or plastics is greatly limited by the facts that these pollutants are too diffuse, originate in many different countries, or challenge unwilling industrial sectors. Regulations (and the enforcement of those existing or possible regulations) are also greatly limited by the geographic scope and prevalence of these threats in society; great volumes of pollutants have already entered the environment and changes may occur too slowly to have effects on petrel populations.

Clearly the implementation of the conservation strategies recommended for Black-capped Petrels do not assure that we will have success in reaching our goals and vision. What is assured is the necessity to prepare for strategies to evolve as assumptions are tested, and new information becomes available and/or conditions change. We must recognize that the conservation of the petrel is a "long game" required decades of dedication, persistence, and that we must maintain perpetual vigilance again looming threats. We can take heart that the species without intervention has managed to hold on in unlikely places despite great challenges. The Black-capped Petrel is a species like no other in the Caribbean, and since it serves as a symbol and reflection of human quality of life, hope should spring eternal.

Integrating the Threat Level

For strategies of threat reduction (that is, interventions directed at threats or at one of the factors contributing to that threat), we developed an additional rating that integrated the level of the threat. Specifically, we identified the highest rated threat to which a given strategy applies and applied scores as follows: 4 to Very High threats, 3 to High threats, 2 to Medium Threats, and 1 to Low threats. We then multiplied the average of the overall impact and feasibility scores for each strategy times the threat rating. This allowed highlighting strategies that were not only feasible and impactful but also that could reduce the most significant threats to petrel populations.

Table A6-2 presents the threat-based strategy ratings. Note those strategies rated 12: These are considered paramount for the current conservation plan, along with enabling strategies.

Table A6-2 Threat-based Strategy Ratings							
ID		Strategies to Address Threats	Combined Impact/ Feasibility Score	Highest Threat addressed	Threat level	Threat rating	Threat-based Strategy Rating
4		Reduce predator pressure	3	Predation	Very High*	4	12
5		Reduce flight hazards (collisions and groundings)					
	5a	Voluntary solutions with tower industries	3	Towers	High	3	9
	5b	Regulatory solutions with government to tower issues	3	Towers	High	3	9
	5c	Awareness campaign to decrease light pollution	3	Light pollution	Medium	2	6
6		Undertake strategies of community development in Boukan Chat					
	6a	Sustainable agriculture and reforestation programs	3	Ag. Expansion	Very High**	4	12
	6b	Environmental awareness and education programs	3	Ag. Expansion	Very High**	4	12
	6c	Economic empowerment - VSLA facilitation	2	Ag. Expansion	Very High**	4	8
	6d	Economic empowerment - livelihood training	2	Ag. Expansion	Very High**	4	8
	6e	Engage with government to clarify and strengthen oversight of forested areas	2	Ag. Expansion	Very High**	4	8
	6f	Stove Program	2	Wood harvest	Medium	2	4
7		Scoping study of socio-economic drivers of the threats at La Visite	not-rated				
8		Engage with DR government to plan and strengthen park management for the benefit of petrels					
	8a	Direct Engagement	3	Predation	High	3	9
	8b	Public Advocacy	2	Predation	High	3	6
	8c	Habitat Restoration	3	Invasive ferns	Medium	2	6
9		Advocate for reduction of threats at Sea					
	9a	Better incorporation of pelagic seabirds in fishery management plans	2	Red. Prey Avail.	Medium	2.5	5
	9b	Stronger regulation of and mitigation from marine energy	3	Oil spills	Medium	2	6
	9c	Better compliance of marine energy industries to regulations	3	Oil spills	Medium	2	6
	9d	Stronger regulation of contaminant releases	2	Contaminants	Medium	2	4
	9e	Stronger regulations of plastic usage regionally	2	Plastics	High	2	4

* Predation rated “high” at every site, so a roll-up across sites produces a range-wide “very high” threat rating.
** In the absence of current interventions

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APPENDIX 7: INFORMATION NEEDS

There are many unknowns concerning the BCPE. Here, we summarize those that are most critical to rating threats, assessing status (KEAs), and developing and implementing strategies.

