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Tenth Meeting of the Scientific and Technical
Advisory Committee (STAC) of the Protocol
Concerning Specially Protected Areas and Wildlife
(SPA W) in the Wider Caribbean Region

Virtual, 30 January – 1 February 2023

**PROPOSAL BY THE KINGDOM OF THE NETHERLANDS FOR THE
UPLISTING OF THE LESSER ANTILLEAN IGUANA (*IGUANA
DELICATISSIMA*) FROM ANNEX III TO ANNEX II OF THE PROTOCOL
CONCERNING SPECIALLY PROTECTED AREAS AND WILDLIFE
(SPA W PROTOCOL)**

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Proposal by the [Kingdom of the] Netherlands for the uplisting of the Lesser Antillean iguana (Iguana delicatissima) from Annex III to Annex II of the Protocol concerning Specially Protected Areas and Wildlife (SPA W Protocol)



Photograph by Matthijs Van den Burg, with added symbol of the species' IUCN Red List category.

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1 Nomination requirements

1. Requirements regarding species nomination are set forth in Specially Protected Areas and Wildlife (SPAW) Protocol Articles 11, 19, and guidelines and criteria adopted by the Parties pursuant to Article 21. The procedures to amend the annexes, contained in Article 11(4), state that “any Party may nominate an endangered or threatened species of flora or fauna for inclusion in or deletion from these annexes,” and that, after review and evaluation by the Scientific and Technical Advisory Committee, the Parties shall review the nominations, supporting documentation and the reports of the Scientific and Technical Advisory Committee and shall consider the species for listing. Such a nomination is to be made in accordance with guidelines and criteria adopted by the Parties pursuant to Article 21. As such, this nomination addresses the 2014 “Revised criteria for the listing of species in the Annexes of the Protocol Concerning SPAW and Procedure for the submission and approval of nominations of species for inclusion in, or deletion from Annexes I, II and III.” Finally, Article 19(3) lists the type of information that should be included, to the extent possible, in reports relevant to protected species.
2. Article 1 of the SPAW Protocol defines Annex II as “the annex to the Protocol containing the agreed list of species of marine and coastal fauna that fall within the category defined in Article 1 and that require the protection measures indicated in Article 11(1)(b). The annex may include terrestrial species as provided for in Article 1(c)(ii).” Further, Article 11 of the Protocol specifies that “each Party shall, in cooperation with other Parties, formulate, adopt and implement plans for the management and use of such species...”

2 Summary of justification

3. Overall, the Lesser Antillean Iguana is considered among the most threatened, and rapidly declining, reptiles (Van den Burg et al. 2018a). *Iguana delicatissima* qualifies for uplisting from Annex III to Annex II on the basis of the following criteria as set out in the Revised criteria for the listing of species in the Annexes of the SPAW Protocol:
 - Criterion 1; The species has undergone extreme declines throughout its entire range, with numerous extirpated island populations. The remaining island populations are fragmented, and half are becoming extirpated through hybridization, which is a considerable mitigation challenge. The remaining populations, except for one, reside on islands smaller than 2km², and thus extremely vulnerable to stochastic events such as disease and the increasing number of catastrophic hurricanes in the region. Coastal

development and spread of invasive species further threaten these remaining populations.

- Criterion 4; IUCN Iguana Specialist Group experts have assessed this species as Critically Endangered
- Criterion 5; There is a growing interest from the commercial trade in this species through illegal obtainment, despite the species being listed on CITES Appendix II as *Iguana spp.*
- Criterion 6; with only few, small remaining populations that occur in different countries and different jurisdictional regions, regional cooperation is essential for the long-term protection and recovery of *I. delicatissima*. Beyond coordinated direct actions and studies towards the species itself, cooperation on biosecurity issues are extremely important given the proliferation of incursion pathways of *Iguana iguana*; the biggest threat to *I. delicatissima* through hybridization. As the few remaining populations are mostly small in size and occur in four different nations (including several internal jurisdictional regions), cooperation is essential for the long-term survival of this species such as coordinated biosecurity policies and management of genetic diversity for interisland translocation programs.
- Criterion 9; ongoing dramatic declines are at a range-wide scale.

