Invasive Species Threats in the Caribbean Region

REPORT TO THE NATURE CONSERVANCY

PREPARED BY

Moses Kairo and Bibi Ali

CAB INTERNATIONAL
Caribbean and Latin American Regional Centre
Gordon Street, Curepe
Trinidad & Tobago
West Indies

Oliver Cheesman, Karen Haysom and Sean Murphy

CABI Bioscience
UK Centre (Egham)
Bakeham Lane, Egham
Surrey, TW20 9TY
United Kingdom

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

The project reported here represents the first concerted attempt to collate and synthesise information on threats posed by invasive species in the insular Caribbean.

The synthesis was based on direct interaction and input from a range of stakeholders throughout the region. With few exceptions such as Cuba, and the Netherlands Antilles, it is anticipated that views expressed are largely representative of the regional status of invasive species issues.

A database comprising a range of information on of invasive species was developed. The database can be queried using various search parameters. At present it contains information on 552 species. The information included varies from species and is reflective of the status of knowledge. The database is not complete and there is much additional data/gaps to be filled.

The status of individual species in all broad community types (marine, freshwater and terrestrial) varies between islands but an attempt was made to identify the most serious threats at the regional level. It should be noted however, that priority species will vary from island to island and additional information will be required before completing the prioritization process

A database with contact details and areas of specialization for more than 250 people interested in invasive species issues in the Caribbean was compiled.

Current governmental regulations with relevance to invasive species were reviewed. Generally, specific legislation dealing with invasive species within the Caribbean is lacking. Much of what is available is outdated and does not satisfy agreed-upon international conventions and treaties.

Notwithstanding the efforts to update some legislation by certain countries, the risk, however, is that piecemeal updating of legislation will not lead to true harmonisation but will instead mean that the existing patchwork legal framework is simply replaced by a more modern patchwork legal framework in the Caribbean region.

The present effort has initiated a process of collation of species information into a database. This needs to be built further, gaps in present information filled for each island.

Priority areas which require action are identified. This includes development of national and regional policies and strategies, specific action plans to deal with present and potential problems, framework for exchange of information, capacity building etc.

2 INTRODUCTION

2.1 Invasive Species: key issues and threats

Invasive species in the form of weeds, pests and diseases afflicting crops and livestock have been recognised as a threat to agricultural systems for centuries. However, they are now recognised as having an ever-increasing impact on a broad range of socio-economic activities. Increasingly, invasive species are seen as a threat to indigenous biodiversity, through their impacts on natural and semi-natural habitats and ecosystems. Invasive species are now widely cited as the second greatest global threat to biodiversity, after habitat destruction. Of course, these two phenonmena can interact: habitat destruction can make areas more vulnerable to invasive species, and species invasions can result in the destruction of habitats.

2.1.1 Definitions

The study and management of invasive species, although attracting substantially increased attention in recent years, has not been assisted by a lack of clarity in definition of fundamental terms. This project has not set out to solve this problem, but has adopted a pragmatic approach, based on the following loose definitions:

An **invasive species** is one whose establishment and (often rapid) spread threatens ecosystems, habitats or species.

Many invasive species are **alien** (= non-native, non-indigenous, foreign or exotic), having been deliberately or accidentally introduced to an area from their native range, or from another site of introduction. Most alien species do not become naturalized and those that do become naturalized do not all become invasive.

Indigenous species, as well as alien species, may become invasive, usually in response to environmental change (typically human-mediated habitat disturbances). For example, the Bermuda Cedar *Juniperus bermudiana*, an endemic tree, spread across Bermuda after human colonisation, establishing a virtual monoculture in many areas that had previously supported more diverse plant communities (Wingate, 2001). Ironically, the Bermuda Cedar was subsequently almost wiped out by an invasive exotic scale insect, and has now largely been displaced in the local plant community by non-native *Casuarina*.

2.1.2 Impacts of invasive species

The impacts of invasive species can be ecologically complex, operating at ecosystem, habitat, community, species and even genetic levels. At the simplest level, indigenous species may be threatened directly by the proliferation of a predator or competitor. However, cumulative effects across biological scales can result, for example, in complex changes in the availability of resources (nutrients, light, oxygen), the dynamics of competition for resources, and ecosystem structure and function. An example is the deliberate introduction of the highly invasive Australian native tree, *Melaleuca quinquenervia* into Florida and the neighboring Bahamas Islands. This species poses a severe threat to biodiversity because of its strong tendency to form virtual monocultures, but also as a result of its allergenic characteristics, high flammability, and

alteration of hydrological regimes through soil accretion (Center *et. al*., 2000). Even where populations of indigenous species are not entirely extirpated by invasive species, their genetic constitutions may be affected (selective loss of genotypes, changes to the gene pool, hybridisation).

Globally, the United Nations Environment Programme (UNEP) has estimated that invasive species represent a major factor in the potential extinction of 30% of threatened bird species, and 15% of threatened plant species. Overall, approximately two-thirds of species extinctions may involve competition with invasive species. More alarmingly, invasive species are considered to be THE greatest threat to biodiversity in geographically and evolutionarily isolated systems such as islands of the Caribbean.

As with ecological impacts, the economic and socioeconomic impacts of invasive species are complex and often difficult to quantify. Mack *et al* place this number at $138 billion/year in the US alone. Invasive species can damage buildings and other structures, obstruct waterways, and disrupt transportation. Their effects can negatively impact on agriculture, aquaculture, forestry and tourism, and reduce the amenity (and other) value of land, Invasive species may have impacts on human health, through the spread of disease agents and their vectors. The impact of invasive species on the wide range of "ecosystem services" on which the health of the biosphere and human populations ultimately depend are particularly difficult to quantify.

