

Grenada Dove

Conservation Action Plan

2026 – 2035





In-person participants of the Grenada Dove Conservation Action Planning Workshop, Day 2, 9 October 2025 (Photograph by Reginald Joseph)

Citation:

Buckmire, Z., J. Daniel, and P. Rosa (Editors). 2026. Grenada Dove Conservation Action Plan 2026–2035. Gaea Conservation Network, St. George's, Grenada.

Executive Summary

The Grenada Dove (*Leptotila wellsi*) is one of the rarest doves in the world, restricted to the island of Grenada. With an estimated population of 160 individuals (range 107–229) and a range fragmented into two core habitats, the dove is listed as Critically Endangered on the IUCN Red List. Direct threats to the dove include habitat destruction, degradation and fragmentation, invasive predators, and small population effects; while indirect and potential threats include climate change and severe weather, water scarcity, agriculture and livestock, pollution, disease, and policy and institutional limitations. The effects of these various threats are synergistic, and a multipronged approach with the collaboration of stakeholders across society is necessary.

This Conservation Action Plan 2026–2035 outlines the actions and resources necessary to safeguard the species and its dry forest habitat. It is informed by decades of research and developed over months of organising and two days of facilitated stakeholder workshops. The overarching goal agreed upon by stakeholders in this process is two-fold:

By 2035, the Grenada Dove has an increasing population across its range, supported by habitat protection, restoration, and invasive predator control. Its conservation is strengthened by research, education, and public engagement, and all Grenadians know and value the dove as a symbol of national pride.

This goal is supported by 7 intersecting objectives tackling various conservation gaps and needs.

1. By 2030, 50% of the Grenada Dove's critical dry forest habitat is protected, restored, and effectively managed with strengthened enforcement.
2. By 2033, there is a robust and adaptive invasive predator control and nuisance species management program within the critical Grenada Dove habitat to reduce predation and disturbance pressure.
3. By 2029, there is a robust, sustained research and monitoring program for the Grenada Dove that provides knowledge of population trends, ecology, and habitat to inform management.
4. By 2030, the Forestry and National Parks Department and key public, private, and civil society organisations regularly collaborate to secure the resources required to conserve the Grenada Dove and its habitat.
5. By 2028, there is a sustained public education and engagement program with targeted outreach for the Grenada Dove, which is valued as a symbol of national heritage and pride with strong support for its conservation.
6. By 2030, legislation is strengthened and enforced by relevant agencies, ensuring the long-term conservation of the Grenada Dove and the protection of its habitat.
7. By 2032, the Grenada Dove and its habitat are conserved through small-scale, low-disturbance, regenerative, community-led tourism initiatives that support local livelihoods and are strengthened by collaboration among communities, public agencies, and private sector partners.

The dove is part of our biodiversity, part of our heritage, and uniquely Grenadian. It needs our collective and concerted action now to prevent its extinction, “because it is unique – only one of its kind. If we lose it, it is gone [forever].”

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Acknowledgments

This 2026 Conservation Action Plan for the Grenada Dove builds upon decades of work by local and international researchers and conservation practitioners. It provides a timely update to the two Grenada Dove Recovery and Action Plans (1998, 2008), led by Bonnie Rusk of the former Grenada Dove Conservation Programme.

On 8–9 October 2025, more than 70 stakeholders gathered in person and online to chart the way forward for the dove. They represented government, NGOs, academia, and community groups, ensuring a holistic approach informed by multiple perspectives (see table of Contributors for full list of attendees). The workshop was organised by the Gaea Conservation Network and hosted by the Department of Biology, Ecology and Conservation and Fellows in Caribbean Academic Leadership at St. George's University. The American Bird Conservancy provided primary funding under grant agreement #Belton-2501 with additional support from BirdsCaribbean. Facilitation of the conservation planning workshop was led by Justin Springer (Re:wild), Zoya Buckmire (Grenada Fund for Conservation), Dr. Lisa Sorenson (BirdsCaribbean), and Dr. Jody Daniel (Gaea Conservation Network).

The Ministry of Agriculture & Lands, Forestry, Marine Resources & Cooperatives and the Ministry of Climate Resilience, the Environment & Renewable Energy were represented on the stakeholder committee that organised the workshop in the preceding months. The workshop was opened by Wayne Smart, Executive Director of Gaea Conservation Network, who welcomed participants and introduced remarks from the Honourable Andy Williams, Member of Parliament for St. George South and Minister of Mobilisation, Implementation and Transformation; Mrs Aria St. Louis, Head of the Environment Division at the Ministry of Climate Resilience, the Environment & Renewable Energy; Dr. Mark T. Clunes, Interim Provost of St. George's University; Dr. Cristofre Martin, Chair of the Department of Biology, Ecology and Conservation at St. George's University; Dr. Patricia Rosa, Deputy Chair of the Department of Biology, Ecology and Conservation at St. George's University; and Amy Upgren, Director of International Programs at the American Bird Conservancy. We sincerely thank the Government of Grenada for its support in this endeavour.

The development of this Conservation Action Plan was driven and supported by the following organizations.



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Acronyms & Abbreviations

BEC	Biology, Ecology and Conservation Department at the St. George's University
CAP	Conservation Action Plan
CYEN	Caribbean Youth Environment Network
FCAL	Fellows in Caribbean Academic Leadership
FNPD	Forestry and National Parks Department
GCN	Gaea Conservation Network
GDBS	Grenada Bureau of Standards
GFC	Grenada Fund for Conservation Inc.
GSDTF	Grenada Sustainable Development Trust Fund
GSWMA	Grenada Solid Waste Management Authority
GTA	Grenada Tourism Authority
IUCN	International Union for the Conservation of Nature
NAWASA	National Water and Sewage Authority
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental Organisation
OECS	Organization of Eastern Caribbean States
PDA	Planning and Development Authority
SGU	St. George's University
TAMCC	T.A. Marryshow Community College
VCU	Vector Control Unit, Ministry of Health
WINDREF	Windward Islands Research & Education Foundation
WRMU	Water Resources Management Unit

Introduction

This Conservation Action Plan provides a ten-year strategy (2026–2035) for the recovery of the Grenada Dove (*Leptotila wellsi*), Grenada's national bird and one of the world's most endangered avian species. This section describes the species' ecology, status, and distribution; summarizes the threats it faces and recent population viability analyses; outlines the history of conservation efforts to date; and reviews the relevant policies and legal framework. The plan draws on the best available science and stakeholder input gathered during a Conservation Action Planning workshop held in October 2025.

Purpose

The Grenada Dove (*Leptotila wellsi*) is one of the rarest birds in the world, restricted only to the island of Grenada, and was declared Grenada's "national bird" in 1991. The existence of this endemic bird is a source of pride for Grenadians, ingrained in the local cultural and biological heritage through years of targeted outreach programs like "I Love My Dove" led by RARE Conservation. Even so, most Grenadians have never seen a Grenada Dove in person, due to its restricted range and a lack of awareness of the differences between the species and other much more common local doves.

As of 2025, with a declining habitat range and an uncertain but very small population size, the Grenada Dove needs concerted action to ensure its continued existence. This Conservation Action Plan 2026–2035 aims to outline the actions and resources necessary to safeguard the species and its dry forest habitat.

Why Conserve the Dove?

The reasons given by the workshop participants for saving the Grenada Dove varied, from inherent existence value to biodiversity maintenance to a sense of human responsibility to conserve what we have endangered. These reflect the diversity of values and perspectives represented in the room during the CAP workshop and also embodies the cross-sectoral nature of the issue; protecting the dove is not just a conservation imperative, but a social and moral one as well. A selection of the stated reasons is quoted below:

- "We have the responsibility to act on behalf of all species that do not have a voice!"
- "Everything on the planet is part of a complex system and has both purpose and inherent value."
- "Because it is unique – only one of its kind. If we lose it, it is gone."
- "As a father of young kids, I would not like for the extinction of an endemic animal and national symbol to occur under our watch."
- "Humans caused the issue – humans should fix it!"
- "It is important to prevent extinction because it is more than just a bird, but more so a representation of us as a people and being that it is only found in Grenada, it is necessary to preserve for heritage and tourism values."

Species

This section introduces the Grenada Dove – its appearance, habitat preferences, and behaviour – before turning to the more pressing concerns of its conservation status and the multiple, interacting threats that have brought it to the brink of extinction. A summary of a recent population viability analysis rounds out the picture, providing the scientific basis for the conservation actions and priorities that follow.

Description & Ecology

The Grenada Dove is a medium-sized dove (26–31 cm, ~200 g) with a plump body. Its plumage includes solid cinnamon-brown upperparts, a pale pinkish-beige face and forehead, greyish crown, white throat, and cinnamon/pinkish-buff nape, neck and breast. The belly is white with a strip of white feathers extending over the shoulder and the dove has no spots along the wings or back – two key field marks that distinguish it from other local doves, such as the Zenaida Dove (*Zenaida aurita*), the much smaller Common Ground Dove (*Columbina passerina*), and the uncommon Ruddy Quail-Dove (*Geotrygon montana*). The Grenada Dove's eyes are pale yellow, surrounded by a bright carmine ring, and the legs and feet are vivid reddish pink. Males and females look alike, though males are slightly larger, and juveniles are duller with less vivid colouring. Shy and elusive, the Grenada Dove is most often seen walking quietly on the forest floor or perched low within dense vegetation.

The Grenada Dove is a solitary, ground-feeding bird, though pairs are sometimes seen, and small groups (2–3 individuals, Rusk 2017) may forage together. Its preferred habitat is dry coastal scrub and mixed deciduous forest, especially areas with thorny leguminous trees and shrubs. These forests provide a carpet of leaf litter and exposed soil where the dove searches for small seeds. Foraging occurs within the forest, occasionally near clearings or edges. Access to fresh water is especially important during the long dry season.

Breeding is suspected to occur mainly during the rainy season (June–December). The dove's distinctive, descending “hooooo,” repeated every 7–8 seconds, is most often heard at this time as males establish territories and attract mates. Grenada Doves build fragile stick platform nests 4–7 meters above the ground, sometimes higher, but this observation and other breeding behaviour require further investigation. Both parents share incubation and care of the young, switching duties morning and evening.

Status, Distribution & Threat Overview

The Grenada Dove is classified as Critically Endangered on the IUCN Red List of Threatened Species, with the most recent survey (Rivera-Milán *et al.* 2015) estimating a total population of about 160 individuals ($\pm$ 30). The population has been at this very low level since at least the mid-1980s (Blockstein 1988, 1991, Rusk 2017). Endemic to Grenada, it now survives in just two small areas of dry forest: on the southwest coast (including Mount Hartman National Park and Estate, Petit Bouc and Woodlands, Lower Woburn, and perhaps surrounding forests) and on the west coast (Perseverance Dove Protection Area, Woodford, Beausejour and Grenville Vale Estates, and Black Bay). These two populations were likely connected historically but are now separated by nearly 9 km

of urban development, including the capital city of St. George's. Mount Hartman National Park has long been considered the core of the species' population, supporting nearly half of the remaining birds.