3 Species information

4. In accordance with Article 19(3) of the SPAW Protocol the following information on the species is included in this proposal to list the *Iguana delicatissima* on Annex II of the SPAW Protocol.

3.1 A. Scientific and Common Names of the Species

Classification

- 1 Class: Reptilia
- 2 Order: Squamata
- 3 Family: Iguanidae
- 4 Genus/species: *Iguana delicatissima* (Laurenti, 1768)

Common names

- 1 English: Lesser Antillean Iguana; Synonyms: West Indian Iguana
- 2 French: Iguane des Petites Antilles
- 3 Spanish: Iguana del Caribe
- 4 Dutch: Antilliaanse leguaan

3.2 [Biological data](#)

5. The Lesser Antillean Iguana is a herbivorous, mainly arboreal, lizard that is endemic to the Caribbean Lesser Antilles, where it is an ecological keystone species. The species can grow to a maximum of 44 cm snout-vent length, and maximum total length of 150 cm. The main two characteristics that distinguish it from its sister species *Iguana iguana*, are the absence of black stripes on the tail and the absence of a large subtympenic scale on the lower jaw. Sexual maturity is reached in the 2nd or 3rd year, mainly for female iguanas, given male iguanas need to compete for territory and dominance in order to mate (Van den Burg et al., 2018a). Eggs are laid in nests dug by the adult female, from which hatchlings emerge after an incubation period of three months (Day et al., 2000). Clutch sizes (4-30 eggs) are generally lower than its sister species, dependent on female body size (Knapp et al., 2016). The reproduction cycle slightly differs between islands in northern and southern Lesser Antilles (Van den Burg et al., 2018a). The iguana is a herbivorous generalist and eats leaves, flowers and fruits from a wide variety of native plants (Angin and Questel in prep.). Similar to other iguanine species, the iguana plays an important ecosystem service by consuming fruits, dispersing seeds, and cropping forest canopy foliage. Through nestbuilding it aids in ground and nutritional turnover, and is an important food source for other Lesser Antillean species such as birds of prey and snakes (Knapp et al., 2009; Knapp et al., 2016).

3.3 [Habitat](#)

6. *Iguana delicatissima* species occurs in a wide variety of habitats, including xeric shrub and woodland habitats, coastal woodlands and mangroves, riparian forest, and transitional rainforests up to its elevational limit. Additionally, it can be found in completely undisturbed, as well as highly disturbed areas such as within villages and cities (Knapp and Perez-Heydrich, 2012). The presence of a tree layer or at least a shrub layer being a fundamental criterion for the presence of the species in a habitat, it is thus found most in lowland dry forests or back beach thickets. The Lesser Antillean Iguana is also found around fresh or brackish water environments (ponds, lagoons, mangroves, gullies) if these have a riparian forest in good condition. Finally, it can be found in all forest environments from sea level to 1000 m (Breuil, 2002 ; Knapp et al. 2014; Angin et al., 2015).
7. Recent studies on juveniles have also shown the importance of copses and shrubby strata for the early stages of the young. These habitats are also the main food source for the animals. A diversity of tree species ensures a good food diversity for the animals. Studies on the territory of this species have shown the importance of ecological corridors between habitats to ensure good conservation of populations. Indeed, for reproduction, the females will migrate towards the egg-laying sites which can be separated from other territories by several kilometres. The guarantee

of a healthy habitat, preserved from threats, is a fundamental need for the species (ANGIN.B, 2017).

8. The egg-laying sites are areas with little or no vegetation on a loose substrate (sand, earth, etc.), often located on a slight slope in areas well exposed to the sun (Breuil, 2002). The females will dig a burrow about one metre long and a few dozen centimetres below the surface (Breuil, 2002). In areas where the ground is harder and composed of stones (e.g. îlet Chancel, Martinique), the burrows will be smaller (Breuil, 2002; Knapp et al. 2014).