2.1.3 A growing problem

The occurrence of invasive species problems has increased in recent years, and is likely to increase further, as a consequence of expanding global trade and increased international movement of humans, biological material and other commodities. This increased traffic provides a range of pathways for the introduction of alien species (for example, see Wittenberg & Cock, 2001). Whilst most invasive species problems arise from such introductions, it should be noted that (according to the very approximate "tens rule" – for example, see Williamson, 1996) only around 10% of introduced alien species become established in a new environment, and only around 10% of these become invasive.

The increasing recognition of invasive species as an environmental and sustainable development issue is emphasised by the explicit reference to the problem in the United Nations Convention on Biological Diversity (CBD). Article 8h of the CBD calls on signatory nations to *"Prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species."* This was reaffirmed at the Sixth Conference of Parties Meeting at the Hague in 2002 which explicitly calls for action to prevent and mitigate impacts of invasive alien species in Decision VI/23 (http://www.biodiv.org/decisions/default.asp?lg=0&dec=VI/23). Commitment to such measures to promote the global sustainable development agenda have since been reaffirmed in other for a such as the Millennium Declaration, and there have been calls for urgent and decisive action on the special needs of small island developing states (SIDS) by implementing the Barbados Programme of Action (Appendix 1).

2.1.4 Dealing with invasive species

In terms of practical solutions to the invasive species problem, there can be little doubt that prevention is better than cure. Eradication programmes are expensive and in many cases simply impractical. Early detection and control of species invasions are more likely to prove effective

and sustainable. Relevant infrastructure already exists (to a greater or lesser extent) in the agricultural sector, both in terms of regulatory frameworks and mechanisms for implementation. There is a need to build on existing facilities wherever possible, and to broaden the scope of regulations and their implementation beyond purely agricultural concerns. Global experience suggests that two particular obstacles in such a process are a lack of baseline information on invasive species, and a low level of awareness of the threats that they represent. Awareness needs to be raised at all levels of society, from public to policy-makers. A particular challenge arises from the fact that many of the major pathways for species introductions (those related to trade and tourism, for example) are critical to national economies.

2.2 Invasive Species and Islands

As noted above, invasive species are now considered to represent the greatest threat to island biodiversity and habitat loss. There are two main factors to be considered here.

Firstly, islands are particularly valuable centres of biodiversity. Their physical isolation from the continental mainland, and the dynamics of natural colonisation and local evolutionary adaptation that result, often leads to the development of unique biotas. Endemism is a common feature of the flora and fauna of islands.

Secondly, islands appear to be particularly vulnerable to the impact of invasive species. A number of reasons have been suggested for this, including: low density of indigenous species (providing for greater vacant niche space and less competition than would be found on the mainland), the small size of island populations (rendering them prone to extinction), evolutionary effects of isolation on island species (leading, for example, to loss of defensive behaviours and consequent vulnerability to introduced predators). Other factors that have been cited as increasing the impact of invasive species on islands include release of introduced species from natural enemies (predators and competitors that regulate their numbers in continental populations are absent), and patterns of human exploitation of islands (many New World islands were colonised by Europeans before the continental mainland, were important trade centres with substantial international traffic in commodities, and have acquired very high density human populations).

2.3 Invasive Species and the Caribbean

The Caribbean region is regarded as one of the world's biodiversity "hotspots" (Myers *et al*., 2000): it supports some 7000 species of endemic plants and 779 endemic vertebrates (148 birds, 49 mammals, 418 reptiles, 164 amphibians). Invertebrate endemism is also extensive in the region, but relatively poorly documented. For example (excluding the highly South American-influenced fauna of Trinidad & Tobago), some 40% of Caribbean butterflies are known only from a single island (Smith et al., 1994). Further information on Caribbean biodiversity is available at: http://www.biodiversityhotspots.org/xp/Hotspots/caribbean/.

Human-mediated species extinction on the islands of the Caribbean, as elsewhere, has resulted from a combination of factors, including the impacts of invasive species. Case *et al*. (1992) and Whittaker (1998) report that several Caribbean reptiles appear to have been lost during the initial

human (Amerindian) occupation of Caribbean islands, including Hispaniola and Puerto Rico. Many other species have become extinct (or extremely rare and vulnerable) in the more recent past. Amongst the species lost entirely from the region were giant tortoises *Geochelone* spp, once present on the islands of the Bahamas, Mono Island and Curaçao and the Caribbean monk seal (*Monachus tropicalis*) which was formally declared extinct in the 1996 (IUCN Red List of Threatened Animals).

Morgan & Woods (1986) and Whittaker (1998) consider the fate of Caribbean land mammals, and report that as many as 67 out of 76 species (88%) have become extinct in the last 20,000 years, including all 3 known primates and 16 known Edentata. Indigenous rodents and Insectivora are still represented in the region, but have lost many individual species. Late Pleistocene extinctions may be attributed to changes in climate and sea level, but 37 species extinctions post-date human occupation of the Caribbean (from around 4500 years ago). Bats appear to have fared better, with eight out of 59 species lost, possibly because they proved less susceptible to human activities. For further consideration of the development of the mammalian fauna of the Caribbean, see chapters in Woods & Sergile (2001).