The Grenada Dove faces multiple severe, interacting threats that endanger its already small and fragmented population. The threats facing the Grenada Dove were identified and characterized through a Fuzzy Cognitive Mapping (FCM) exercise conducted during the CAP workshop (Kosko 1986). This participatory process gathered stakeholder input on the various threats, their relative strengths, and their connectivity, informed by existing literature on the species. Both direct and indirect threats were identified; the details and results of this exercise, including the ranking and relative influence of each threat, are presented in the Stakeholder Threat Assessment section. The nine threat categories resulting from this process are as follows:

- **Development impacts on habitat:** The greatest threat is the destruction, degradation, and additional fragmentation of dry forest habitat for commercial and housing development. The current development at Mount Hartman, a billion dollar 'University Town and Resort' (Grenada Land Actors 2024), would directly impact the dove's most important stronghold, bringing further habitat loss, pollution, disturbance, and more predators. Disturbance is a major factor as Grenada Doves are shy, startle easily, and fly to the ground when disturbed; even low levels of human activity can disrupt feeding and breeding.
- **Invasive predators:** Introduced mammals – including mongooses, rats, cats, and common opossums (manicou) – are abundant in the dove's habitat and pose a grave threat to the remaining population. Nest predation of eggs and nestlings is likely common, and because the species forages mainly on the ground, adults and juveniles are also highly vulnerable to predation. Rats likely also compete with the doves for food resources, and other free-roaming mammals such as dogs and cows can significantly disturb the dove and its habitat (Banks & Bryant 2007).
- **Small population effects:** The small population size makes the species more vulnerable to environmental disturbances and the other risk factors identified in this document. With so few individuals, the population faces genetic challenges that make recovery difficult. These include isolation, low genetic diversity, inbreeding depression, skewed sex ratios, reduced reproductive success, poor immunity to disease, and poor long-term resilience.
- **Policy and institutional limitations:** The lack of legislation and enforcement, as well as limited human and financial capacity within the management agencies, indirectly contributes to the endangerment of the dove and degradation of its habitat. Lack of political will, insufficient public support, development agendas, foreign interests, and lack of government transparency are all limiting factors that influence the strength of existing protections for the species and the likelihood of scaling up protection and enforcement.
- **Climate change and severe weather:** Various potential impacts – from bush fires and heat stress to altered rainfall patterns – can further degrade habitat, alter dry forest structure, and reduce the food and water resources the dove needs to survive and reproduce. Storms and hurricanes are expected to become increasingly frequent and intense. Hurricanes have already caused major declines, such as Hurricane Ivan in 2004, which reduced the west coast population by nearly half (Rusk 2005).

- **Water scarcity:** The increased likelihood and duration of droughts projected under climate change could severely limit the dove population. Access to water sources within its habitat may become restricted or not available, resulting in increased distances and movement to locate fresh water, increased competition and overcrowding at watering holes, and further exposure of the doves to invasive predators and other wildlife carrying diseases (Bolton *et al.* 2016).
- **Agriculture and livestock:** Farming in areas around the Dove Sanctuaries, although small-scale, can negatively affect habitat through land use changes, clearing, encroachment, pesticide use, and the attraction of invasive mammalian predators. The use of these areas for free-roaming livestock is especially damaging, as untethered animals can overgraze the habitat, cause erosion and degradation, and also compete with doves for limited water sources.
- **Pollution:** Pollution is a serious issue in both core dove habitats. Perseverance Sanctuary borders the national landfill, with significant encroachment along its boundaries as well as toxic fumes from frequent long-lasting landfill fires, and the Mount Hartman Sanctuary and surrounding estate is a popular illegal dumping ground. Improper waste management in these areas leads to contamination of water and food sources, proliferation of rodents and invasive predators, bioaccumulation, and increased fire hazard. Aside from solid waste, light and noise are also an issue, especially with noise from heavy machinery obscuring auditory signals and reducing the effectiveness of communication among doves.
- **Disease:** The doves are likely susceptible to several diseases and ailments, including avian influenza, trichomonosis, pox, malaria, and ecto- and endo-parasite infections, which can cause stress, mortality, reduced fitness, or reproductive failure. Their exposure to these can be amplified by the presence and introduction of invasive species (especially non-native doves) and by increased interspecies mingling at water sources during drought (Bolton *et al.* 2016). While “there are no data available on the types or impact of disease on Grenada Dove populations to date” (Peters *et al.* 2025), disease impacts are evident in other endemic and rare doves, warranting investigation in this species.

Population Viability Analysis

A recent population viability analysis (PVA) was conducted to estimate the extinction risk of the Grenada Dove under current conditions and various simulations of threats and management (Peters *et al.* 2025). The authors found that the West population (Perseverance and Woodford Estates, Beausejour and Grenville Vale Estates, and Black Bay) had a 100% probability of going extinct in the short term (19 years). The southwest population (Mount Hartman, Petit Bouc and Woodlands, Golf Course, and Café) population had a lower probability of extinction (50 year mean time to extinction), but ongoing development in Mount Hartman and loss of that habitat would significantly increase the extinction risk of that population. Models simulating population supplementation of the two extant subpopulations through captive breeding were the most successful in terms of population viability. Models using a captive breeding programme or translocations from current populations to establish a new population in the former northern range of the Grenada Dove’s habitat to serve as a “reserve population mitigating the risk posed by hurricanes” suggested that sustained increases in the Grenada Dove population were only likely with a high number of captive breeding birds being

introduced, resulting in potentially negative effects on current populations. Thus, supplementation of the populations could be a valuable and effective conservation strategy, but must be done with caution and with accurate data on the survival and mortality rates, sex ratios, and genetic health of the species.

During the solutions analysis in the CAP workshop, the captive breeding programme was also suggested to address the threat category of small population effects. This could involve taking individuals from both Mount Hartman, the larger but less genetically diverse population, and Perseverance, the smaller more genetically diverse population (Peters *et al.* 2023), to create an ex-situ breeding programme that can then supplement the wild populations. A similar recovery programme has brought the Pink Pigeon (*Nesoenas mayeri*) back from the brink of extinction, using birds bred in captivity in a government breeding facility in Mauritius. The captive population on Mauritius was supplemented with pigeons from captive populations in zoos and other collections to increase the genetic diversity (Jackson *et al.* 2022). There are currently no captive populations of Grenada Dove nor adequate knowledge on the species biology to ensure they can be sustained in captivity, but the knowledge of other *Leptotila* doves and lessons learned from breeding species such as the Pink Pigeon and Socorro Dove (*Zenaida graysoni*; extinct in the wild) can be leveraged. There have been some successes with captive breeding programs with small founder numbers (e.g., Pink Pigeon, Mauritius Kestrel *Falco punctatus*). Presently, there is no local or regional capacity for a captive bird breeding programme, but there is international support available, for instance through the IUCN Species Survival Commission Pigeon and Dove Specialist Group.

It is important to state that captive breeding is not a replacement for in-situ conservation actions. Even if a captive breeding programme is successful, the lack of habitat protection for the dove persists as a threat. In a case study report about the then-proposed Mount Hartman development, this response was given by Dr. David Blockstein to the suggestion of captive breeding in lieu of habitat protection: “The recommendation to rescue the birds implied that there is some habitat to place rescued birds. There isn’t. That is the crux of the issue. As we currently understand the habitat needs of the species, there is not unoccupied, protected habitat for reintroduction. That is why many of us are trying to hold onto what habitat exists” (in Rusk 2010a). A review of the appropriateness of captive breeding programmes, which mentions the Grenada Dove case, is covered by Bowkett (2008), and its limitations are well-discussed elsewhere (Snyder *et al.* 1996).

While captive breeding is not yet defined as an immediate solution for the Grenada Dove, the current **Conservation Action Plan (CAP)** recognizes it as a potential strategic tool for long-term survival. As a Critically Endangered and conservation-reliant species (Scott *et al.* 2020), the dove’s situation warrants proactive planning for captive management as part of a multi-pronged approach alongside habitat protection, predator control, and genetic rescue. To this end, a high-priority action for this period is to **conduct a comprehensive feasibility study on captive breeding** (Action 3.5). This study – informed by ongoing targeted research on the dove’s demographics and genetic diversity (Action 3.2–3.5) – will evaluate the resources, technical requirements, and risks associated with establishing an insurance population. By including this as a formal action item, the plan ensures that if wild populations continue to decline, the foundation for a captive program will have been rigorously assessed, regardless of whether a full-scale breeding program is initiated during this specific ten-year cycle.

Location

This plan encompasses the current and former distribution of the Grenada Dove, including the Perseverance Protected Area and Dove Sanctuary (established via SRO No. 3 of 1996) and the Mount Hartman National Park. While both areas were initially established as reserve zones in 1996 to preserve the dove, Mount Hartman was later de-gazetted through SRO No. 3 of 2008. This legal exemption allowed for the land to be treated as Crown Land, leading to the sale of Lots 1 and 2 in 2021 for the current resort development (The Attorney General 2022a, 2022b). The map below (**Figure 1**) shows the latest known boundaries for the Dove Sanctuaries, the historical range of the dove – as private lands on the southwestern and western coasts of mainland Grenada – and the areas of land sold at Mount Hartman in 2022. It also highlights private lands on the southwestern and western coasts where the dove has historically been recorded.

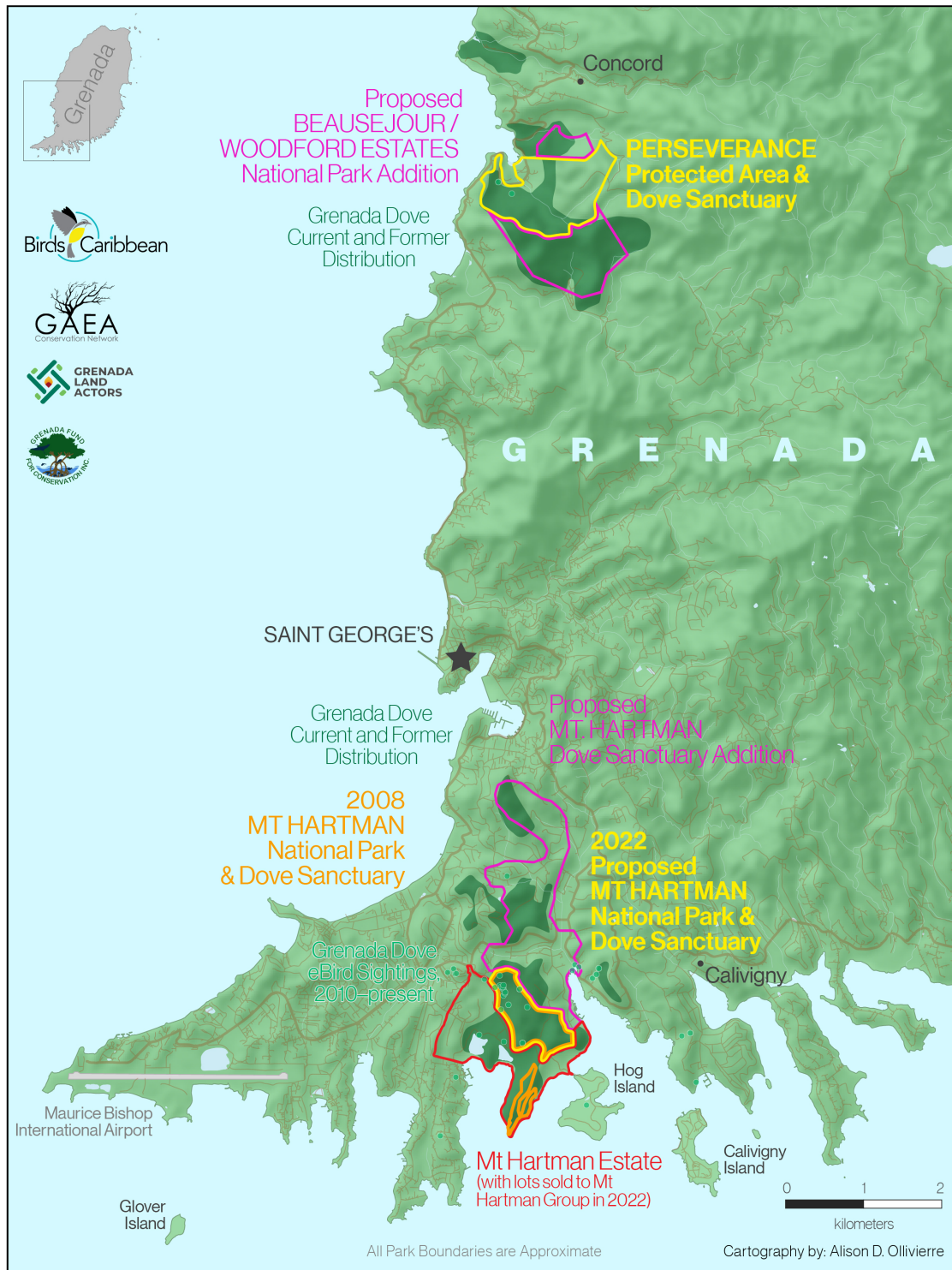


Figure 1. Map of Grenada Dove current and former distribution on the southwest and west coasts of Grenada. Shown are the Perseverance Protected Area and Dove Sanctuary, the 2008 and 2025 Mt. Hartman National Park and Dove Sanctuary boundaries, proposed sanctuary additions at Mt. Hartman and Beausejour/Woodford Estates, and the Mt. Hartman Estate lots sold in 2022. Note: All park boundaries are approximate; Mt. Hartman boundaries are not officially gazetted. Map by Alison DeGraff Ollivierre.