3.4 Estimated Populations of Species and their Geographic Ranges

Size of populations

9. The species historically occurred on all 12 main-islands between Anguilla and Martinique (including most islets), except for Saba and Montserrat (see Annex 1). Currently, Lesser Antillean iguanas can be found on only six main islands. However, each of these islands has already been invaded by *Iguana iguana* and the native population is slowly decreasing due to hybridization. This process of introgression has not been mitigated on any island despite several past and ongoing efforts. Populations not directly threatened by on-island hybridization occur only on five smaller islets, none of which is larger than 2 km². Overall, the species has seen a distribution decrease of >80%. The vulnerability of this species and the necessity of protecting these remaining populations is therefore critical.
10. The total number of Lesser Antillean iguanas across the region is estimated between 13,000 and 20,000 individuals (Van den Burg et al., 2018a). Critically, the majority (10,000-15,000) of these iguanas occur on a single island (Commonwealth of Dominica), which has recently been invaded by *I. iguana*, which has already resulted in high occurrence of hybridization with the native *I. delicatissima* population (Van den Burg et al., 2020). Only two of the five islands without the presence of invasive *I. iguana* support a population of *I. delicatissima* larger than 200 individuals.

Restrictions on its Range of Distribution

11. The species occurs below 1000 meters above sea level; hence it is absent from several mountainous areas within its range (Knapp and Perez-Heydrich, 2012; Knapp et al. 2014).
12. Both hatchlings and juveniles live predominantly among bushes and low trees, usually in thick vegetation offering protection, basking sites, and a wide range of food. With age they climb higher and inhabit larger trees (Van den Burg et al., 2018a).

Degree of Population Fragmentation

- The historical degree of fragmentation is high given its restriction to islands. However, there is an increase in intra-island population fragmentation because many islands have been invaded by the Common Green Iguana and/or the Indian mongoose causing local extirpations.

Evidence of Decline

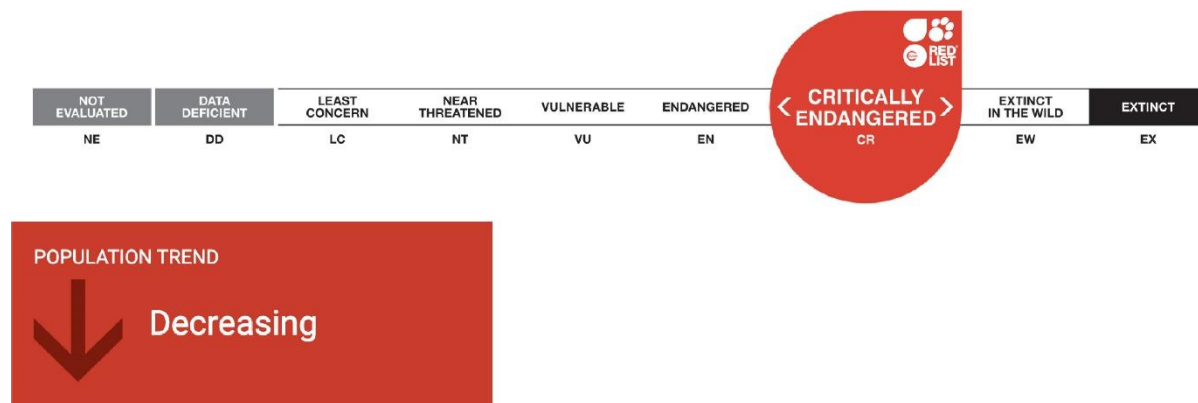


Fig. 1 IUCN global status from <https://www.iucnredlist.org/species/10800/122936983>