Many species of animals, plants and even microorganisms have been introduced to the Caribbean, either accidentally or deliberately, for a variety of reasons. The Small Indian Mongoose (*Herpestes auropunctatus*) provides a widely-cited example of the environmental damage that has resulted from such introductions. This species was deliberately imported as a biological control agent against rats in sugar cane fields, first being successfully introduced in the Caribbean to Jamaica in 1872 (Cock, 1985). In Jamaica, it has subsequently been linked to the extinction of five endemic species: one lizard (*Celestrus occiduus*), one snake (*Alsophis ater*), two birds (*Siphonorhis americanus* and *Pterodroma caribbaea*) and one rodent (*Oryzomys antillurum*). In the years following its establishment in Jamaica, the mongoose was spread to many other Caribbean islands, and has had similar devastating impacts on their biodiversity (for example, in Cuba it has been identified as one of the main agents responsible for the decimation of endemic insectivore populations).

It should be noted that such experiences have led to substantial refinements in the practice of biological control, which can provide an exceptionally cost-effective and sustainable means of managing invasive species. Cock (1985) provides a history of biological control introductions in the Caribbean up to 1982 but there is little comparable information on other introductions.

2.4 Prospects for Invasive Species Management in the Caribbean

Capacity to tackle invasive species issues at a national level vary considerably amongst the countries of the insular Caribbean. Although some have conducted valuable reviews of baseline data (such as that carried out in the preparation of the Bermuda Biodiversity Strategy and Action Plan), most have not yet collated relevant information. Where relevant regulations and infrastructure exist at a national level (generally in relation to the agricultural sector), there is often a lack of capacity and enforcement.

Recent experiences with a number of major invasive pests in the Caribbean, such as the introduction and rapid spread of the Pink Hibiscus Mealybug (*Maconellicoccus hirsutus*), have

served to emphasize the regional nature of these threats (Kairo, 2000). A regional response to the invasive species problem is an attractive proposition. International support is available for the development and implementation of regional strategies against island invasive species. The Invasive Species Specialist Group of the IUCN/Species Survival Commission (ISSG), for example, assisted in the review and strategy development process for the Pacific (see below). Also, the Global Invasive Species Programme (GISP) counts amongst its specific objectives the facilitation of regional initiatives against invasive species.

The current "state of the art" regional strategy for addressing the island invasive species problem is that for the Pacific (Sherley, 2000). The South Pacific Regional Environment Programme (SPREP) have produced an assessment of invasive species issues in the region, combining technical reviews of terrestrial and freshwater invasive species, an account of relevant legislation, an assessment of pathways by which species introductions occur, and a draft regional strategy for invasive species. The emphasis is on invasive species that threaten biodiversity, rather than on agricultural pests and species affecting human health. Marine issues have been dealt with under a different programme of the SPREP.

In the development of the draft regional strategy presented in Sherley (2000), SPREP recognised the following as key generic issues underpinning the invasive species problem in the Pacific:

- shortage and inaccessibility of scientific information on basic biology (for risk assessment and development of management strategies)
- lack of awareness of the impacts of invasive species on indigenous biodiversity
- insufficient networking mechanisms for dissemination of information (particularly to relevant decision-makers and government officials)
- poorly developed mechanisms for co-ordinated and collaborative action on invasive species management across the region
- failure to address invasive species impacts on biodiversity in existing legislative and regulatory frameworks and cross-sectoral policies
- inadequate enforcement of existing legislation (in some cases)
- shortage of technically trained personnel
- inadequate quarantine and risk assessment infra-structure
- insufficient funding to develop infra-structure, train personnel and develop risk assessment and invasive species management mechanisms

The draft strategy outlines the measures necessary to overcome these impediments, to be implemented (or at least co-ordinated) at a regional level wherever possible.

There is little doubt that the same generic issues (as identified in Sherley (2000) for the Pacific, and summarised above) apply to the invasive species problem in other island regions, such as the Caribbean. This development by the SPREP of a strategy to address these issues, at a regional level, in the Pacific is encouraging. It is apparent, however, that availability of funding (and political will) will represent the ultimate constraint on further development and implementation of this strategy.

In the Caribbean, a range of regional and extra-regional institutions, instruments and programmes already exist that could assist in the development and implementation of a regional initiative to address the invasive species problem. Some of the key players are listed below. More details are provided in Appendix 1**.**

- BirdLife International (http://www.birdlife.net/)
- CAB International (http://www.cabi.org/))
- Caribbean Conservation Association (http://www.ccanet.net/)
- Caribbean Natural Resources Institute (http://www.canari.org/)
- Caribbean Network for Integrated Rural Development **(CNIRD)(**http://www.cnird.org)
- Caribbean Regional Environment Programme **(CREP)** (http://crep.ccanet.net/)
- **CARIFORUM** ((http://cariforum.org/about.htm))
- Food and Agriculture Organization of the United Nations (FAO)((http://www.fao.org)
- Global Strategy on Invasive Alien Species (GISP)
- http://globalecology.stanford.edu/DGE/Gisp/index.html
- Inter-American Biodiversity Information Network **(IABIN)** (http://www.iabin.net/)
- Invasive Species Specialist Interest Group **(ISSG)**(http://www.issg.org)
- Island Resources Foundation **(IRF**)(http://www.irf.org/)
- Organization of American States **(OAS)(**http://www.oas.org/)
- Organization of Eastern Caribbean States **(OECS)(**http://www.oecs.org/about.htm)
- The Association of Caribbean States **(ACS)(** http://www.acs-aec.org/)
- The Caribbean Community and Common Market (CARICOM)(http://www.caricom.org/)
- The Nature Conservancy **(TNC)(**http://nature.org)
- UK OT Environmental Charters (http://www.ukotcf.org/)
- UK Overseas Territories Conservation Forum (http://www.ukotcf.org/)
- UN Economic Commission for Latin America and the Caribbean – Caribbean Development and Co-operation Committee (ECLAC)(http://www.eclacpos.org/Default.htm)
- UNEP Caribbean Environment Programme and Cartagena Convention and SPAW Protocol (http://www.cep.unep.org/)
- World Conservation Union **(IUCN)(**http://www.iucn.org)
- World Wildlife Fund **(WWF)(**http://www.panda.org)