Conservation & Management to Date

In 1996, the Government of Grenada legally established Mount Hartman National Park and the Perseverance Dove Sanctuary, providing the first formal protection for Grenada Dove habitat (Government of Grenada 1996). **Figure 2** provides a visual summary of key conservation milestones. Management by the Forestry and National Parks Department has historically included patrols, boundary maintenance, rubbish clearing, signage, and predator control. Between 2013 and 2015, an intensive predator control programme removed more than 1,400 mongooses from Mount Hartman and Perseverance, along with other invasive mammals (Rusk 2015a). These efforts have helped reduce local threats, but the protected areas cover less than 10% of the dove's range, and most remaining habitat lies on private or unprotected land vulnerable to development.

Species Recognition & Early Status	1884: Species formally described
	1960s: Believed nearly extinct
	1987: Modern surveys begin; Population: ~100
Legal Protection & Political Milestones	1991: Declared National Bird of Grenada
	1994: Listed as Critically Endangered; Convention on Biological Diversity ratified
	1996: Mt. Hartman and Perseverance protected areas established
Major Setbacks	2004: Hurricane Ivan causes major decline; Population: ~182 pre-Ivan, 64–120 post-Ivan
	2008: Mt. Hartman National Park exempted from protection
	2022: Government sells two Mt. Hartman parcels for development
Conservation Gains	1998, 2008: Recovery and action plans drafted
	2013–2015: Predator control removes 1,400+ mongooses
	2013: Distance sampling survey; Population: 107–229
Recent Research & Action	2018: Genetic studies confirm low diversity and male-biased sex ratio
	2025: Population viability analysis predicts high extinction risk; Conservation Action Planning workshop convened

Figure 2. Summary of key events in Grenada Dove conservation history, from species description (1884) to present (2025). A detailed chronology is provided in **Appendix 1**.

Research and monitoring have been ongoing since the first modern surveys in 1987 (Blockstein 1988), with long-term population monitoring extending through 2016 (Rusk 2017). A 2013 range-wide survey using distance sampling estimated a population of 107–229 individuals (Rivera-Milán *et al.* 2015). Recent fieldwork has included camera trapping, territory mapping, and passive acoustic monitoring (Wise & Geary 2025). Enhanced public engagement efforts have also continued since 2013 (Rusk 2016). Conservation efforts have been supported by a range of local and international partners, including government agencies, universities, NGOs, and zoos.

Two previous Grenada Dove Recovery and Action Plans (Rusk *et al.* 1998, 2008) and a Conservation and Management Plan for Perseverance-Beausejour (Rusk 2010b) called for halting habitat loss, preventing further declines, and expanding suitable habitat. Key recommendations included protecting private and Crown lands in dove habitat, mitigating industrial threats, identifying new sites and restoring vegetation corridors, conducting regular population surveys, sustaining predator

control, researching breeding biology and limiting factors, implementing site-specific management plans, and expanding community outreach and education programmes. Despite these efforts, progress has been constrained by limited funding, capacity, and institutional support, and many of these recommendations remain relevant today. This Conservation Action Plan builds on these prior efforts and incorporates many of the same priorities. A detailed chronology of Grenada Dove conservation is provided in **Appendix 1**.

Relevant Policies, Plans & Agreements

The Birds and Other Wildlife (Protection) Act, last amended in 1990, makes no mention of the Grenada Dove. National legislation (e.g., National Parks and Protected Areas Act [amended 2009]) provides the framework for habitat management for the dove, but has no explicit mention of the species itself. The sustainable management of dry forests is mandated in the 2018–2028 Revised Forest Policy (CANARI 2018).

Grenada has been party to the Convention on Biological Diversity since 1994, and as such has prepared several National Biodiversity Strategy and Action Plans (NBSAPs) to date. The most recent, publicly available NBSAP (Thomas 2016) does not make direct reference to the Grenada Dove as a key part of the country's biodiversity, but does recognize the importance of dry forest habitat and the impact of invasive species on biodiversity. Several of the action items outlined in the 2016 NBSAP are the same as those elaborated in this Conservation Action Plan, suggesting alignment with the general national agenda for biodiversity conservation.

In 2023, Grenada also completed its landmark National Ecosystem Assessment (Agard *et al.* 2023), which details the status of and threats to both the Grenada Dove and its habitat.

Stakeholder Threat Assessment

To assess the stakeholders' perspectives on the complex web of threats facing the Grenada Dove, we employed Fuzzy Cognitive Mapping (FCM), a participatory method that functions as a quantitative problem tree. FCM allows stakeholders to collaboratively map relationships between threats, assign strengths to these connections, and identify which interventions will have the greatest impact on species conservation. These maps are not population models, nor are they meant to reflect scientific consensus exclusively – they simply allow us to rank and understand what stakeholders think are the most impactful threats to the Grenada Dove population.

We simultaneously involved both online and in-person stakeholders in the threat ranking and identification, including conservation biologists, land managers, government representatives, farmers, and community members. Participants collectively identified threats, mapped the causal relationships between them, and voted on the strength (scale of 1–3) and uncertainty (scale of 1–3) of each connection. Arrow directions were assigned based on whether one threat amplifies (positive) or reduces (negative) another. The majority of decisions reached a unanimous agreement, demonstrating strong consensus among diverse stakeholder groups. However, these results represent stakeholder perception of threats, not necessarily empirical evidence of impacts, and must be interpreted in this light.

Threat Categories

Our threat categories were adapted from the IUCN Threats Classification Scheme (Version 3.3; 2022), modified to capture the specific causal pathways affecting the Grenada Dove. Rather than mapping every individual threat, which would have been prohibitively time-intensive, we focused on broad threat categories that group multiple related problems.

This approach follows the criteria for good threat categorization: each category works independently as a causal driver, is actionable through conservation interventions, groups multiple related problems, and is specific enough to observe in the field.

Following conservation planning best practices, we defined threats as:

- Primary causal drivers that can operate on their own, even if they also interact with other threats
- Actionable problems that conservation efforts can address
- Broad categories that group multiple specific related issues
- Observable phenomena with concrete evidence (not abstract processes)

For example, "Development" is an appropriate threat category encompassing hotel construction, road building, and quarry expansion, while "Habitat Loss" is a consequence (mechanism) of development rather than an independent threat.

Eight threat categories were predetermined based on our literature review (Figure 2), and the participants voted to confirm these eight, also adding "Policy & Institutional Limitations" as a critical missing threat not originally in the IUCN framework. This category captures governance failures, weak enforcement, and a lack of institutional capacity that enable other threats to persist.

One notable modification was changing "Water Availability" to "Water Scarcity" to align with the threat-focused framing used throughout the analysis. Our inclusion of "Water Availability" in the initial list of threats, though absent from the IUCN list, is informed by a 2011 report (Rusk 2011). Grenada Doves were first observed using well ruins in 2010 surveys incidentally, which motivated Rusk to study their use in the following year. In 2011, rainfall was substantially lower than the previous year, and Grenada Doves were observed using the 4 of 6 water well ruins in the Mount Hartman Estate that still contained water in the driest month that year (April). As such, we included "Water Availability/Scarcity" in the list of potential threats, and stakeholders supported its inclusion in the final list. In the end, we were left with the following categories: 1) Agriculture & Livestock, 2) Climate Change & Severe Weather, 3) Development, 4) Disease, 5) Invasive Species, 6) Pollution, 7) Small Population Effects, 8) Water Scarcity, and 9) Policy & Institutional Limitations.

Network Analysis Results

The FCM revealed complex interconnections between threats (**Figure 3**). Stakeholders identified numerous causal pathways linking threats both directly to the dove population and indirectly through other threats. The network shows a layered structure: broad-scale threats at the top – Climate Change & Severe Weather, Policy & Institutional Limitations, and Development – influence

multiple threats below them. These flow into intermediate threats such as Water Scarcity, Agriculture & Livestock, and Pollution, which in turn affect threats that directly impact the dove population, including Invasive Species, Disease, and Small Population Effects.

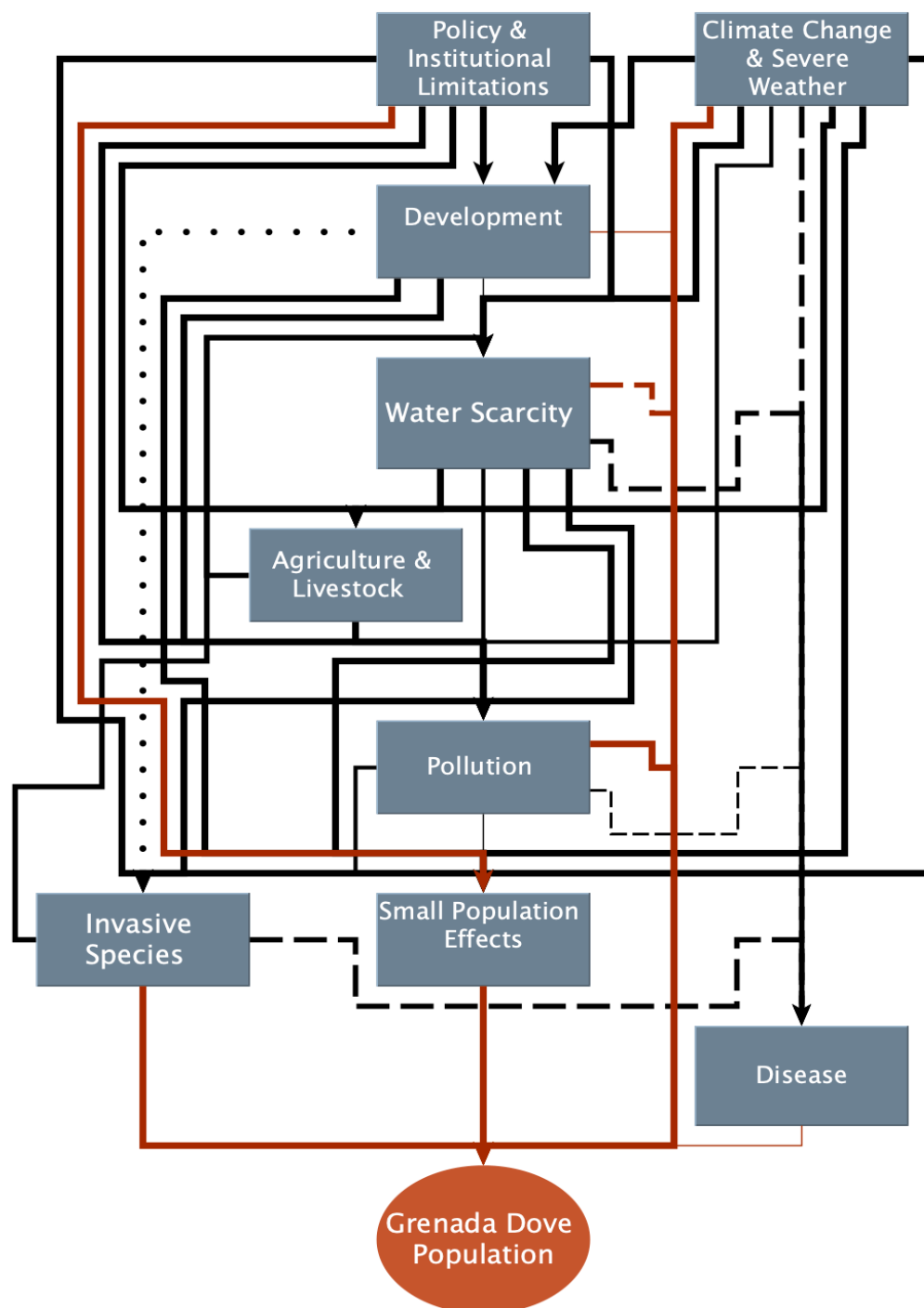


Figure 3. Fuzzy Cognitive Map of threats to the Grenada Dove population based on stakeholder perceptions. Arrows represent perceived causal relationships, with thickness indicating relationship strength (1–3 scale). Black arrows indicate positive relationships (one threat amplifies another); red arrows indicate negative relationships. Line style indicates stakeholder certainty: solid = high, dashed = low, dotted = medium.