- Based on historic range data and an estimated index of abundance, the total population has experienced declines of $\geq 75\%$. Although extirpation from some islands occurred in the early to mid-20th century, the remaining population has continued to decline within the last three generations (33–42 years) (Van den Burg et al., 2018a).
- Importantly, Van den Burg et al. (2018a) estimated that by 2050 only 1% of the current area of occupancy will remain if the spread of *Iguana iguana* to other islands and within occupied-islands is not immediately halted.
- On many islands the species has already become (genetically) extinct. Data on historic population numbers of pure *I. delicatissima* are limited, but the area of their occurrence (via human records and fossil evidence) is well known. On Guadeloupe ($> 1500 \text{ km}^2$), pure *I. delicatissima* populations occurred throughout the island until the 1950s when non-native iguanas arrived. Currently, no native populations are believed to be absent of hybridization, and pure *I. delicatissima* are restricted to only a 10 km^2 area (Angin, 2017).
- Equally, on Martinique, Common Green Iguanas have already replaced *I. delicatissima* throughout the island except for the northern region (Angin, 2017), and it will be extremely difficult to prevent further encroachment.
- On St. Eustatius, an island only recently invaded by non-native iguanas, the population has suffered from agriculture habitat destruction (Reichling, 2000; Fogarty et al., 2004). The

population was recorded to be in significant decline and fragmented across the island in 2000-2004 and the current population has further declined to only a few hundred iguanas (Reichling, 2000; Fogarty et al., 2004; Van den Burg et al., 2018c; Debrot et al., 2021).

3.5 [Status of Legal Protection](#)

National

Anguilla (United Kingdom)

19. Protected under the Biodiversity and Heritage Conservation Act (2009); Act: Government of Anguilla. 2009. Biodiversity and Conservation Heritage Act, R.S.A. c. B43. Anguilla: Government of Anguilla.

Kingdom of the Netherlands

20. Protected under the National Nature Conservation Framework Act BES (Wet Grondslagen natuurbeheer en -bescherming BES), and under the regulations of the St. Eustatius Flora and Fauna Resolution - AB1997 Art 2.

Republic of France

21. Guadeloupe, Martinique, and Saint-Martin: protected according to the ministerial decrees of October 14, 2019 for Guadeloupe and Martinique and January 24, 2020 for Saint Martin.
Saint-Barthelemy: protected under the Code de l'Environnement de Saint-Barthelemy, article 911-2. Annexe Reptiles.

Commonwealth of Dominica

22. Protected under both the Forestry and Wildlife Act, and the National Parks and Protected Areas Act.

Regional

23. Importantly, since the IUCN-status change from 'Endangered' to 'Critically Endangered', based on a long-overdue status update of all island populations, novel legislation that reflects the urgency of this species protection is limited.

International

CITES

24. CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-exports and introduction from the sea of species covered by the Convention must be authorized through a permitting system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that permitting system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species.

The species covered by CITES are listed in three Appendices, according to the degree of protection they need, the Iguana delicatissima are listed on CITES Appendix II as *Iguana spp.* Appendix-II specimens require: an export permit or re-export certificate issued by the Management Authority of the State of export or re-export is required; and an export permit may be issued only if the specimen was legally obtained and if the export will not be detrimental to the survival of the species.

3.6 [Ecological Interactions with Other Species and Specific Habitat Requirements](#)

25. Similar to other iguanine species (Burgos-Rodríguez et al., 2016; de A. Moura et al., 2016), through the process of seed ingestion *Iguana delicatissima* is a disperser of native plants, which has been demonstrated in other iguanas to promote both seed survival and germination rates.

3.7 [Management and Recovery Plans for Endangered and Threatened Species](#)

26. There are currently three action plans dedicated to the protection of *Iguana delicatissima* in the Wider Caribbean region:
- 1 2014-2016 IUCN Species Action Plan (planned to be updated in 2022)
 - 2 French Action Plan specific to Guadeloupe, Martinique and Saint Martin (2017-2022)
 - 3 sub-regional Action Plan for the northern populations (2018-2023); which concerns a collaborative project between stakeholders on Anguilla, St. Barths, and St. Eustatius.
27. Additionally, the species has an ongoing captive breeding program as part of a European Association of Zoos and Aquaria (EAZA) studbook (ESB; European studbook), which is currently in the process of being changed to an EAZA Ex-situ Programme (EEP).
28. Several ongoing efforts are in place to try and halt the spread of non-native iguanas on some islands; St. Eustatius (since 2017; Debrot et al., 2021), La Desirade (since 2018), Martinique (since 2019; Angin, 2017;), and Dominica (since 2018; Van den Burg et al., 2020).
29. Regional cooperation for recovery programs will be essential given the island-distribution of the species not only to boost population sizes but also to prevent genetic inbreeding in small populations either given recent or previous bottlenecks (such as found in the population of St. Eustatius; Van den Burg et al., 2018c).
30. Recently, a dozen iguanas were translocated from the Commonwealth of Dominica to an offshore islet of Anguilla (Prickly Pearl East; Pounder et al., 2021) to strengthen the very small (n = 14) and recently established population of pure *I. delicatissima* that were removed from the main island of Anguilla, where non-native iguanas are displacing the native population since the mid-1990s.