2.5 The complexity of the Caribbean as a geopolitical region

In assessing the geopolitical character of any region, difficulties arise in definitions and understandings of terms such as region, country, nation, state, territory, etc. It is surprisingly difficult to define the boundaries of the Caribbean region. In its broadest sense, the Caribbean encompasses a widely distributed and geopolitically diverse group of islands, and a small number of associated countries on the central and south American mainland. This reflects historical associations: Guyana and Belize, for example, are often included in the Caribbean because of their former status as British colonies. It is the insular Caribbean (islands) with which we are concerned here.

A number of the Caribbean countries have, in the last 50 years, won independence from Britain. Consequently, terms referring to old island groupings based on the former British colonies are still used, but in an increasingly ambiguous sense: British West Indies, British Windward Islands, etc. Overall, the number of terms used for island groupings within the Caribbean, and their inconsistent usage, can cause confusion.

The complexity of the insular Caribbean is exacerbated by the diversity of political systems under which particular islands and countries are administered. To a large extent, this reflects the colonial history of the islands. Currently, the region includes territories that are administered to a greater or lesser extent by the US, UK, French and Netherlands governments, as well as a number of independent states. The variations in the systems of governance in each of the countries of the insular Caribbean, along with other administrative, geographic, demographic, historical and economic information further illustrates the diversity and complexity the Caribbean region.

The historical complexity of the insular Caribbean is significant in shaping not only the current political arrangements of particular countries, but in determining the range of cultures that have contributed to the development of the islands, the nature of current relationships between countries, and ultimately the sense of identity felt by the population of the region. In turn, each of these factors contributes to the internal dynamics of the region, and the way in which it interacts with the international community. Not surprisingly, these characteristics are themselves complex. However, attempts at forming regional institutions (in particular) demonstrate the desire of the Caribbean to foster internal stability and present a strong regional identity to the world. Unfortunately, another layer of complexity exists in the diversity of regional institutions that have arisen.

Regional actions to address invasive species in the Caribbean are therefore yet to develop. However, three Caribbean countries (Bahamas, Dominican Republic and Jamaica) are participants in an inter-American initiative. The IABIN Pilot Project is developing the Invasives Information Network (I3N) to begin exchanging information on invasive species in the Americas. The benefits of this project include: the fostering of scientific and technical cooperation, support of decision-making by providing access to key information, national capacity building, development of new tools for information sharing and the promotion of common standards. However, a Caribbean-specific initiative (which could feed into such inter-American programmes) would be highly beneficial.

3 CURRENT PROJECT

The current project proposed the following:

- The collation of data on individual invasive species, across all taxa, known from the Caribbean region.
- A review of current government policy and regulations, and strategies of key non-governmental organisations, in individual Caribbean states and regionally.
- An assessment of current (and potential future) threats and impacts of invasive species in the region, including key pathways for movement, elements of vulnerability to invasion, opportunities for mitigation and prevention, etc.
- Identification of gaps in current knowledge, regulation and understanding of threats and impacts.
- Priority setting for future initiatives.

Specific proposed outputs were:

- A summarised account, in tabular format, of documented invasive species of the Caribbean, grouped by taxon, broad natural community type, and area of occurrence, with notes on the significance of their impacts.
- An overview of the biological and socioeconomic impacts of invasive species in the Caribbean, incorporating an analysis of current (and potential future) threats and impacts of invasive species in the region, including key pathways for movement, elements of vulnerability to invasion, opportunities for mitigation and prevention, etc.
- A summary of governmental and non-governmental activities in relation to invasive species in individual Caribbean states, in the context of the particular issues pertaining to each state.
- A description of regional and other international collaborative activities in relation to invasive species in the Caribbean.
- A set of contact information for key individuals and organisations engaged in work on invasive species in the Caribbean.
- An analysis of gaps in current knowledge, regulation and understanding of threats and impacts.
- Recommendations for future initiatives, including an assessment of the opportunities for the development and implementation of threat-reduction strategies in relation to invasive species in the Caribbean.

4 METHODS

4.1 Defining the Caribbean

The insular Caribbean, which is more or less synonymous with the West Indies or the Antilles, can be considered as comprising three major island groups: the Bahamas, the Greater Antilles and the Lesser Antilles. Bermuda may be included as a separate entity in the Wider Caribbean, as it is here.

The Bahamas, biogeographically if not administratively, include the Turks & Caicos Islands. The Greater Antilles comprise Cuba, Jamaica, Hispaniola (Haiti and the Dominican Republic) and Puerto Rico. Biogeographically, the Virgin Islands (US and British) may also be included in the Greater Antilles, although they are often included amongst the Leeward Islands (see below). The Cayman Islands are also biogeographically part of the Greater Antilles. The Lesser Antilles comprise two further island groups, the Windward Islands and the Leeward Islands, plus Trinidad & Tobago and Barbados.