For example, Climate Change increases Water Scarcity, which concentrates doves at fewer water sources, increasing their exposure to Invasive Species predators. Similarly, Policy & Institutional Limitations can enable unchecked Development, which degrades habitat and amplifies Pollution. These cascading effects mean that a single broad-scale threat can influence the dove population through multiple pathways simultaneously. The red arrows in the network indicate negative relationships, for instance, where one factor may reduce another, though positive (amplifying) relationships dominate the system.

Total influence analysis (**Figure 4**) quantifies stakeholder perceptions of threat importance by calculating the cumulative influence of each threat through all direct and indirect pathways in the network. According to this analysis, reducing Water Scarcity would provide the greatest perceived improvement (~30%), because many threats pass through it before affecting the dove population. However, these threats are difficult to manage directly at the local conservation level. Bar colour indicates stakeholder certainty, with higher values (orange) reflecting greater agreement among stakeholders about a threat's relationships. Disease shows notably lower certainty (purple), indicating more disagreement about its role in the network.

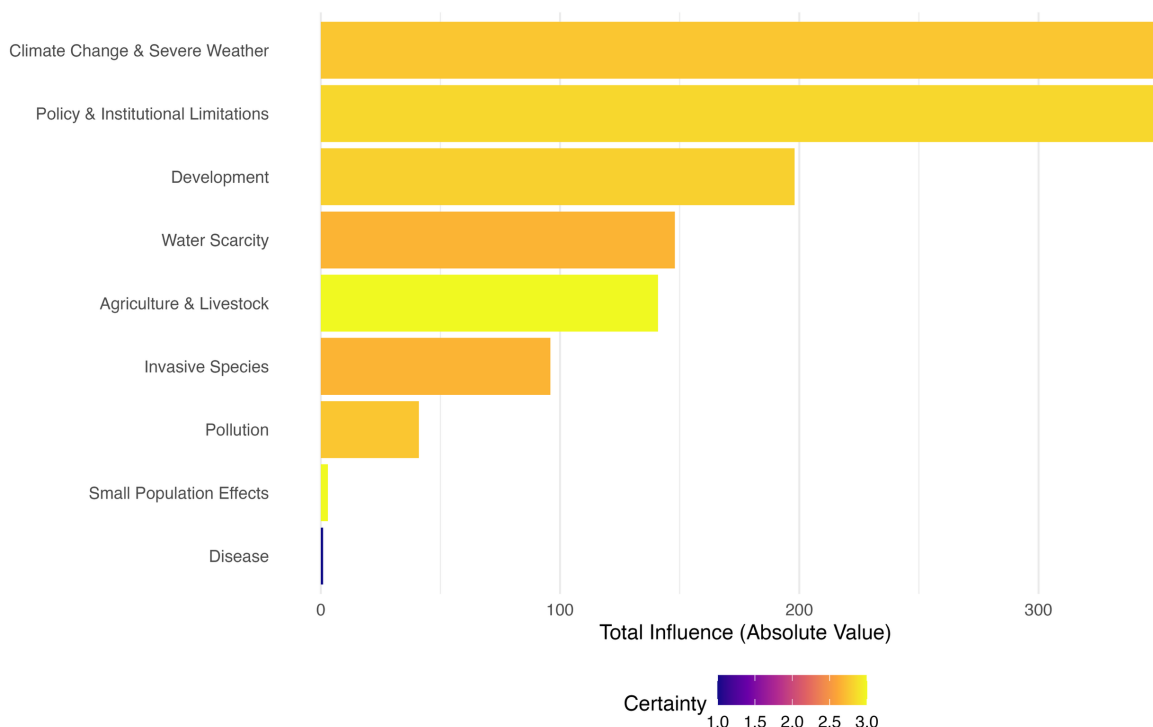


Figure 4. Overall threat importance to the Grenada Dove population based on stakeholder perceptions. Bars show the total perceived influence of each threat through all direct and indirect pathways in the threat network. Colour indicates stakeholder certainty (4 minus mean uncertainty; purple = less certain, orange = more certain).

Intervention effectiveness modelling (**Figure 5**) explores the potential impact of threat reduction based on the stakeholder-defined network. To model intervention scenarios, we reduced the strength values of each threat's outgoing relationships by 50%, then recalculated the cumulative effects on the dove population. This approach asks: "If we could halve the impact of this threat, how much

would the dove population benefit according to stakeholder perceptions?" These results quantify what stakeholders collectively believe would happen if threats were reduced, rather than empirical predictions. According to this analysis, reducing Water Scarcity would provide the greatest perceived improvement (~30%), reflecting its role as a mediating factor connecting upstream drivers to downstream impacts. The highest-impact actionable interventions are Invasive Species Control (~20%), Pollution Reduction (~18%), and Development Management (~16%). These interventions represent effective use of limited conservation resources, as stakeholders perceive them to be both impactful and directly manageable through on-the-ground actions

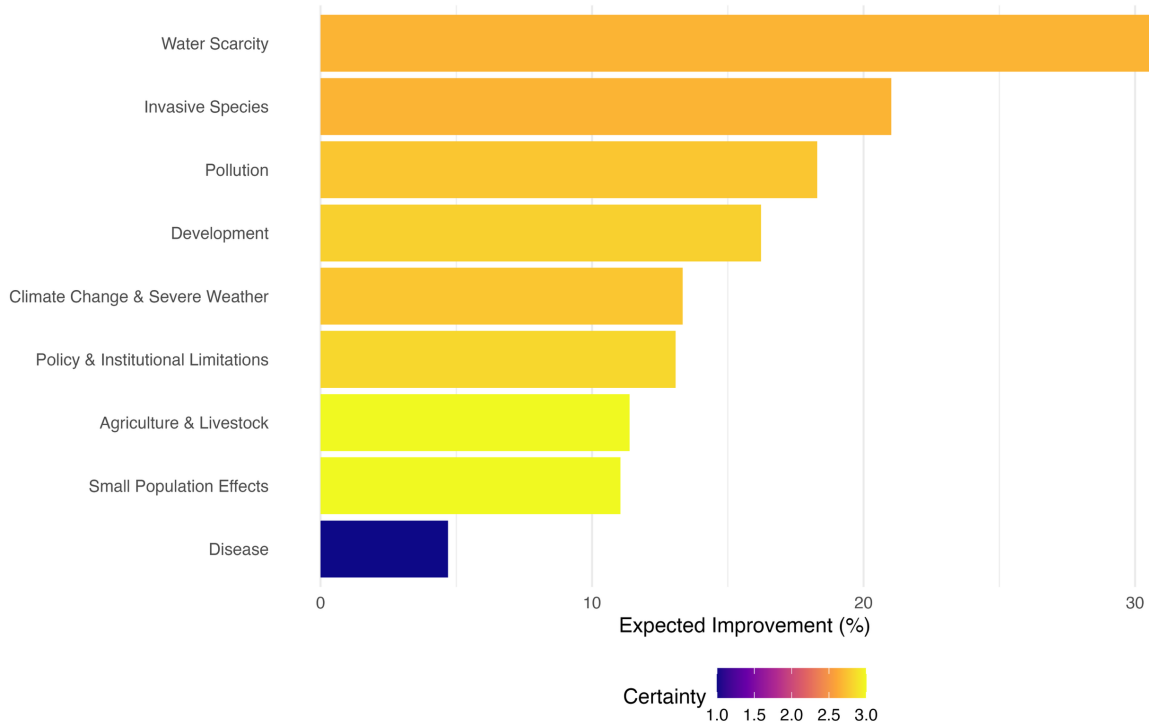


Figure 5. Expected improvement to Grenada Dove population from 50% threat reduction scenarios based on stakeholder perceptions. Bars show the modelled improvement to population health if each threat's outgoing relationship strengths were reduced by 50%. Results reflect stakeholder beliefs about intervention effectiveness rather than empirical predictions. Colour indicates stakeholder certainty (4 minus mean uncertainty; purple = less certain, orange = more certain). Disease shows lower certainty, indicating greater stakeholder disagreement about its relationships.

Stakeholder Priority Actions by Votes

With the threats identified and characterized through the Fuzzy Cognitive Mapping exercise, workshop participants turned their attention to developing solutions. On Day 1 of the CAP workshop, participants brainstormed potential solutions for each of the nine threat categories. On Day 2, these solutions were refined into specific, actionable steps. At the end of the action drafting activity, participants (in person and online) were given six votes to allocate across all draft actions, selecting the actions they considered most critical to the conservation of the Grenada Dove. The prioritized actions with more than 5 votes are shown in **Figure 6**.

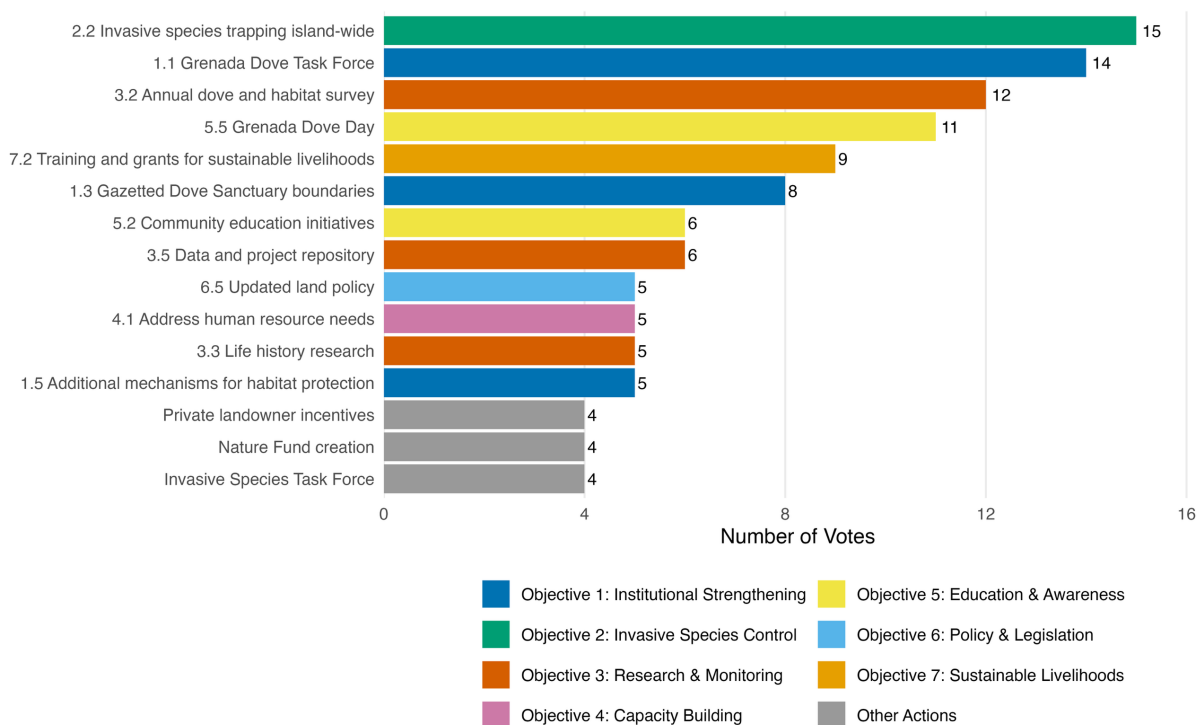


Figure 6. Stakeholder-prioritized conservation actions for the Grenada Dove. Results from participatory voting at the conservation action planning workshop.

Actions are color-coded by their corresponding objectives in this plan. Invasive species control (Action 2.2) received the highest priority (15 votes), followed by establishing a Grenada Dove Task Force (Action 1.1, 14 votes) and implementing annual monitoring surveys (Action 3.2, 12 votes). The diversity of high-ranking actions across multiple objectives reflects the need for integrated, multi-faceted conservation approaches to address the complex threats facing the species.

Targets

This section defines the conservation targets for the Grenada Dove and its habitat, along with desired outcomes over the short term (5 years) and long term (20–30 years). Conservation targets represent the species and ecological systems that this plan aims to protect, while threat targets identify the key pressures that must be reduced or eliminated to achieve conservation success.

Conservation Targets

Table 1: Conservation Targets and their current and desired status in the short term (ST: 5 years; and long term (LT: 20–30 years).