Table A7-1: Research needs to understand the impact of threats

Code	Threat	Nature of Research	Notes on implementation
RT1	**Very High Threat:** Agriculture Expansion	Degree of Impact*; Location, Speed; Socio-economic drivers.	Ground surveys and monitoring; Regular re-evaluations of habitat availability, using satellite data. Socio-economic scoping study at La Visite.
RT2	**Very High Threat:** Predation by Introduced Species	Degree of Impact*; Location; Seasonality of predation events.	Grupo Jaragua and EPIC to continue monitoring active petrel nests with camera traps, confirming or ruling out negative effects of introduced predators.
RT3	**High Threat:** Pigs destroy burrows	Degree of Impact*; Location; Seasonality of events.	Grupo Jaragua to continue monitoring active petrel nests with camera traps, confirming or ruling out negative effects of introduced predators.
RT4	**High Threat:** Collision mortality and injury	Degree of Impact*; Nature (e.g. telecommunication towers, terrestrial wind turbines); Location; Seasonality of collisions; Frequency of occurrence; Ownership of infrastructures.	Grupo Jaragua and EPIC to monitor frequency of collisions with ARUs mounted on tower cables. Assemble baseline data to assess effects of strategy.
RT5	**High Threat:** Fire mortality	Degree of Impact*; Location; Seasonality of mortality events due to fires; Frequency of occurrence.	Ground surveys and monitoring. Potential to locate harmful fires using remote detection.
RT6	**Medium Threat:** Groundings from light attraction	Degree of Impact*; Nature (e.g. types, sources of lights causing attractions); Location; Seasonality; Frequency of occurrence; Ownership of light sources.	Ground surveys and monitoring; Awareness campaign.
RT7	**Medium Threat:** Wood harvest	Degree of Impact*; Socioeconomic drivers.	Ground survey; Socio-economic scoping study at La Visite.
RT8	**Medium Threat:** Oil spills (O&G, shipping)	Degree of Impact*; Nature (e.g. accidental spill at platform, wreckage, illegal bilge dumping); Location and Seasonality of exposure (e.g. breeding vs nonbreeding); Frequency of occurrence; Governance (e.g. regulatory country).	Spatial data (tracking and ship-based) to assess exposure. Surveys as part of damage assessment.
RT9	**Medium Threat:** Mercury and other contaminants	Degree of Impact*; Location and Seasonality of exposure (e.g. breeding vs. non-breeding). Impacts on survival and reproduction.	Spatial data (tracking and ship-based) to assess exposure. Diet study to assess pathway. Impact and source of contamination through tissue analysis.
RT10	**Medium Threat:** Livestock grazing	Degree of Impact*; Location; Socioeconomic drivers.	Ground survey; Socio-economic scoping study at La Visite.
RT11	**Medium Threat:** Reduced prey availability	Degree of Impact*; Location of exposure; Seasonality (e.g. breeding vs. non-breeding); Drivers of depletion (e.g. impact of climate change on prey availability). Impacts on survival and reproduction.	Diet study; spatial data (tracking and ship-based) to assess exposure to changes.
RT12	**High Threat:** Plastics	Degree of Impact*; Location and Seasonality of exposure (e.g. breeding vs. non-breeding). Impact on survival and reproduction.	Dedicated study to assess impact and source of contamination, in individuals found dead.
RT13	**Low Threat:** Non-timber Forest Product collection	Degree of Impact*; Nature; Location; Socioeconomic drivers.	Ground survey; Socio-economic scoping study at La Visite.
RT14	**Low Threat:** Invasive fern spread	Degree of Impact*; Location of highest impact.	Grupo Jaragua to monitor through ground survey.