The Leeward Islands (the northern island group of the Lesser Antilles) comprise Antigua & Barbuda, Montserrat, Anguilla, St Kitts & Nevis, Guadaloupe and its dependencies (Marie Galante, La Désirade, St Barthélemy and Iles des Saintes), St Eustatius, Saba, and St Martin/St Maarten (an island split administratively between France and the Netherlands). The Leeward Islands may also be considered to include the US and British Virgin Islands (but see above).

The Windward Islands (to the south) comprise Martinique, Dominica, Grenada, St Lucia, and St Vincent & the Grendines.

A further group of islands off the north coast of Venezuela, which may or may not be included in the broad grouping of the Lesser Antilles, include the Dutch islands of Aruba, Curaçao and Bonaire. This loose grouping also includes the Venezuelan administered islands of Los Roques, La Tortuga, Margarita and Blanquilla, but (confusingly) these tend to be regarded as satellites of South America rather than as part of the insular Caribbean.

In addition to these broadly geographical groupings, there are politically-based groupings: the Netherlands Antilles (Aruba, Curaçao, Bonaire, St Maarten, St Eustatius, Saba); the French Antilles (Martinique, Guadaloupe and its dependencies), and the (Wider) Carribean UK Overseas Territories (Anguilla, Bermuda, British Virgin Islands, Cayman Islands, Montserrat, Turks & Caicos Islands).

In order to provide a consistent basis for our coverage of the Caribbean, a list of "target" countries was drawn up. This is included here as **Appendix 2**.

4.2 Information collation and synthesis

4.2.1 List of contacts

To begin the collation of information, an initial list was prepared of relevant experts, resource persons and practitioners within and outside the region. As well as drawing on in-house

knowledge, numerous databases were searched for relevant contacts. This list was used as the foundation for the future work and was modified as the project progressed.

4.2.2 Questionnaire and emails

A simple questionnaire was developed to generate interest and provide direction for further investigations **(Appendix 3)**. The questionnaire sought to obtain specific information with respect to invasive species on individual islands and on a regional basis, as well as to test the level of awareness that existed within the region on the problem of invasive species and their management. In addition, it was used as a tool to facilitate the further addition of resource persons, institutions and projects to the database. Complete English, French and Spanish translations of the questionnaire were circulated via email.

In addition to direct communication with those experts with knowledge of invasive species within the Caribbean region, the questionnaire was circulated via the following electronic mailing lists: <Caribbean Biodiversity> <Caribbean Conservation Association>,<Caribbean IPM>, <Virgin Islands Resource Management Cooperation>, <Carib-Territories> and <Caribbean Coral Reefs>.

4.2.3 Electronic workshop

Following the collation of responses from the questionnaires, an electronic workshop was initiated. The major objective of the workshop was the identification of priorities for action on invasive species at national and regional levels. The workshop commenced on April 4th 2003 and was conducted for 3 weeks (ending on April 30th 2003).

The workshop was conducted using the groups platform provided by Yahoo (http://www.yahoogroups.com). This provides an easy means for exchanging e-mails within a group with varying degrees of control over the process.. The group was titled carib_ias_threat with the home page located at http://groups.yahoo.com/group/carib_ias_threat and a group email address at carib_ias_threat@yahoogroups.com. Resource materials were located at http://www.cabi-bioscience.org/html/clarc.htm or by going directly to http://www.cabi-bioscience.org/html/e_workshop.htm.

Three documents were posted in pdf format on this website to provide resource information. These documents were also forwarded as text files upon request. The materials comprised: a draft document, providing an initial general list of invasive species listed by country and a summary of the major issues raised in questionnaire responses (**Appendix, 4-6)**.

Dr. Moses Kairo, Caribbean and Latin America Regional Centre of CAB International moderated the electronic workshop. The proposed discussion topics included:

- Prioritization of invasives nationally/ regionally using Table 1 as the foundation document.
- Assessment and examination of existing policy frameworks and legislation on invasive species management, and opportunities for improvement (with the possibility of using existing agricultural policies for wider invasive species issues).
- Characterization of the threats and impacts of invasive species.
- Identification of knowledge gaps.

- Development of recommendations for improvements and opportunities for partnerships to reduce the threat of invasive species, with special focus on those with multiple-site impact.

Participants were identified based on the continuously upgraded contact database. They were also invited to forward the workshop invitation to anyone who may have been interested in being part of the workshop. During the workshop summaries of the discussions were collated and circulated on two occasions (**Appendix 7)**. Attempts were made to facilitate non-English speakers as need arose.

4.2.4 Literature search

Data on invasive species were also obtained through literature searches using existing databases, relevant internet websites, reports (workshops, research, meetings), proceedings of conferences, journal articles and texts.

Legislation from different countries with relevance to invasive species was reviewed. The review was restricted to materials available at the Hugh Wooding Law School in Trinidad. This did not provide complete coverage and some countries were missed out. However, material from 12 territories was examined (Table 7).

4.2.5 Direct communication

In addition to direct communication with a range of relevant technical experts, correspondence was initiated with the Permanent Secretaries of all the relevant ministries of agriculture, health, environment and tourism in the island countries involved in the surveys and a few responses have been received.

4.3 Databases

The information from the various activities described above was used to develop two databases – one for invasive species information and the other for contact details.

4.3.1 Invasive Species Database

The data capture for this database was intended to be as accurate and as comprehensive as possible at an island level. For this purpose, a range of data fields was identified. Inevitably, gaps in information (the identification of which represents a critical feature of an assessment of this kind) resulted in many records being incomplete. Information from the database was used to generate answers to relevant queries, which aided in the preliminary prioritization of invasive species at national and regional levels.

