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	**Low 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 modelling; 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 modelling.
RT18	**Low 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 A7-4: 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	Each country has unique factors that influence capacity
RES2	**Strategy ES2:** Locate and characterize nest sites	Tracking of birds captured at sea to assist discovery of new breeding areas, with a focus on breeding status and in different foraging areas (e.g., near Dominica, Cuba, Guadeloupe).	Detailed information on nesting location.
RES3	**Strategy ES3:** Restore or create nest sites – restoration and attraction	Suitability of potential sites, accepted levels of threats; artificial nest design, efficacy, cost, ease of implementation; type, timing, characteristics of social attraction	Information needed to evaluate feasibility of strategies
RES4	**Strategy ES3:** Restore or create nest sites -- translocation	Growth rates; feeding rates, diet composition, quantity, and quality; egg transferability (for future returning breeders); socio-economic and political feasibility.	

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

Code	Strategy	Nature of Research	Notes on implementation
RS1	**Strategy 4:** Reduce Predator Pressure	Effective trapping protocol (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	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	Test logic and assumptions underlying strategy (Morne Vincent).	Social research to determine if interventions affect attitudes and behavior over the long term
RS4	**Strategy 7:** Scoping study of socio-economic drivers of threats at La Visite	This strategy consists of research.	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.