31. There are several collaborative efforts among stakeholder organizations to accommodate knowledge transfer and collaboration. Namely, within the FWI, during annual fieldwork trips to small islets of Guadeloupe and Martinique, the French stakeholders invite personnel from regional stakeholders to participate and learn techniques. On Dominica, shortly after the identification of non-native iguanas, collaborators from the US and St. Eustatius aided the local NGO WildDominique with techniques and initial data collection. Within the sub-regional action plan of the northern islands, personnel from Anguilla, St. Eustatius and St. Barths collaborate both online and during exchange island visits.

3.8 [Research Programs and Available Scientific and Technical Publications Relevant to the Species](#)

32. On St. Eustatius, a research program was initiated in 2015 and has since attracted numerous university students that completed their theses, resulting in several scientific papers and insights (Van den Burg et al, 2018b, 2018c, 2022; van Wagensveld and Van den Burg, 2018). During 2018-19 a local eradication program was completed to address the immediate threat of recently arrived non-native iguanas (Debrot et al., 2021).
33. On Anguilla a program is ongoing in which local stakeholder organizations perform fieldwork on the main island to identify remaining pure *I. delicatissima* within the predominantly hybridized population. If identified, these remaining animals are translocated to Prickly Pearl in order to conserve the Anguilla population of *I. delicatissima* (Pounder et al., 2020).
34. On the Commonwealth of Dominica, a program to capture non-native iguanas and assess their differences with the native *Iguana delicatissima* population is ongoing since 2018 (Brisbane, 2018; Van den Burg et al., 2020).
35. On several islands in the FWI, a population monitoring program has been in place since 2012 using capture-mark-recapture methods (Warret Rodrigues et al., 2021). A genetic study to understand the limits of reproduction of the population of the îlet Chancel is currently in progress. At the same time, an ongoing study and control actions of the Common Green Iguana are underway in Guadeloupe and Martinique to limit and understand its expansion.

3.9 [Threats to the Protected Species, their Habitats and their Associated Ecosystems, Especially Threats which Originate Outside the Jurisdiction of the Parties and recommendations](#)

Non-native species

36. The main threat to *I. delicatissima* is the spread of non-native iguanas within its native range. Common Green Iguanas are much more vigorous reproductively compared to native Lesser

Antillean Iguanas, and hybridization and displacement is rapid post-introduction (Van den Burg et al., 2018a). Current biosecurity measures are insufficient to prevent both the intentional and unintentional transport of these iguanas among islands (Knapp, 2007; Knapp et al., 2014, 2020; Van den Burg et al., 2018c; Van den Burg et al., 2020), and incursions to recently uninvaded islands still occur: St. Eustatius in 2016+2017 (Van den Burg et al., 2018c), La Desirade in 2017 (B. Angin, personal communication), Commonwealth of Dominica in 2017 (Van den Burg et al., 2020).