Value	Current Status	Desired Status
Grenada Dove	Exists in only two isolated locations. Population size is ~160 individuals (range 107–229) but trends are currently unknown.	ST: Existing populations are stable or increasing with updated population estimates to inform management LT: Populations are increasing across species' range with increased connectivity through habitat corridors
Dry forest habitat	Status unknown.	ST: Extent and condition of dry forests across the dove's range are known, and restoration is underway where necessary LT: Good quality dry forest with sustainable forest recruitment levels across the dove's range

Threats

Table 2: Major threats to the Grenada Dove and their current and desired status in the short term ST: 5 years; and long term (LT: 20–30 years).

Threat	Current Status	Desired Status
Development	Unregulated and encroaching upon dove habitat	ST: All new development is halted within critical dove habitats and ongoing developments are scaled back LT: Habitat protection is fully integrated into national land-use and physical development planning
Invasive predators	High population density within dove habitats	ST: Predator density is reduced in key dove habitat, especially during breeding season LT: Predator control is ongoing in critical dove habitats with sustainable biosecurity measures in place

Threat	Current Status	Desired Status
Water scarcity	Limited water sources within the habitat	ST: Water supplies are supplemented during prolonged drought periods LT: Water sources mapped, protected, and managed to ensure sustainable, unpolluted supply
Agriculture and livestock	Unregulated crop farming and free-roaming livestock degrade habitat	ST: Number of crop fields and free-roaming livestock are reduced within the critical dove habitat LT: Free-roaming livestock are completely excluded from the critical dove habitat
Pollution	Illegal dumping rampant and landfills encroaching on borders	ST: Illegal dumping sites cleaned up and better patrolled LT: Expansion of the landfill halted, and the dove habitat maintains its extent
Policy and institutional limitations	Inadequate laws, staff, and funding for enforcement	ST: Enforcement capacity increased through fundraising and hiring of staff, site boundaries are gazetted to improve enforcement LT: Political and public support secured for sustainable actions, more habitat is legally protected

Action Plan

This section presents the goals, objectives, and actions that will guide Grenada Dove conservation over the next decade (2026–2035). The plan is organized around seven objectives addressing habitat protection, predator control, research and monitoring, public engagement, and legislation for long-term sustainability. Each objective includes specific, measurable actions with assigned responsibilities and timelines.

Goal

By 2035, the Grenada Dove has an increasing population across its range, supported by habitat protection, restoration, and invasive predator control. Its conservation is strengthened by research, education, and public engagement, and all Grenadians know and value the dove as a symbol of national pride.

Objective 1

By 2030, 50% of the Grenada Dove’s critical dry forest habitat is protected, restored, and/or effectively managed by strengthened enforcement.

Justification:

Habitat loss, degradation and fragmentation are the most important threats to the dove, given its small population size and low genetic diversity (Peters *et al.* 2022). Strengthening protection for the two existing Dove Sanctuaries, as well as seeking ways to manage unprotected or privately owned lands within the species’ range, will promote connectivity between the two populations and provide habitat buffers against development and other pressures.

Actions in the next ten years:

1.1 Create a Grenada Dove Task Force (GDTF) to oversee the Conservation Action Plan implementation. In the short term, an interim body should be created to oversee the implementation of the CAP, which should then be formalized through the FNP and Cabinet as necessary. The GDTF should be a multi-agency entity comprising government, NGOs, scientists, and civil society.

1.2 Conduct legislative and literature reviews on the protection status of all dove habitats. There needs to be a thorough review of the official boundaries of both Dove Sanctuaries, the legal status of the sites, enforcement responsibilities and mechanisms, and proposed and potential areas outside the sanctuaries, including their land tenure and analysis of their suitability for the dove.

1.3 Gazette both Dove Sanctuaries and amend relevant legislation. The National Parks and Protected Areas Act needs to be amended to include both sites with up-to-date boundaries in the schedule, which can be used to create formal GIS maps for use in planning reviews. Gazetted and updated boundaries will eliminate confusion and uncertainty of the extent of protected habitat and make enforcement of violations easier.

1.4 Assess the quality of all dove habitats and plan for restoration where needed. After the review of dove habitats is completed (Action 1.2), a thorough habitat assessment is required to assess the quality and status of each habitat, accompanied by research on what constitutes “quality habitat” for the dove (Actions 3.2 and 3.3). These assessments should be used to inform and prioritize restoration efforts within the dove’s range to ensure the most critical dry forest areas are maintained. Additional targeted research on habitat quality and use is also needed (see Action 3.2).

1.5 Explore and use additional mechanisms and avenues for habitat protection. To maximize the extent of quality dove habitat outside of the Dove Sanctuaries, alternative avenues for protection will be necessary. The PDA’s legislative framework can be used to restrict development or place stipulations on development in or near dove habitat; this should be facilitated by the inclusion of existing and proposed Grenada Dove habitat in the National Physical Development Plan, which is in the PDA’s mandate to develop under the Physical Planning and Development Control Act (am. 2008). A community co-management framework should also be created to engage private landowners within the dove’s range in effectively managing their land for the dove’s benefit, and private land purchases can be explored as a way to safeguard habitat for conservation.

1.6 Map and protect water sources used by the dove and other species, using the framework of the Water Resources Management and Regulation Bill (2025). Groundwater and surface water sources within critical dove habitat should be mapped to identify areas for intervention during droughts or periods of water scarcity. Water at these sources should be analysed for quality (chemical composition and pollution), and the location of key watering holes should be assessed for the potential of saltwater intrusion under sea level rise. A comprehensive water resource study for doves in the Mount Hartman Estate was done in 2011 (Rusk 2011), and an updated survey should be completed using the same methods for comparability. Water supplementation can be considered during the dry season, but must be done with caution to avoid attracting predators and increasing disease exposure risk; continuous monitoring would be needed on the use of any artificial water sources by the dove and other species.

Table 3: Priority level, implementing organizations, and target year for each proposed action to meet Objective 1.

#	Action	Priority	Lead Organization	Supporting Organizations	Target Year
1.1	Create Grenada Dove Task Force	High	FNPDP	Key stakeholders including Environment Division, GCN, GSWMA	2026
1.2	Conduct legislative and literature reviews	High	FNPDP	Environment Division, Ministry of Legal Affairs, Lands and Survey	2026
1.3	Gazette Dove Sanctuaries	High	Ministry of Legal Affairs	FNPDP, Land Use Division, Lands and Survey	2027
1.4	Assess habitat quality	Medium	FNPDP	Land Use Division, Lands and Survey, NGOs e.g., GCN	2027

1.5	Explore additional protection mechanisms	High	FNPD / PDA		2030
1.6	Map water sources	Medium	WRMU	Land Use Division, NAWASA, GDBS, Environment Division, Ministry of Health	2028

Objective 2

By 2033, there is a robust and adaptive invasive predator control and nuisance species management program within critical Grenada Dove habitat to reduce predation and disturbance pressure.

Justification:

Invasive predators are the greatest direct threat to the dove, as a ground-foraging species with a counterintuitive predator response (flushing to the ground). Reducing the density of invasive predators in key dove habitat will significantly increase survival and nest success. Management of non-predator nuisance species like livestock and dogs will also reduce disturbance to the habitat and minimize stress to the already pressured dove populations.

Actions in the next ten years:

2.1 Create an Invasive Species Task Force (ISTF). This task force will be a multi-agency entity that coordinates all training and trapping activities for the benefit of the Grenada Dove. Interested citizens can be incentivized to participate in control programs and receive training in safe trapping techniques for predators. The ISTF will be responsible for continuous community engagement, annual trainings, and resource allocation (e.g., traps, rifles).

2.2 Implement invasive predator control programme. Targeted control of invasive predators, including mongoose and feral cats, should be implemented within both Dove Sanctuaries and on private lands with doves where possible. In the long term, this program should be expanded to include landscape-scale trapping for mongoose and feral cats, especially to buffer the Dove sanctuaries and other dove areas to reduce invasive species immigration rates. Active trapping should be done before and during the dove breeding season and passive trapping for the remainder of the year until accurate data on breeding phenology can be obtained to inform the programme. Research, data collection, and adaptive management will be key components of a trapping program, with data used to inform and improve scope, trapping practices, and track changes in the invasive predator populations and dove populations over time.

2.3 Consider an exclusion fence for key Grenada Dove territories. The construction of a predator exclusion fence should be explored as a means of safeguarding critical Grenada Dove habitat, especially areas with a high concentration of identified dove territories. All predators within the Dove Sanctuary should be eradicated once the fence is completed, and traps placed within and around the perimeter as an additional biosecurity measure. This initiative could be funded by the developers if made a condition of planning approval, e.g., through PDA's legislative framework. The merits and

applicability of a predator exclusion fence for dove conservation are covered thoroughly in Rusk (2016a), with estimated costs, logistical requirements, and case studies.

2.4 Enact invasive species legislation and stronger biosecurity protocols. Creating specific invasive species management legislation will formalize the ISTF and provide enforcement strength to the task force to improve the execution of the invasive predator trapping program. Importation of plants and soil is subject to the Plant Protection Act (am. 2005), but there is a need for updated and targeted biosecurity protocols to limit the introduction of new invasive animals, plants, and pathogens. This can be done by leveraging the knowledge and lessons learned from regional networks like the OECS and Caribbean Invasive Alien Species Network. Further research can also be done into the impact of imported soil on the Grenada Dove.

2.5 Engage surrounding communities to better manage nuisance species. Ongoing community engagement should be a priority, especially in the areas directly surrounding the Dove Sanctuaries. Education is needed on proper waste disposal methods to prevent invasive predator congregation sites, rules for management of livestock and dogs to prevent free-roaming nuisance species, and to recruit volunteers interested in being trained in trapping methods.

Table 4: Priority level, implementing organizations, and target year for each proposed action to meet Objective 2.

#	Action	Priority	Lead Organization	Supporting Organizations	Target Year
2.1	Invasive Species Task Force	High	VCU	Task force including FNPDP, Ministry of Agriculture, NGOs e.g., GCN, community members and volunteers, professional trappers	2026
2.2	Invasive predator control	High	VCU	Trained individuals, professional trappers, Ministry of Agriculture	2027
2.3	Consider predator exclusion fence	Low	FNPDP	Ministry of Agriculture, Ministry of Health – VCU, NGOs e.g., GCN	2033
2.4	Legislation and improved biosecurity	Medium	Ministry of Agriculture	GDBS, NGOs, researchers including BEC students, WINDREF	2030
2.5	Community engagement for nuisance species	Medium	Ministry of Agriculture	FNPDP, GCN	2027

Objective 3

By 2029, there is a robust, sustained research and monitoring program for the Grenada Dove that provides knowledge of population trends, ecology, and habitat use to inform management.

Justification:

A lack of Grenada Dove life history information is a serious constraint on effective management, as many characteristics of the species are inferred from similar species elsewhere or remain unknown.

Actions in the next ten years:

3.1 Establish a Research and Monitoring Working Group (RMWG). This multi-stakeholder entity, including representatives from academia, NGOs, and government, will set priorities for the research and monitoring needs of the Grenada Dove. The working group will also be responsible for seeking and acquiring funding and equipment to facilitate the research, compiling these data to be added to the data and project repository (3.6 below), and issuing newsletters to communicate scientific findings (5.8).

3.2 Conduct a standardized annual population survey and habitat assessment. This action is key to obtaining continuous and accurate data on the Grenada Dove's population sizes, trends, distribution, and habitat. Habitat assessments need to include the extent, condition, and phenology of dry forest, as well as the factors influencing dry forest use by Grenada Doves. The methods can include counts with distance sampling and territory mapping (Rivera-Milán *et al.* 2015), and experimental research on habitat suitability and changes due to climate change. The annual population sizes and overall trends can be used to determine the effectiveness of management intervention over the life of this CAP.

3.3 Conduct targeted life history research. To fill the data gaps in the life history of the Grenada Dove, several aspects must be investigated. These include its breeding biology and reproductive success (using nest cameras), population demographics and individual survival (using colour banding), habitat use and selection (using passive acoustic monitoring), diet (using camera traps), and drinking behaviour. Mark recapture/resight of colour-banded individuals could serve as an alternative, and reliable, method for population assessments.