The current database has a list of entries with a specific computer generated identification number that stays with that record and can be used to link data between different tables. Also included are the relevant sources of reference for the particular species input. All the information in the database is arranged by species i.e. each record holds data on a single species as follows:

- The species name, synonyms and common names by country.

- The type of organism - plant, bird, mammal etc. and the broad natural community type - terrestrial, marine or freshwater.
- Native distribution in countries worldwide as well as non-native distribution in the Caribbean and any further available information on non-native distribution in Caribbean below country level.
- Introduction, dispersion, naturalization with dates of introduction by country. This includes Caribbean countries where species is naturalised only, naturalised and invasive with the general reasons for introduction and factors contributing to spread in the Caribbean.
- The habitats in which the species has established and any further information on habitat with a summary of the species impacts in different locations and the key aspects of species biology.
- Any Caribbean countries with risk assessments and further information on risk status which describes the extent of work or where risk assessment conclusions vary among countries, the agencies involved and the programmes.
- Brief description of management approaches and any other relevant information.

4.3.2 Contacts Database

This simpler database contains information on individuals and organizations: name, title, organization, contact information and a brief description of their work and areas of interest. As well as collating information on government agencies and projects in invasive species management, data are also included on those non-governmental organizations that are presently (or potentially) involved.

5 RESULTS

5.1 Invasive species database

The following sections provide information on invasive species in the Caribbean. This has been compiled from resource documents and personal communications during the course of the present project. It should be noted that the exercise was limited by time and the lists are in no way complete. Much additional data has yet to be incorporated into the database. This includes more detail on listed species as well as incorporation of additional species. It should also be emphasized that for many species there is a dearth of quantitative information on the ecology and socio-economic impact. Nevertheless, queries were run on the database as it stands and the results are presented below.

A total number of 552 species were reported alien to the Caribbean region, including 390 species regarded by one or more authors / respondents to be naturalized (established in the wild) or invasive (established and spreading or constituting a biological, environmental or socio-economic threat to the region). The complete list of species encountered in this review is given in **Appendix 8**.

Table 1 shows the number of species reported alien or naturalised / invasive by country. Numbers reported reflect a combination of the true number of species reported alien, or alien naturalised / invasive, the size of the island and number of habitats within it for colonization, the proximity to neighbouring islands or the American mainland and the recording infrastructure. The countries with the largest number of reported alien species were Dominican Republic (186) species], Puerto Rico (182) species], Bahamas (159) species], and Jamaica (102) species]. Fewer species were reported in other countries and it would be particularly beneficial to conduct further monitoring and research in islands such as Bonaire, Turks-Caicos and British Virgin Islands.

It is notable that many of the species recorded as alien or naturalised /invasive in the Caribbean also occur as naturalised or invasive aliens on the American mainland where they feature on lists produced by southern exotic pest plant councils (e.g. Florida).

The source of entry to the Caribbean of a small number of species e.g. Cattle Egret *Bubulcus ibis* and several of the recently discovered marine invertebrates (Buurt, 1999) is questionable. These examples may have occurred due to natural range extensions without human assistance. The vast majority of species encountered were reported to have entered after deliberate or accidental human introduction. Subsequent to the initial introduction, the spread of many of the species to further islands is often human facilitated.

There were many examples of conflicts in the attribution of status (exotic versus native) in the Caribbean, in particular for species with New World distributions, and for species thought to have originated from within the Caribbean region. This arises mainly in cases where initial introductions are likely to have been historical, as in the case of introduction by Native Americans, or by Spanish settlers and have been wrongly accepted by various authors as part of the native biodiversity.

Table 1. The number of species encountered reported exotic, or exotic naturalised / invasive in the Caribbean, presented by country. Exotic = known to be present in the Caribbean in cultivation, captivity or in the wild. Naturalised = known to be established in the wild in at least one Caribbean country. Invasive = established in the wild and reported to be spreading, and / or regarded as a threat to a native species, ecosystem or causing a socio-economic impact.

Country	**Exotic In**	**Naturalized or Naturalized and Invasive In**
Antigua-Barbuda	45	18
Anguilla	9	9
Aves I.	0	0
British Virgin I.	9	5
Guadeloupe	31	5
Montserrat	26	3
Netherlands Leeward I.	0	0
St. Kitts-Nevis	5	2
St. Martin	2	2
US Virgin I.	42	11
Barbados	60	30
Dominica	34	7
Grenada	37	5
Martinique	37	7
St. Lucia	37	4
St. Vincent	32	2
Haiti	63	18
Navassa	0	0
Bonaire	4	2
Curacao	41	31
Aruba	5	3
Bahamas	159	93
Bermuda	73	68
Cayman I.	7	2
Cuba	60	8
Dominican Republic	186	147
Jamaica	102	52
Puerto Rico	182	157
Turks-Caicos I.	8	6
Trinidad-Tobago	61	23

A further caveat is the introduction of errors associated with misidentifications. The use of some common names is likely to lead to confusion, and the use of some scientific species names may actually refer to complexes of taxonomically similar species. There is a case, particularly in the case of countries with poorer biological recording infrastructure, for examining this more closely.

The majority of published information sources such as country lists of introduced and introduced invasive species presented information that was geographical in focus. That is to say, lists of species known to have been introduced at country level, sometimes supplemented with further

within-country detail of species distributions. With the exception of species that behave invasively in many countries across the region (**Table 1**), information of an ecological nature e.g. types of habitats invaded, impacts on species or ecosystems specific to the country was generally less available.