37. The invasive alien small Indian mongoose, *Urva auropunctata*, is known to depredate young iguanas and eggs causing population extirpations on several islands; e.g., St. Kitts and Nevis (Van den Burg et al., 2018a). Its remaining presence on Lesser Antillean islands also prevents reintroduction programs of *I. delicatissima* to increase the number of its populations.
38. Reintroduction programs will be most feasible on islands without a non-native iguana or a small Indian mongoose population, which are limited to few very small islands.
39. On islands where *I. delicatissima* is still present, other non-native species continue to threaten local populations (e.g., Anguilla, St. Eustatius, Désirade, Saint Barthélemy and Commonwealth of Dominica). Namely, feral cats (*Felis catus*) or chickens predate on hatchling and young iguanas (Van den Burg et al., 2018b, Warret Rodrigue et al., 2021), and can thereby have high impacts on local population size. Only the populations that inhabit small islets are not currently threatened by feral cat and chicken populations. Rats are present throughout the range of *Iguana delicatissima* and pose another known threat by preying on eggs (Warret Rodrigue et al., 2021).
40. Iguanas that enter gardens with unleashed guard dogs also easily fall prey to these domestic animals, even large adult iguanas; which has been reported from both St. Eustatius and Commonwealth of Dominica (Debrot et al., 2013; Van den Burg et al., 2018a).

Habitat destruction

41. Throughout the Lesser Antillean region free-roaming goats and sheep have a large impact on habitat quality (Van Andel et al., 2016; Madden, 2020; Warret Rodrigues et al., 2021); though no study has directly studied that in relation to *Iguana delicatissima*. Most habitat destruction falls under 'Infrastructure development' see point iv below.

Tourism

42. The main current threat of tourism is its potential to act as an incursion pathway. Namely, the largest *Iguana delicatissima* population not directly threatened by on-island non-native iguanas are the Petite Terre islets, southeast of Guadeloupe. One of these uninhabited islands is visited daily by several boats with tourists that depart from Grande-Terre where *I. delicatissima* is

extirpated and only large non-native iguana populations occur. Although some educational efforts are ongoing to inform both the companies and individual tourists of the threatened status of the species, additional negative impacts besides the invasion of non-native iguanas remain, e.g., feeding of iguanas with processed and unnatural food sources or the transport of new pathogens (Angin, 2017, French et al., 2022).

Infrastructure development

43. Although most habitat was previously destroyed for agricultural purposes, coastal development currently is the main threat to remaining habitat and communal nesting sites in the Lesser Antilles (Knapp et al., 2014; Van den Burg et al., 2018a). Several islands are undergoing increased development in their coastal region.
44. Chicken-wire fences form a trap for iguanas which cannot free themselves and die from dehydration/starvation (Rodrigues et al., 2012; Debrot and Boman, 2014; Angin and Guiougou, 2015; Van den Burg et al., 2018b). Although its negative impact on iguana populations have been described, there are no indications that this fence type will be phased out or removed, given they are preferred over other types of fences due to price.
45. Roads mainly form a threat to migrating adult female iguanas (Curot-Lodéon, 2016; Knapp et al., 2016), though to any individual as well including recently emerged hatchlings (Debrot and Boman, 2014; Knapp et al., 2014; Van den Burg et al., 2018b). This has been mainly studied on the Commonwealth of Dominica where female adult mortality rises during the nesting season when females migrate from their home range to the coast to nest (Knapp et al., 2016). An awareness campaign however, reduced mortality by 50%.