3.4 Conduct targeted genetic research. The work of Peters *et al.* (2020, 2022, 2023) should be continued to further elucidate the genetic diversity of the two subpopulations, including inbreeding levels, founder effect, and heterozygosity. DNA sampling to determine sex ratios should also be carried out, using feather samples collected during banding.

3.5 Conduct feasibility study on captive breeding. Captive breeding is recognized as a potential tool for the long-term conservation of the Grenada Dove. To assess the feasibility and needs of a captive breeding program for the Grenada Dove, a feasibility study must be conducted informed by the results of the ongoing targeted life history and genetic research (Actions 3.3 and 3.4). Given their extensive experience with conservation programs for columbids, the IUCN Species Survival Commission Pigeon and Dove Specialist Group will be a key partner in evaluating the potential of a captive breeding program for the dove, and for identifying the resource and research needs to successfully establish such a program.

3.6 Create a data and project repository. The collection of the above data must be accompanied by appropriate data management, through the creation of a central data repository with a data

moderator and regulated access for stakeholders. The FNPDP should make it a requirement of issuing or renewing research permits (for the Grenada Dove or in/around its habitat) that projects be registered in this repository so that all stakeholders are kept informed of ongoing projects to avoid duplicating work and effort. Data sharing agreements should also be drafted to allow the use of data within the repository for collaborative papers and to inform funding proposals.

3.7 Launch a citizen-science program to increase public awareness and capacity for data collection.

In close conjunction with the outreach component (Objective 5), a citizen science program should be established to increase capacity for monitoring by encouraging locals to collect and submit observations of the dove and associated invasive species. These observations can be funnelled through platforms like eBird and iNaturalist to create reliable, georeferenced records of dove and invasive species occurrence, which can then inform management. Engaging in this form of data collection will also empower locals to take action as they can directly contribute to the conservation of the dove.

Table 5: Priority level, implementing organizations, and target year for each proposed action to meet Objective 3.

#	Action	Priority	Lead Organization	Supporting Organizations	Target Year
3.1	Research and monitoring working group	High	GCN	To coordinate formation of working group, with all interested stakeholders	2026
3.2	Annual bird and habitat survey	High	BEC	GCN	2026
3.3	Targeted life history research	Medium	GCN	BEC, GFC	2027
3.4	Genetic research	Medium	University of Chester	GCN, BEC	2029
3.5	Captive breeding feasibility study	Medium	IUCN Pigeon & Dove Specialist Group	GCN, FNPDP, Environment Division	2029
3.6	Data and project repository	High	FNPDP	GCN, FCAL, Environment Division	2026
3.7	Citizen science program	Medium	GCN	FNPDP, BEC/SGU, TAMCC, CYEN, other youth and environmental groups	2027

Objective 4

By 2030, the Forestry and National Parks Department and key public, private, and civil society organisations regularly collaborate to secure the resources required to conserve the Grenada Dove and its habitat.

Justification:

The FNPDP is the primary entity responsible for the protection and conservation of national parks and endangered species. Still, it is severely under-resourced, lacking both the human and financial capacity to effectively fulfil its mandate. Collaboration with other local entities, across government and the private/civil sector, as well as exploring creative avenues for funding, will be necessary to ensure the future of the dove.

Actions in the next ten years:

4.1 Identify and address human resource needs. To strengthen the capacity of the FNPDP, the department must identify its gaps and needs as it relates to skills and manpower for the management of the Dove Sanctuaries. Government and NGOs can then collaborate to hire and train staff, especially rangers, to patrol, enforce laws, conduct research, monitor, and protect these sites.

4.2 Collaborate to improve waste management. The relevant government agencies (Ministries of Agriculture, Lands, and Forestry; and Climate Resilience, the Environment, and Renewable Energy) should provide support to the GSWMA to implement a waste diversion initiative to reduce pollution in and around the Dove Sanctuaries. The National Parks and Protected Areas Act and the Waste Management Act (2001) both need strengthened enforcement to curb the phenomenon of illegal dumping at Mount Hartman and to better regulate the expansion of the landfill at Perseverance.

4.3 Leveraging available climate financing to fund dove conservation. Creative financing avenues must be explored to increase funding available, such as linking habitat conservation with climate change adaptation. The FNPDP should collaborate with the Ministry of Climate Resilience to apply for climate financing through the Green Climate Fund to restore dry forest habitat within the dove's range.

4.3. Create dedicated Nature Fund from tourism fees. Additional funding can be generated by mandating a nominal visitor's fee for all persons entering the state of Grenada, included on all airline or cruise tickets. The money collected should go into a dedicated Nature Fund to support conservation activities, including but not limited to the dove. Proper financial management will be paramount to ensure this Nature Fund is directly supporting conservation action, and it should be implemented with an advisory board, dedicated bank account, and clear guidelines of how money will be allocated to various initiatives.

4.5 Provide incentives to private landowners within the Grenada Dove range for habitat protection. Some of the funds generated through the above avenues should be earmarked for private landowner incentives. As the protected areas under the FNPDP's purview cover less than 10 % of suspected dove habitat, including the management of non-protected and private lands, is essential. Landowners within the range who agree to conserve or manage their lands for the benefit of the species should be offered cash or tax reductions as an incentive.

Table 6: Priority level, implementing organizations, and target year for each proposed action to meet Objective 4.

#	Action	Priority	Lead Organization	Supporting Organizations	Target Year
4.1	Human Resource needs	High	FNPD	Ministry of Climate Resilience, the Environment, and Renewable Energy, NGOs e.g., GCN, GFC, local volunteers	2027
4.2	Collaboration for improved waste management	Medium	Ministry of Climate Resilience, the Environment, and Renewable Energy	GSWMA	2028
4.3	Leverage climate finance	High	FNPD	Close collaboration between Ministry of Agriculture, Lands, and Forestry and Ministry of Climate Resilience, the Environment, and Renewable Energy	2026
4.4	Nature Fund from visitor's fees	High	Ministry of Finance	Ministry of Agriculture, Lands, and Forestry and Ministry of Climate Resilience, the Environment, and Renewable Energy	2030
4.5	Private landowner incentives	High	Ministry of Finance	FNPD	2030

Objective 5

By 2028, there is a sustained public education and engagement program with targeted outreach for the Grenada Dove, which is valued as a symbol of national heritage and pride with strong support for its conservation.

Justification:

“No one will protect what they don't care about, and no one will care about what they have never experienced.” This quote from Sir David Attenborough exemplifies the importance of public engagement and education around conservation. The previous “I Love My Dove” campaign was incredibly successful in fostering national pride around the species, but there is now a generational gap in persons exposed to this campaign and many Grenadians do not know nor have ever seen a Grenada Dove.

Actions in the next ten years:

5.1 Integrate Grenada Dove education into the national curriculum at all levels. The Grenada Dove, and other endemic and important native species, should be meaningfully integrated to the school curriculum at all levels (primary, secondary, and tertiary). The content of the teachings can be tailored to each age group as appropriate, but key themes should include the existence of the dove, the importance of endemic species to biodiversity, habitat associations and ecology, threats such as invasive species and illegal dumping, the importance of protecting habitat for all species, and the cultural and economic benefits. Media such as videos, storybooks, and colouring books can be developed and distributed to schools to support this integration.

5.2 Implement targeted education program for decision makers and key stakeholders. To reach key stakeholders and decision makers, specific outreach needs to be targeted at parliamentarians, government officials, waste management companies, tourism agencies, and other actors identified by a stakeholder mapping exercise. The GDTF should craft briefings for these audiences, as well as arrange individual meetings and take advantage of fora such as the policy roundtable (Action 6.8) to strengthen the education on the Grenada Dove at the highest governance levels.

5.3 Develop robust community engagement initiatives. Outside of the schools, community education and engagement should also be ongoing. Tools for this outreach can include signs, billboards, annual townhall meetings, community/grassroots level walkabouts, bioblitzes and birding walks, presentations, workshops, ambassadors, and a community library.

5.4 Implement a Knowledge, Attitudes, and Practices survey to quantify public opinion. As soon as possible, a public opinion survey should be conducted to gauge the Knowledge, Attitudes, and Practices (KAP) of the Grenadian people as it relates to the Grenada Dove. This will form a baseline against which the results of the public education and engagement campaign can be evaluated, using the same consistent protocol over time. This survey will be especially useful to evaluate the long-term impacts, if any, of the “I Love My Dove” campaign, and to provide an opportunity for reflection and improvement of the previous communication strategy.

5.5 Develop campaigns about the dove using both traditional and social media. A comprehensive media campaign must be developed using both traditional and social media for maximum reach. For traditional media, this will include radio and television features of short clips, cartoons, and a jingle about the Grenada Dove, as well as physical posters and billboards at the airport and other key locations. For social media, these will include influencers, content creators, and existing environmental groups using their platforms to create and share posts to drive awareness even beyond Grenada. Merchandise can also be made for use in on-island outreach and to generate revenue, such as colouring books, stickers, t-shirts, bags, etc.

5.6 Declare a National Grenada Dove Day in celebration of the species. To strengthen the importance of the dove as a symbol of national pride, a day should be declared as National Grenada Dove Day. The celebration can include a variety of outreach and conservation activities, including a mascot naming competition, art competition, field trips, clean ups, and mobile education units.

5.7 Improve general environmental education nationwide. There needs to be increased education and awareness on general environmental issues, such as littering, illegal dumping, and development. This will raise the profile of issues that affect the Grenada Dove and other species, but the campaigns do not have to directly reference the dove.

5.8 Issue regular newsletters from the Research and Monitoring Working Group to communicate updates. To increase the connectivity of the Research and Monitoring component (Objective 3), the RMWG should collaborate with communication specialists to issue newsletters at regular intervals (annually or semi-annually) to provide updates to all stakeholders on the ongoing activities, results, and next steps for the Grenada Dove research.

Table 7: Priority level, implementing organizations, and target year for each proposed action to meet Objective 5.

#	Action	Priority	Lead Organization	Supporting Organizations	Target Year
5.1	Integrated curriculum	High	Ministry of Education	GCN, FNPDP, CYEN, GFC, BirdsCaribbean, SGU, TAMCC, Ministry of Agriculture, Lands, and Forestry, Ministry of Climate Resilience, the Environment, and Renewable Energy	2028
5.2	Key stakeholder education	Medium	GDTF		2027
5.3	Community education initiatives	High	NGOs	SGU	2026
5.4	Knowledge, Attitudes, and Practices survey	High	GCN	BEC	2026
5.5	Media campaigns	Medium	GCN	GFC, Ministry of Creative Affairs, Ministry of Agriculture, Lands, and Forestry, Ministry of Tourism, Creative Economy, and Culture, GTA	2027
5.6	Grenada Dove Day	High	Grenada Cultural Foundation	Ministry of Creative Affairs, Ministry of Agriculture, Lands, and Forestry	2027
5.7	Overall environmental education	High	Ministry of Education	NGOs/CSOs	2027
5.8	Newsletters for research updates	Medium	RMWG	GCN, Ministry of Agriculture, Lands, and Forestry	2026

Objective 6

By 2030, legislation is strengthened and enforced by relevant agencies ensuring the long-term conservation of the Grenada Dove and the protection of its habitat.

Justification:

Lack of enforcement has constrained the management of the Grenada Dove's habitat for the last 3 decades. Existing legislation is weak and outdated, and in the absence of fit-to-purpose regulations and a National Physical Development Plan, infrastructure development is encroaching upon and negatively impacting Grenada Dove habitat. Clearer policies, site-specific management plans, new and updated legislation, and strengthened enforcement are all needed to safeguard the dove and its habitat.

Actions in the next ten years:

6.1 Develop and enforce an integrated National Physical Development Plan. Considerations for the Grenada Dove and its habitat should be integrated into national plans for development, such as through the National Physical Development Plan (see action 1.5). The Physical Plan should clearly demarcate the boundaries of the Dove Sanctuaries and incorporate various land zones for the protection of heritage, culture, and nature.