RT15	**Low Threat:** Hurricane fallout	Degree of Impact*; Population-level impact (short- and long-term); Frequency of occurrence; Effects of climate change.	Statistical modeling; Population viability analysis to estimate population-level impact. Citizen science for surveys of grounded birds (eBird).
RT16	**Low Threat:** Fisheries bycatch (incl. lights)	Degree of Impact*; Nature (e.g. type of fishery, type of exposure); Location and seasonality of exposure (e.g. breeding vs nonbreeding); Economics and governance (e.g. country of origin of fleet, regulatory country).	Spatial data (tracking and ship-based) to assess exposure. Diet study to identify the nature of exposure.
RT17	**Low Threat:** Fire damage (habitat)	Degree of Impact*; Nature (natural vs anthropic); Location and Seasonality. Impact on current and suitable habitat.	Ground surveys and monitoring. Potential to locate harmful fires using remote detection and habitat modeling.
RT18	**Medium Threat:** Attraction and/ or collisions with marine infrastructure	Degree of Impact*; Nature (e.g. type of infrastructure); Location and seasonality of exposure (e.g. breeding vs nonbreeding); Frequency of occurrence; Governance (e.g. regulatory country).	Spatial data (tracking and ship-based) to assess exposure. Surveys (e.g. on offshore platforms).
RT19	**All marine threats****	Revision of marine range and threats at sea; Movements, foraging habitat characteristics; Location and seasonality of exposure.	Spatial data (tracking and ship-based) to assess risk overlap. Assess use and distribution in Gulf of Mexico, eastern Caribbean Sea and tropical Atlantic.

* Degree of impact = change in vital rates; extent of population affected.

**See also Table 4 in the main text

Table A7-2: Monitoring needs to assess status and trends of Black-capped Petrel populations

(repeat of Table 5 in main text)

Code	KEA	Indicator	Target	Monitoring need
M1	Flyway Population Index	Number of radar targets/effort at selected flyways	All known, probable or suspected nest sites	Refine sampling and analytic protocols; specifically select drainages/flyways and decide frequency and timing that give power to detect trends. Look to Marbled Murrelet monitoring as an example.
M2	Breeding Vocal Activity	Call rate (calls per minute, during peak activity period) at nesting sites	All known, probable or suspected nest sites	Develop sampling and analytic protocols, considering density and range; intensify ARU deployment for baseline
M3	Colony Occupancy	Active nests/Total nests at each nesting site	All known nest sites	Establish study zones (consistent across years) within sites; develop a protocol that is consistent across sites, including dates or period for assessing activity, accepted proofs of activity.
M4	Reproductive Success	Fledged nests/Active nests at each nesting site	All known nest sites	Establish study zones (consistent across years) within sites; develop a protocol that is consistent across sites, including dates or period for assessing fledging, accepted proofs of fledging; tools to standardize data.
M5	Breeder Return Rate	Number of individual breeders that return in following year (%)	All known nest sites	Develop a mark-recapture program.
M6	Habitat Intactness	% of Minimum Suitable Breeding Habitat Cleared	Known nest sites subject to clearing	Establish minimum suitable polygons consistent across years.
M7	Breeding Distribution	Number of confirmed nesting sites	Global population	Continue searches in probable and suspected areas.

Table A7-3: Research needs to develop Key Ecological Attribute Indicators, and collect information on basic natural history

Code	Indicator or Need	Nature of Research	How is the question that will be answered relevant to assessment or strategy?
RK1	Desired KEA: Population size	Assess if current observations at sea can be used to provide an index of population size, with the objective to update Simons et al. (2013) population estimate.	Population size is key to estimate population viability, and address threats.
RK2	Desired KEA: Adult survival	Develop a mark-recapture program to determine annual adult return rate (proximate) and survival (ultimate). Assess differences between sites.	Adult Survival is key to estimate population viability.
RK3	Desired KEA: Meta-populations	Assess the degree of genetic variability in the global population; assess subspecies status between known phenotypes.	Differentiation between populations will have to be considered ahead of certain management activities (e.g., attraction, translocation, etc.).
RK4	Breeding biology	Estimate basic reproductive indicators, including (but not limited to) nest-site fidelity, age at first reproduction, nest attendance patterns. Estimate survival between and during life stages.	Information needed to address threats, implement and evaluate strategies, and as prerequisite for further research.
RK5	Spatial and movement ecology	Locate terrestrial flight corridors. Assess marine use, including (but not limited to) fidelity and connectivity to foraging locations; post-fledging dispersal; use of Gulf of Mexico, eastern Caribbean Sea, and tropical Atlantic.	
RK6	Foraging ecology	Assess diet across annual cycle.	