5.1.1 Invasive species in different ecosystems

The list of species reported alien, or naturalized / invasive was dominated by terrestrial species (479 alien, 390 naturalized or invasive, **Table 2**. Marine species made the smallest contribution to the list (16 species naturalised/invasive, 4% of the total naturalised/invasive list). The comparative lack of alien /invasive marine species is interesting, as a number of mechanisms for marine species introductions have been identified e.g. through the emptying of ballast water from tanks or the transport of organisms on the hulls of ships. A number of authors commented on the difficulty of determining whether newly reported marine species were introduced aliens or native species that had formerly gone unobserved. This confusion arises in part because advances in technology facilitating the reporting of marine species, such as improvements in diving equipment, have been recent. Therefore it is more likely that there is a gap in knowledge regarding the status of introduced organisms in the marine environment, and the threat that these may constitute.

Table 2. Alien species in Caribbean by broad habitat type

Broad habitat type	Exotic	Naturalised and / or invasive
Terrestrial	479	390
Freshwater	55	10
Marine	18	16
Total	552	416

5.1.2 Organism types

The large number of introduced species reported in the region is drawn from a broad range of organism types including many different groups of plant, invertebrate, and vertebrate and several fungi /micro-organisms (Table 3). Plants contributed the greatest number of species. Three hundred and twenty seven (59%) of total species encountered as exotics were plants, including 281 species (63%) of species reported naturalised/invasive. Trees species dominated this group. At least 220 trees have been introduced to the region for forestry, agroforestry or amenity / ornamental purposes of which 179 have been reported established in the wild or established and behaving invasively in at least one country. Among the invertebrates, the greatest number of species reported were insects (90 species). The relatively high number of species reported for this group reflects the importance of many of these species as agricultural pests, which is likely to have raised awareness and reporting of aliens in this group. Among the vertebrates, the largest number of exotic species were fish (37 exotic, 35 naturalised/invasive). It is notable that the number of micro-organisms (including fungi), reported introduced, naturalised or invasive is

negligible. This is almost certainly due to under-reporting and this represents a knowledge gap for further study.

Table 3. Alien species in Caribbean by group

Organism type		Exotic	Naturalised and / or invasive
Plants	**Total**	**327**	**281**
	Aquatic (floating or submerged only)	4	3
	Cattail	1	0
	Climber/vine	17	17
	Fern	5	5
	Grass	28	26
	Herb	35	34
	Sedge	1	1
	Shrub	16	16
	Tree	220	179
Invertebrates	**Total**	**121**	**66**
	Crustacean	2	2
	Earthworm	1	0
	Insect	90	45
	Jellyfish	1	1
	Mite	8	8
	Mollusc	17	10
	Solifugud	1	0
	Tunicate	1	0
Vertebrates	**Total**	**100**	**95**
	Amphibian	8	8
	Bird	20	19
	Fish	37	35
	Mammal	20	18
	Reptile	15	15
Others	**Total**	**4**	**4**
	Fungi	2	2
	Diseases	2	2
All species	**Total**	**552**	**446**

5.1.3 Major invasive species in the Caribbean

The number of species reported alien, and naturalised or invasive far exceeds the number of introduced agricultural pests known from the region. It is reasonable to conclude that the majority of species in the list have established outside of agricultural systems. Non-agricultural habitats where alien species are known to have established include wetlands and riparian corridors, disturbed land, grasslands (including rangelands and overgrazed pasturelands), urban habitats, roadsides, forests and beaches/dunes.

The impact of individual introduced species at local level may be variance with the impacts recorded in other regions, although there are likely to be many similarities. It is possible that impacts of the same introduced species may vary among islands. It is important that the ecological and environmental impact of species be more fully understood and there is scope for further research in this area that would underpin future management and risk assessment.

A list of current major invasive threats was drawn from the total list by isolating all those species reported naturalised or invasive in five or more Caribbean countries (Table 4).

Table 4. Major invasive threats

Species	Organism type	Number of countries naturalised and / or invasive
Macronellicoccus hirsutus	Invertebrate - Insect	11
Paracoccus marginatus	Invertebrate - Insect	13
Solenopsis invicta	Invertebrate - Insect	6
Toxoptera citricidus	Invertebrate - Insect	12
Eichhornia crassipes	Plant - Aquatic	6
Adenanthera pavonina	Plant - Tree	8
Albizia lebbeck	Plant - Tree	6
Casuarina equisetifolia	Plant - Tree	5
Tabebuia heterophylla	Plant - Tree	14
Ziziphus mauritiana	Plant - Tree	5
Bufo marinus	Vertebrate - Amphibian	9
Molothrus bonariensis	Vertebrate - Bird	7
Passer domesticus	Vertebrate - Bird	5
Canis familiaris	Vertebrate - Mammal	8
Capra hircus	Vertebrate - Mammal	9
Equus asinus	Vertebrate - Mammal	5
Felis catus	Vertebrate - Mammal	13
Herpestes auropunctatus	Vertebrate - Mammal	16
Mus musculus	Vertebrate - Mammal	7
Ovis aries	Vertebrate - Mammal	5
Rattus norvegicus	Vertebrate - Mammal	6
Rattus rattus	Vertebrate - Mammal	9
Sus scrofa	Vertebrate - Mammal	6

The impact of the majority of species on this list could be described as biological /environmental. For example, prominent on the list are a number of generalist mammalian predators such as domestic cats, dogs and mongoose that have been the subject of control programmes to reduce their negative effect on endemic reptile and bird species via predation. Also prominent are mammalian herbivores which similarly impact negatively on native and endemic fauna through competition for grazing or by trampling burrows, and negatively on native vegetation by alteration of native community dynamics. Uncontrolled grazing has been discussed within the workshop, as a major threat to many native species and species diversity. This of course is

primarily due to the effects of overgrazing. With respect to livestock overgrazing threats to native plant species, it is not uncommon to go into some areas and see that all the under-story vegetation is denuded except for only the closest growing grasses. Also of importance is the introduction of predators such as dogs, cats which have become feral and the notorious mongoose.