6.2 Use existing legislation to protect critical Grenada Dove habitat outside Sanctuary boundaries. The GDTF should work with relevant agencies to identify critical habitat areas (through Actions 1.2 and 3.2) and pursue protection using the most appropriate legal mechanism:

- Environmental Protection Areas (EPAs) under the Physical Planning and Development Control Act (2016) provide long-term land use control, including development restrictions and EIA requirements. The Natural and Cultural Heritage Advisory Committee advises the PDA, which then recommends declaration to the Minister. The Minister declares EPAs by Order published in the Gazette.
- Special Enforcement Areas under the Physical Planning and Development Control Act (2016) allow rapid response to unauthorized development, including removal or alteration with only 14 days' notice. The Minister declares these directly by Order published in the Gazette.
- Prohibited Areas under the Integrated Coastal Zone Management Act (2019) can protect dove habitat within the coastal zone for "protection or rehabilitation of flora and fauna." The Minister designates these by Order in consultation with the Director of the Integrated Coastal Zone Management Office and Fisheries Division.

Recommendations for an EPA in the Mount Hartman/L'Anse aux Epines area were submitted to the PDA in 2023 (Coral Cove Group & L'Anse aux Epines Association 2023), which provides a useful starting point.

6.3 Use existing legislation to create management plans. To supplement the National Parks and Protected Areas Act and other legislation relevant to the FNP, the Integrated Coastal Zone

Management Act (2019) can also be used to develop site-specific management plans, including for sites outside of protected areas.

6.4 Institute policies to restrict livestock roaming within Sanctuaries. Policies must be put in place to regulate landless farmers, such as mandating that all roaming livestock be kept out of key habitat areas and that livestock will be impounded if not tagged.

6.5 Strengthen enforcement for illegal dumping and other forms of pollution. Increased monitoring is needed by all relevant agencies to reduce the incidence of pollution, including solid waste, effluent, and air pollution. The GSWMA should collaborate with the Ministries of Health, Agriculture, and Environment to enforce penalties for illegal dumping, as provided in the Waste Management Act. These organizations can increase their capacity for monitoring and identifying offenders by using community wardens, a public reporting system, and trail cameras.

6.6 Update land use plans to reduce fragmentation. The existing land policy framework (CANARI 2018) should be applied to support connectivity among fragments of Grenada Dove habitat by zoning corridors as protected habitat, including through the development of an updated and ground-truthed national land use plan. The Systems Plan for Parks and Protected Areas (Turner, 2009) should also be updated to include these habitat corridors. Additional regulations can include details on the size of trees that must be maintained within dry forest habitat, based on the results of the habitat assessments (Action 3.2).

6.7 Develop protective legislation and policy for species of special concern. Protections should be established for species of special concern, such as keystone, endemic, endangered, or culturally important species. This would include the Grenada Dove, other endemic birds such as the Grenada Hook-billed Kite (*Chondrohierax uncinatus mirus*) and the Grenada Wren (*Troglodytes grenadensis*), and key ecosystems such as mangrove and dry forests, among others. The Integrated Coastal Zone Management Act (2019) already provides for "protection of species of special concern" and could serve as a vehicle for listing protected species. Alternatively, protections can be written into specific legislation or appended as a schedule to an existing law. The latter option allows the species list to be updated periodically with the best available science without redrafting the whole law.

6.8 Coordinate semi-annual round table for policy development and implementation. The actions outlined under this objective should be coordinated by a committee that convenes regular roundtable discussions to drive these actions forward. This round table will be the venue for updating drafting notes, updating regulations, providing administrative guidance to other involved agencies, and building capacity within and outside of government.

Table 8: Priority level, implementing organizations, and target year for each proposed action to meet Objective 6.

#	Action	Priority	Lead Organization	Supporting Organizations	Target Year
6.1	National Physical Development Plan	High	PDA	Ministry of Infrastructure and Physical Development	2030
6.2	Designate critical habitat as EPAs, Special Enforcement Areas, or ICZM Prohibited Areas	High	PDA	Natural and Cultural Heritage Advisory Committee, ICZM Office, Fisheries Division, GDTF	2026
6.3	Management plans	High	FNPd	Ministry of Agriculture, Lands, and Forestry, Ministry of Climate Resilience, the Environment, and Renewable Energy	2027
6.4	Livestock policy	Medium	Ministry of Agriculture, Lands, and Forestry	Ministry of Carriacou and Petite Martinique Affairs	2028
6.5	Pollution enforcement	Medium	GSWMA	Ministry of Health, Ministry of Agriculture, Lands, and Forestry, Ministry of Climate Resilience, the Environment, and Renewable Energy, NGOs, GDBS	2027
6.6	Updated land policy	High	Land Use Division	Ministry of Agriculture, Lands, and Forestry, Ministry of Legal Affairs, Ministry of Climate Resilience, the Environment, and Renewable Energy	2028
6.7	Species of special concern	High	ICZM Office	Ministry of Climate Resilience, the Environment, and Renewable Energy, Ministry of Blue Economy and Marine Affairs, FNPd, NGOs e.g., GCN, GFC, BEC/SGU, WINDREF	2026
6.8	Policy round table	High	Ministry of Legal Affairs	Ministry of Agriculture, Lands, and Forestry, Ministry of Legal Affairs, Ministry of Climate Resilience, the Environment, and Renewable Energy	2027

Objective 7

By 2032, the Grenada Dove and its habitat are conserved through small-scale, low-disturbance, regenerative, community-led tourism initiatives that support local livelihoods and are strengthened by collaboration among communities, public agencies, and private sector partners.

Justification:

Fostering stewardship of the Grenada Dove and its habitats in members of the surrounding communities helps ensure the sustainability of conservation efforts by increasing community buy-in and pride. While several livelihood activities occur in and around the Dove Sanctuaries, such as grazing, farming, and ecotourism to a limited degree, there is an opportunity to mindfully expand these activities for the benefit of both people and nature. Small-scale regenerative and community-led tourism has the potential to improve livelihoods while minimizing disturbance to the dove, but such a program will need to be designed with clear and consistent protocols.

Actions in the next ten years:

7.1 Conduct a situational analysis of livelihoods benefiting from protected areas. There needs to be a comprehensive assessment of land use practices that sustain livelihoods, e.g., agriculture, tourism, and recreation, in communities adjacent to key Grenada Dove habitats (Mount Hartman/Woburn, Woodford/Beausejour). This situational analysis should also include a SWOT (Strengths, Weakness, Opportunities, Threats) analysis of all land users, and an assessment of potential disturbance impacts on dove behaviour and habitat use.

7.2 Provide training and grants to community members to promote sustainable practices and alternative livelihoods. Based on the results of the situational and SWOT analyses, trainings should be provided to interested community members on various topics, including but not limited to climate smart agriculture, birdwatching and tour guiding, and waste management. Training for birdwatching guides should include protocols for minimizing disturbance to doves, such as maintaining appropriate distances, avoiding nesting areas during breeding season, and limiting group sizes. A grant-making program can also be established to provide small grants and additional resources to help these trainees adopt more sustainable practices.

7.3 Develop and enforce guidelines for low-disturbance tourism. Clear guidelines should be established for all tourism activities within or adjacent to dove habitat, including maximum group sizes, designated trails and viewing areas, seasonal restrictions during nesting periods, and noise limitations. These guidelines should be developed in consultation with dove researchers and enforced through the GDTF and tour operator agreements.

7.4 Conduct an impact assessment of the community livelihoods program. The effectiveness of this program should be evaluated over time using an impact assessment, to ensure that the training and grants are having the desired effects of improving community livelihoods as well as reducing pressures on the Grenada Dove. This assessment should include monitoring of dove behaviour and abundance in areas with tourism activity to detect any negative impacts.

Table 9: Priority level, implementing organizations, and target year for each proposed action to meet Objective 7.

#	Action	Priority	Lead Organization	Supporting Organizations	Target Year
7.1	Situational analysis of livelihoods	High	FNP	Land Use Division, Ministry of Social & Community Development, Ministry of Tourism, Creative Economy, and Culture	2026
7.2	Community trainings and grant provision	High	Ministry of Agriculture, Lands, and Forestry	GSDTF, Ministry of Tourism, Creative Economy, and Culture, GTA, GSWMA, NGOs e.g., GFC	2028
7.3	Low-disturbance tourism guidelines	High	GDTF	FNP, Ministry of Tourism, Creative Economy, and Culture, GTA	2027
7.4	Assessment of impact	Medium	GDTF	Ministry of Agriculture, Lands, and Forestry	2032

Monitoring Plan

The monitoring plan below outlines methods to track progress towards the identified targets for species and habitat conservation and threat reduction, and to evaluate the effectiveness of selected management interventions that were detailed in the previous section.

Table 10: Monitoring plan outlining conservation targets, major threats, and interventions with methods for assessing progress and effectiveness.

Conservation Targets
Action: Monitor the Grenada Dove population
Method: Estimate the Grenada Dove population using annual population surveys, including territory mapping surveys, and quantify nesting success
Indicators: Number of Grenada Dove breeding pairs, number of identified dove territories, number of nests per year, proportion of nests successfully fledging young
Action: Assess the condition and extent dry forest habitat
Method: Conduct annual dry forest habitat assessments within the dove's range
Indicators: Area of suitable dry forest habitat, proportion of suitable habitat used by Grenada Doves (overlay of known territories)
Major Threats
Target status: New development is restricted in critical dove habitat
Method: Use remote sensing (satellite imagery, GIS, or drone mapping) regularly to detect land-use changes and encroachment
Indicators: Number of structures built by ongoing or new developments in dove habitat, area of land altered by development activities, date of most recent remote sensing habitat survey
Target status: Predator density reduced in key dove habitat
Methods: Conduct monthly camera surveys to track predator sightings. Analyse trapping data and cross-reference with camera surveys to evaluate success
Indicators: Number of predators detected on camera surveys, camera survey hours (effort), number of predators eliminated through trapping, trapping hours (effort)
Target status: Water supplies supplemented during prolonged drought periods
Method: Monitor water availability and dove usage using camera traps
Indicators: Number of Grenada Doves observed using supplemental water sources, number of species observed using supplemented water sources
Target status: Number of free-roaming livestock reduced within critical dove habitat
Method: Perform semi-annual field surveys to count livestock presence and assess habitat degradation
Indicators: number of free-roaming livestock within dove habitat, frequency of livestock detected on camera surveys, number of clear signs of habitat damage from livestock
Target status: Illegal dumping sites are cleaned up and better patrolled
Methods: Conduct quarterly site inspections and community reporting to track illegal dumping incidents. Use camera traps to continuously record any incidences of dumping and aid in identifying offenders
Indicators: Quantity of rubbish detected in each quarterly site visit, number of community reports of illegal dumping, number of dumping incidents detected on camera traps

Conservation Targets
Target status: Enforcement capacity is increased through fundraising and hiring of staff Method: Track enforcement actions, staffing levels, and budget allocations annually through agency reports Indicators: Number of new staff hired in key agencies, total number of staff with responsibility for dove habitat enforcement and management, quantity of funding raised or allocated for enforcement and site management
Interventions
Action: Create Grenada Dove Task Force [1.1] Methods: Track meeting frequency, attendance, and progress reports submitted quarterly Indicators: Number of GDTF meetings convened per year, meeting minutes, progress reports
Action: Explore and use additional mechanisms and avenues for habitat protection [1.5] Methods: Maintain a registry of proposed and approved protection mechanisms; review annually Indicators: Updated registry of proposed protection mechanisms, details of actions and decisions taken for each proposal
Action: Implement invasive predator control programme [2.2] Methods: Record trap success rates and predator (mongoose, feral cats) counts monthly; bounties for local trappers and hunters Indicators: Number of predators eliminated through trapping, trapping hours (effort), number of predators detected using camera and in-situ surveys
Action: Create a data and project repository [3.6] Methods: Monitor repository submission and usage statistics and data uploads quarterly Indicators: Number of reports and databases submitted to repository, number of user registrations, number of submissions accessed or downloaded
Action: Create a dedicated Nature Fund from tourism fees [4.3] Methods: Publish annual financial reports for monies collected and allocated to dove conservation Indicators: Quantity of funding raised for conservation activities, quantity of funding allocated to dove conservation, reports of activities directly funded from these allocations
Action: Integrate Grenada Dove education into the national curriculum at all levels [5.1] Methods: Develop curricula and lesson plans. Conduct annual surveys of schools to assess curriculum integration and student engagement Indicators: Number of curricula and lesson plans developed, copies of curricula and lesson plans, number of schools adopting new curricula, number of students taught about Grenada Dove
Action: Develop media campaigns about the dove using both traditional and social media [5.5] Methods: Track engagement metrics and public awareness through media analytics and surveys Indicators: Number of media campaigns produced for traditional media, number of media outlets sharing or promoting campaign, number of media campaigns produced for social media, number of shares/likes/interactions on social media posts
Action: Develop protective legislation and policy for species of special concern [6.7] Methods: Monitor legislative progress, policy adoption, and enforcement actions annually

Interventions
Indicators: Number of legal instruments drafted or updated to include Grenada Dove or its habitat, number of legal instruments endorsed or approved by government
Action: Provide training and grants to community members to promote sustainable practices and alternative livelihoods [7.2]
Methods: Track the number of participants trained, grants awarded, and follow-up success stories every two years
Indicators: Number of participants trained, training materials and workshop reports, total value of grants awarded, follow-up interviews with participants

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Appendix 1. Chronology of Grenada Dove (*Leptotila wellsi*) conservation history, documenting species status, population estimates, habitat protection efforts, threats, and management actions from formal description (1884) to present (2025).