Table A7-4: Information needs for Enabling Strategies that create new opportunities

Code	Strategy	Nature of Research	Relevance
RES1	**Strategy ES1:** Build in-country capacity	Social science on effective institutional strengthening for relevant Caribbbean nations, as well as the factors influencing the development of natural resource conservation ethic in their societies.	Each country has unique factors that influence capacity, so there is a need to work with local social scientists and ethnologists.
RES2	**Strategy ES2:** Locate and characterize nest sites	This strategy consists of research. Confirmation and detailed information on nesting locations.	Tracking of birds captured at sea will assist discovery of new breeding areas.
RES3	**Strategy ES3:** Explore Restoration Methods	We anticipate that a translocation feasibility study will call for research on growth and feeding rates; diet composition, quantity, and quality. Additionally, the suitability of the restoration site as breeding habitat is paramount and much is unknown about microhabitat needs. Since current populations of Black-capped Petrels represent relicts of their former distribution, it is also not clear how closely historic populations were tied to current habitats (Simons et al. 2013).	Information needed to evaluate feasibility of strategies

Table A7-5: Information needs for Strategies to reduce threats

Code	Strategy	Nature of Research	Notes on implementation
RS1	**Strategy 4:** Reduce Predator Pressure	Determine the impacts of predation on Black-capped Petrel, particularly on adult survival, and the techniques that will best control predation (e.g., effective traps, deployment pattern, etc.).	Grupo Jaragua and EPIC to continue monitoring effects of introduced predators, and test trapping options. Look at experiences in Hawaiian archipelago for examples and lessons learned.
RS2	**Strategy 5:** Reduce collisions and groundings	Fill gaps in our knowledge of the occurrence and impact of collisions and groundings, especially on adults. Flyways to and from colonies, and fledging corridors also need to be located. Some recommendations to tower owners may need to be piloted on-site (e.g., efficacy of diverters or other devices deployed to mark guy wires).	Look at experiences around the world for emerging tools and lessons learned.
RS3	**Strategy 6a:** Sustainable Agriculture and Reforestation Programs	Social research to determine if interventions affect attitudes and behavior over the long term. Also, precise mapping of land use around petrel habitat (extent of cleared areas converted to trees, extent of buffer to habitat/primary forest patch) will indicate if agriculture expansion actually stopped or reversed.	Test logic and assumptions underlying strategies at Morne Vincent.
RS4	**Strategy 7:** Scoping study of socio-economic drivers of threats at La Visite	This strategy consists of research. We need a more in-depth analysis of the situation at La Visite, Haiti, the largest known colony of petrels, in order to move forward on planning and implementing conservation actions to reduce threats to habitat.	Draw on expertise of social scientists operating in the region.
RS5	**Strategy 8c:** Habitat restoration projects	Test feasibility and efficacy of protocols developed to control invasive ferns in the Dominican Republic. Native species best adapted to recolonize restored habitat.	Grupo Jaragua or other partner needs to locate best areas for testing protocol, assess availability of restoration species in nurseries.
RS6	**Strategy 9:** Address threats at sea through advocacy	Continue to study the at-sea movements and overlap with risk factors using tracking information, in particular in the Eastern Caribbean Sea and tropical Atlantic.	Needed to better assess marine threats, and to give focus to our advocacy.

APPENDIX 8: NATIONAL AND INTERNATIONAL INSTRUMENTS

There is a variety of instruments which nominally protect the Black-capped Petrel or its habitat; there are others that could yield conservation benefits if the species was listed. Included in the tables below are nations with confirmed, probable, or suspected nest sites and/or nations for which the overlap of Exclusive Economic Zone (EEZ) and overall range of the Black-capped Petrel is greater than 2%. (See Appendix 2: Site Profiles).