Hunting

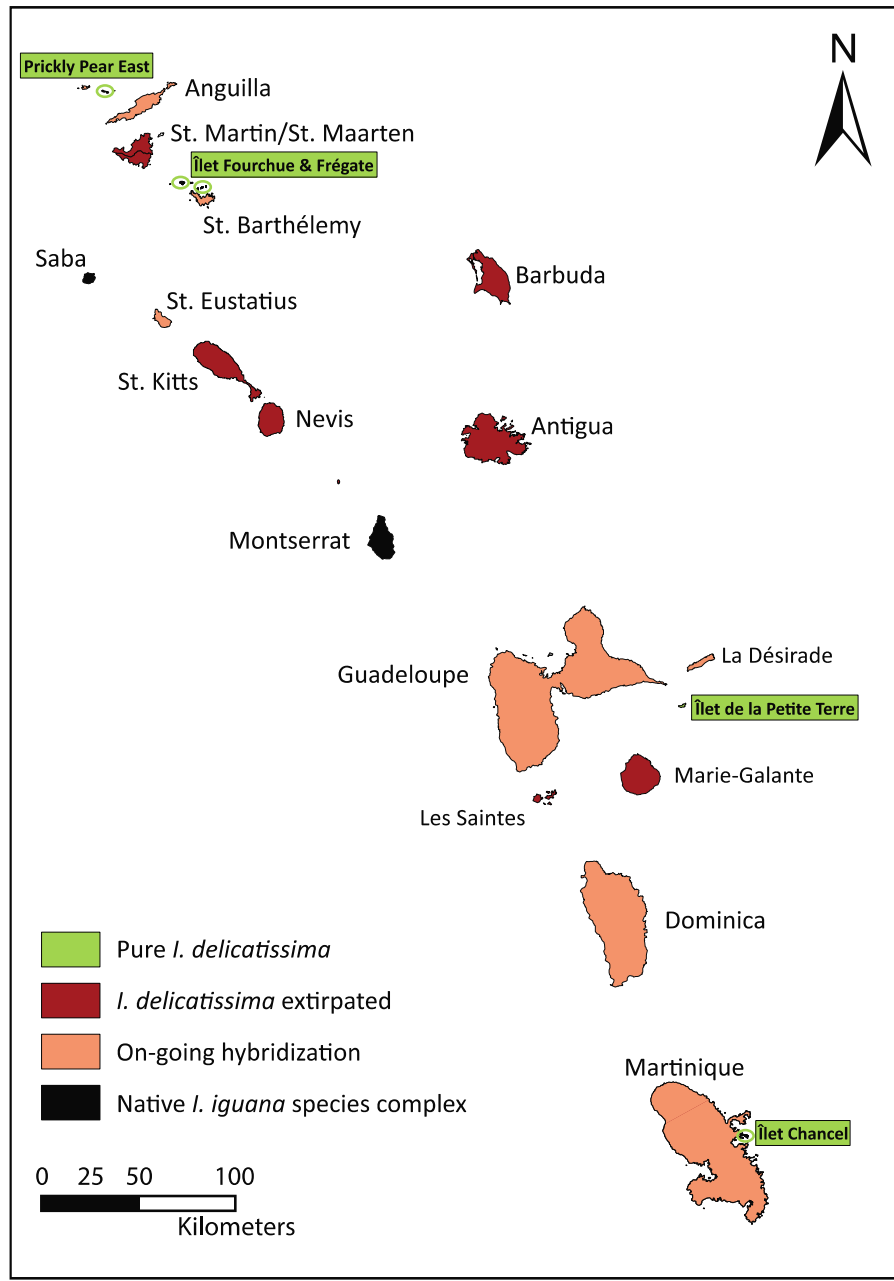
46. Although forbidden by local legislation and believed to becoming less popular, *I. delicatissima* is still hunted and consumed on several islands across the Lesser Antilles (Breuil, 2002; Debrot and Boman, 2014; Knapp et al., 2014).

4 Discussion points and recommendations

47. As summarized in section 1 of this document, the listing of the presented species is justified based on a variety of criteria set out in the Revised criteria for the listing of species in the Annexes of the SPAW protocol.

48. The species has suffered an extreme decline evaluated above 80% according to distribution and population assessments. This species is further highly vulnerable to non-native species, both sister iguana species as well as feral species, which continue to spread and invade additional populations (criterion #1). Second, the IUCN status is Critically Endangered with a decreasing trend in population numbers (criterion #4). It has been listed in CITES Appendix II (criterion #5).
49. Regional cooperation will be essential for the survival of the species because hybridization and predation by non-native species is a significant cause of decline and these factors often originate off islands. Moreover, due to the small sizes of the remaining populations, recovery plans for islands with existing and extirpated populations (reintroductions) will need to consider augmenting genetic diversity from other sources and improve biosecurity collaboration to halt any novel incursions (criterion #6).
50. The need for cooperative protection of species with transboundary ranges are evident. Corporative policies for *I. delicatissima* are crucial because of the species resides in in four countries, including multiple jurisdictional regions within the French territories.

5 Annexes



Annex 1. Current distribution of *Iguana delicatissima* within its historic Lesser Antillean range, including status of extinct and invaded populations.

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