Year	Event
1884	Grenada Dove formally described as a distinct species (<i>Engyptila wellsi</i> ; Lawrence 1884).
1943	Species described as rare in Grenada avifauna (Devas 1943).
1960s	Species believed to be nearly extinct (Devas 1970).
1987	Early modern surveys and baseline monitoring begin to document small population size and distribution. Population estimate: 100 (Blockstein 1988).
1988	IUCN Red List status: Threatened (IUCN 2026).
1989–1990	Evidence of population decline reported (Blockstein 1991). Largely restricted to two areas: Mount Hartman Estate and adjacent forests and the Perseverance, Woodford, and Beausejour area (Blockstein 1991). Population estimate: 75–85 (Blockstein 1991).
1991	Grenada Dove declared National Bird of Grenada (Butler <i>et al.</i> 1992; Government of Grenada 2026), increasing its political and symbolic importance in land-use and development debates (Rosenberg & Korsmo 2001). Simultaneous emergence of large-scale development pressure at Mount Hartman and Hog Island (Rosenberg & Korsmo 2001).
1994	Grenada ratified the Convention on Biological Diversity (CBD; Government of Grenada 2001). Grenada Dove habitat becomes a decisive factor in landfill siting at Perseverance Estate through public consultation (Rosenberg & Korsmo 2001). Approximately half of the Perseverance site occupied by Grenada Doves was clear-cut in anticipation of a quarry (Rusk & Temple 1995, Rusk 2017). IUCN Red List status: Critically Endangered (IUCN 2026).
1995	World Bank ties continued financing of the Solid Waste Project in Grenada to Dove protection, shifting project objectives (Rosenberg & Korsmo 2001). Census focused on two sites after habitat destruction: Perseverance (quarry-related clearing) and Beausejour (road construction and housing development; Rusk & Temple 1995).
1996	Mount Hartman declared a National Park and Protected Area and gazetted, totaling 154.18 acres, with management responsibility vested in the Department of National Parks (Government of Grenada 1996). This was the first formal legal protection for Grenada Dove habitat. Renewed development plans at Mount Hartman conflict with conservation goals and farmer livelihoods (Rosenberg & Korsmo 2001). IUCN Red List status: Critically Endangered (IUCN 2026).
1998	Draft protected area plan for Mount Hartman and Perseverance (Jackson 1998). A census replicated the survey areas used in Blockstein (1991), focusing on sites of known Grenada Dove distribution, although survey effort was reduced in some areas (Rusk 1998). Population estimate: 49–62 (Rusk 1998).
2000	IUCN Red List status: Critically Endangered. Population estimate: 96 (BirdLife International 2000).
2004	Hurricane Ivan resulted in a major shock, causing extensive habitat destruction (Peters 2015), and was later attributed to reduced abundance (Rusk 2017). IUCN Red List status:

Year	Event
	Critically Endangered (BirdLife International 2004). Population estimates: 182 pre-Ivan (Rusk & Clouse 2004); 64–120 post-Ivan (Rusk 2005); 96 (BirdLife International 2004).
2005	Post-Hurricane Ivan evaluation confirms species persistence but highlights continued vulnerability, habitat damage, and altered calling behavior affecting detectability (Rusk 2005; Wunderle 2005). A camera-trap survey in Grenada Dove habitat documented multiple potential mammalian predators and Broad-winged Hawks based on 2,580 camera-hours across seven sites (Twyman 2008). Grenada Dove highlighted as Critically Endangered in regional Caribbean threatened bird assessments (Wege <i>et al.</i> 2005).
2006	Proposed Four Seasons resort development (developed by Cinnamon 88) at Mount Hartman becomes public, raising major conservation concerns due to overlap with Grenada Dove habitat (Rusk 2010a).
2007	Government statements and public controversy about what portion of Mount Hartman Estate was restricted/protected versus developable are reflected in Grenada news (Grenadian Connection 2007a, 2007b). Island-wide Grenada Dove census documents 68 territorial males (136 individuals), indicating a decline relative to pre-Ivan estimates (Rusk 2008). Dry-season fires affected portions of the Beausejour–Perseverance area, contributing to ongoing habitat disturbance in the western Grenada Dove subpopulation (Rusk 2010a, 2017). Population estimate: 136 (Rusk 2008).
2008	Mount Hartman National Park and Protected Area was exempted by Proclamation from section 6(1) of the National Parks and Protected Areas Act, allowing disposal or occupation of the land (Government of Grenada 2008). A detailed account of the Mount Hartman development process, including boundary maps, land conveyances, and a chronological summary of key events, is provided in a case study (Rusk 2010a). Draft recovery and action plan for the Grenada Dove (Rusk <i>et al.</i> 2008). IUCN Red List status: Critically Endangered. Population estimate: 70–120 (BirdLife International 2008).
2009	Protected Areas System Plan reports Mount Hartman National Park as cancelled with intent to reconfigure boundaries and not yet re-established (Turner 2009). Mount Hartman and Perseverance recognized as Important Bird Areas of global significance (Rusk 2009). IUCN Red List status: Critically Endangered. Population estimate: 70–120 (BirdLife International 2009).
2010	Mount Hartman National Park has not been re-gazetted with revised boundaries (Rusk 2010a). Fires affected portions of the Beausejour–Perseverance area during a period of drought, contributing to continued habitat disturbance in the western Grenada Dove subpopulation (Rusk 2010a, Peters 2015). About 1,520 acres were affected by bushfires between 2007 and 2010, largely due to inappropriate land-use practices (Fire Department 2014, cited in Roberts 2015). Environmental Impact Assessment states that the Disaster Vulnerability Reduction Project sub-projects will have no negative impacts on the Grenada Dove or other endangered species (Niles 2010). IUCN Red List status: Critically Endangered. Population estimate: 50–249 (BirdLife International 2010).
2011	Increasingly dry climatic conditions were reported to limit freshwater availability during the dry season, representing an added threat to the Grenada Dove (Rusk 2011).
2012	Research at Mount Hartman found Grenada Dove presence was strongly associated with dense canopy cover, while invasive mongooses were nearly ubiquitous and access to

Year	Event
	freshwater emerged as a key limiting factor (Bolton <i>et al.</i> 2016). IUCN Red List status: Critically Endangered. Population estimate: 87 (BirdLife International 2012).
2013	Predator control programs initiated at Mount Hartman National Park and the Perseverance Protected Area and Dove Sanctuary, targeting invasive mammals, particularly mongoose (Rusk 2016b). Enhanced public engagement efforts began, supported by various stakeholders including corporate sponsors, NGO grants, and government ministries and departments (Rusk 2016b). A range-wide distance sampling survey estimated approximately 160 Grenada Doves, with abundance negatively affected by habitat disturbance and positively associated with vegetation cover and food availability (Rivera-Milán <i>et al.</i> 2015). IUCN Red List status: Critically Endangered. Population estimate: 160 (95% CI: 107–229) (Rivera-Milán <i>et al.</i> 2015); 87 (BirdLife International 2013).
2014	Grenada's Fifth National Report to the Convention on Biological Diversity identified the Grenada Dove as a threatened endemic species and recognized Mount Hartman and the Perseverance area as key biodiversity sites, while noting ongoing challenges related to land use, protected-area governance, and species conservation (Government of Grenada 2014).
2015	During an 18-month predator control program for the Grenada Dove, more than 1,400 mongooses were removed from habitats at Mount Hartman and Perseverance, along with other invasive mammals (Rusk 2015a). IUCN Red List status: Critically Endangered. Population estimate: 110 (BirdLife International 2015).
2016	Long-term population monitoring synthesis extends distribution and monitoring record through 2016 (Rusk 2017). IUCN Red List status: Critically Endangered. Population estimate: 110 (BirdLife International 2016).
2017	IUCN Red List status: Critically Endangered. Population estimate: 110 (BirdLife International 2017).
2018	Opportunistic sampling of molted feathers and eggshells from Grenada Doves at Mount Hartman and Perseverance between 2014 and 2018 indicated low overall genetic diversity, evidence of historical connectivity between the two areas, but limited contemporary gene flow, with higher genetic diversity at Perseverance and a male-biased sex ratio (Peters <i>et al.</i> 2023a). Collected eggshell and feather samples placed the Grenada Dove within a phylogenetic framework, confirming it as a genetically distinct lineage that diverged ~2.5 million years ago and enabling imputed estimates of key life-history traits (e.g., clutch size of two eggs, incubation ~14 days, fledging ~16 days), providing novel information to inform long-term conservation planning (Peters <i>et al.</i> 2022). IUCN Red List status: Critically Endangered. Population estimate: 110 (BirdLife International 2018).
2019	A broader landbird survey conducted in May 2018 and 2019 recorded only three detections of the Grenada Dove (Devenish-Nelson & Nelson 2021).
2020	Continued investor interest and land-use change raised concern over development impacts to three areas of Grenada identified as critical bird habitats and ecosystems: Mount Hartman, La Sagesse, and Levera (BirdsCaribbean 2020).
2021	IUCN Red List status: Critically Endangered. Population estimate: 136–182 (BirdLife International 2021).

Year	Event
2022	The Government of Grenada conveyed two of the three parcels comprising the Mount Hartman Estate to Hartman Group Ltd. for a proposed mega-resort and university town development, with Lot 1 (148 acres; The Attorney General 2022a) and Lot 2 (114 acres; The Attorney General 2022b) transferred under separate conveyances. Survey boundaries associated with these conveyances indicate that the remaining National Park parcel, i.e., Lot 3 (188 acres), does not correspond to the acreage originally gazetted as protected area (i.e., 154.18 acres; Government of Grenada 1996), and that a portion of the formerly protected land located within Lot 2 was sold (The Attorney General 2022b).
2025	Passive acoustic monitoring of the Grenada Dove at Mount Hartman initiated by St. George's University. Camera trapping and territory mapping at both Mount Hartman and Perseverance conducted in July by the University of Chester; no active nests were found, but cameras documented the following: at Mount Hartman, 54% of cameras detected doves (detection probability: 0.95), with 85% mongoose presence, 100% manicou presence, and 54% feral dogs; at Perseverance, 33% of cameras detected doves (detection probability: 0.33), with 22% mongoose presence, 67% feral dogs, and no manicou recorded (Wise & Geary 2025). The UNDP Climate-Resilient Agriculture for Integrated Landscape Management project, led by Gaea Conservation Network, supported training in passive acoustic monitoring of the Grenada Dove and mongoose trapping in March, and funded additional Grenada Dove nest searches from October to December; no active nests were found (unpublished). Local and international stakeholders convened for a Grenada Dove Conservation Action Planning workshop to assess threats and coordinate recovery actions for the species (BirdsCaribbean 2025). A population viability analysis of the two remaining Grenada Dove populations found extremely high extinction risk, with the Perseverance population projected to go extinct sooner (19.2 years) than the Mount Hartman population (50 years). Extinction risk increased under scenarios of habitat loss from development, disease, and skewed sex ratios, and population supplementation emerged as the most effective management option (Peters <i>et al.</i> 2025).

Appendix 2. Solutions brainstormed by workshop participants for each major threat category during Day 1 of the CAP workshop. These solutions informed the detailed actions developed on Day 2 and included in this Conservation Action Plan. Pink cards indicate threat categories; blue and purple cards indicate proposed solutions.





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