Table 8A-1: Legal Status of Black-capped Petrels (BCPE) According to National Instruments*

Nation	Legal Instrument and Status	BCPE or BCPE Locations Covered?	Actual degree of protection/ Enforcement
Nations with confirmed, probable or suspected breeding sites			
Haiti	Decree on hunting and wild bird protection (Moniteur number 26, 1 April 1971), decree on national natural parks (Moniteur number 41, 23 June 1983)	Yes, as a wild bird, and to the degree habitat is in protected areas	Poor
Dominican Republic	Environment and Natural Resources General Law (No.64- 00) and sector- specific laws such as the Law of Protected Areas (No.202-04)	Yes, to the degree habitat is in protected areas	Fair
Dominica	Forestry and Wildlife Act [Ch. 60:02, 1976], National Parks and Protected Areas Act [Ch. 42:02, 1975], and associated regulations	Yes, as a wild bird, and to the degree habitat is in protected areas	Good
Guadeloupe	Nature Protection Law 1976	Yes, to the degree habitat is in protected areas	Fair
Jamaica	1945 Wildlife Protection Act, enhanced by many regulations, 1991 Natural Resources Conservation Authority Act	Yes, as a wild bird and the degree habitat is in protected areas Yes, as a wild bird	Fair
Cuba	La Ley 81 (1997) del Medio Ambiente and other laws, decrees, and resolutions that protect habitat.	Yes, to the degree habitat is in the protected areas	Good
Additional nations with significant overlap (>2%) of Economic Exclusion Zone (EEZ) and overall marine range			
U.S.	Migratory Bird Treaty Act U.S. Endangered Species Act Magnuson-Stevens Fishery Conservation and Management Act	Yes, as a wild bird TBD: Proposed Threatened Yes, as subject to bycatch	Fair N/A Poor
Colombia[a]	No legal status	N/A	N/A
Venezuela	Under La Ley de Gestión de la Diversidad Biológica (2008), all wild animals are protected, native or not	Yes, as a wild bird	N/A

*Information by and large drawn from the Caribbean IBA book (Wege and Anadon-Irizarry 2011). Should be confirmed by reviewers. Wege, D. and Anadon-Irizarry, V. 2011. Important Bird Areas in the Caribbean: Key Sites for Conservation. Birdlife International. 348 pages.

[a] In *Prioridad de Investigation PI2 (alta, of PI1-Urgente, PI2-Alta)*; in *Prioridad de Conservation PC2 (alta, of PC1-Urgente, PC2-Alta, PC3-Mediana)* Arzuza, D.E., Moreno, M.I., & Salaman, P. (2008) Conservación de las aves acuáticas en Colombia. Conservación Colombiana 6:1-72. Junio 2008.

Table A8-2: International Instruments that Include or Could Include Black-capped Petrel (BCPE)

Instrument	BCPE or BCPE Locations Designated?	Haiti	DR	Cuba	Dominica	Guad.	Jamaica	US	Colombia	Venezuela
Declaración de Santo Domingo: Corredor Biológico del Caribe (Caribbean Biological Corridor)	Yes[a]	◈	◈	◈			(observer)	◈ Puerto Rico		
Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (SPAW Protocol to Cartagena Convention)	Yes		◈	◈		◈		◈	◈	◈
Convention on International Trade in Endangered Species (CITES)	No		◈	◈	◈	◈	◈	◈	◈	◈
Agreement on the Conservation of Albatrosses and Petrels (ACAP)	No									
Convention on Migratory Species (CMS)	No			◈		◈	◈			
Convention on Biological Diversity (CBD)	No	◈	◈	◈	◈	◈	◈	◈	◈	◈
World Heritage Convention (WHC)	Two: Dominica, Jamaica	◈	◈	◈	◈ Morne Trois Pitons	◈	◈ Blue and John Crow Mountains	◈	◈	◈

◈Signed and Ratified/Accepted
◈Signed, not Ratified
Table generated from the following websites, accessed 2/11/2020:
http://cbcbio.org/ ALSO UNEP factsheet
https://www.unenvironment.org/cep/what-we-do/specially-protected-areas-and-wildlife-spaw
https://cites.org/eng/disc/parties/index.php
https://www.acap.aq/resources/parties-to-acap
https://www.cms.int/en/parties-range-states
https://www.cbd.int/countries/
https://whc.unesco.org/en/statesparties/
https://whc.unesco.org/en/convention/
https://www.cbd.int/countries/
https://www.cbd.int/information/parties.shtml