5.2 Responses to questionnaire

- A total of 49 persons responded to the initial questionnaire. Nine of the respondents were from outside the Caribbean region.
- 50.9% of respondents had some knowledge of invasive species and initiatives within the region.
- Of these respondents, many of them had multi-site knowledge of invasive species.
- 6.1% of respondents listed capacity building as well as the need for additional human resources, a national identification service and national and regional information sharing as critical areas that needed to be urgently addressed.
- 14.3 % of the respondents listed a need for national lists of biota, which identify invasives and document the appropriate invasive information as the most critical issue to be addressed.
- 8.2 % of respondents listed a need for introduction or stricter regulations at ports of entry and the need for education and awareness programmes for the general public, politicians, policy makers and the private sector.
- 53.1% of respondents listed legislation and policy making as the most critical urgent issues Suggestions for action included, review, overhaul, and modification of existing legislation to make it more current and reflective of environmental issues as well as agricultural and human health issues.
- One respondent listed ad-hoc urban development and spread as major causes of biological invasions as well as identifying an urgent need for easy access to current and accurate information as critical factors.

The summary of the responses is presented in Appendix 5. Many of these issues were discussed in detail during the electronic workshop.

5.3 Results of the electronic workshop

The electronic workshop generated great interest and there ensued a lively and thoughtful discussion on key issues. Many points were raised and the key elements and highlights were synthesized and circulated. The initial and subsequent moderator correspondence requested discussion on characterization of the threats and impacts and prioritization of invasive species as a priority topic in the discussion in order to get feedback on the draft list of invasive species that was circulated. This was to ensure that prioritization of species was based on both qualitative and quantitative information. However, most of the discussions centred around assessment of existing policy and legislative frameworks with respect to invasive species and identification of opportunities for improvement. A summary of the discussion topics and the main points are outlined in **Table 5** whilst the full text of the workshop summary documents are provided in **Appendix 5-7**.

Table 5 - Summary of workshop discussion

Topic	Main points	Main output
Prioritization of invasive species	• The need to prioritize control efforts among established species with emphasis on: • Species that have the greatest proven ability or potential to disrupt ecosystem processes (e.g. fire and hydrologic regimes • Species that directly impact on rare natural communities (e.g. freshwater systems on most of the drier islands) • Species that impact on rare species (even more important if they impact multiple rare species).	A priority list of IS by country and regionally
Information sharing	• Introduced pests eventually spread throughout the region and as such information sharing may be beneficial to all • Importance of proximity to continental areas of the Caribbean Basin	Request for information on any studies, which have not been formally published Contribution to list of invasive species
Definitions	• The numerous definitions on invasives which relate to different international agreements • The final definition adopted should encompass all invasions across taxa and ecosystems • Assumption of a broad based definition which will allow fulfillment of the various international agreements.	List all the definitions as referenced in different key international agreements which will be included in the final report
Policy and legislative frameworks	• Traditional role of ministries • Importance of IS across taxonomic groups and ecosystems • Absence of IS legislation in most countries in the region • The continuing effort to fulfill requirements of international conventions/agreements • Approaches taken by other regions might be relevant to Caribbean territories	Explore the need to develop a legislative/regulatory framework to deal with IS possibly using model regional laws or adapting frameworks from other regions such as the South Pacific. However a concerted effort is required to discuss these issues at the regional level
Public awareness	• The specific lack of awareness by the policymakers and other stakeholders • The non-intervention in critical areas by government agencies	The design of an awareness campaign with an aim to sensitizing the public and especially the policymakers.
Institutional frameworks	• The role and function of Caribbean Plant Protection Commission (CPPC) • The role and function of the new entity CAHFSA • The need for a regional mechanism to foster partnerships in IS issues	Explore methods to overcome the challenged posed by the diverse nature of the region
National Level	• Evolution of existing "Plant Protection Boards" or "Plant Quarantine Board" for IAS threats • The bias towards agricultural pests in traditional plant quarantine boards whilst in IAS management there is the need to review all potential invasives inclusive of animals and micro-organisms	Should these existing national authority/ boards be modified to a "National Alien Species Review Board" with the necessary expertise and the necessary powers of enforcement
Regional Level	• Caribbean nations should go far beyond strengthening their domestic safeguarding capabilities.	Explore all aspects of the formation or a regional body using and modifying existing models

5.4 List of active projects in Invasive Species Management

Many of the projects in invasive species management are based on what are traditionally referred to as pests mainly in agricultural (crop, livestock and aquaculture) and horticultural areas. Those that deal with the environment are mainly as a component of the conservation and/or restoration of endangered species and as such the exclusion of invasives is a major component. An indicative list of active projects in the region is provided in **Table 6.** It is worth noting that many of the projects have been relatively small although there are examples of large projects. One such project involves eradication of the Tropical Bont tick, *Amblyomma variegatum*. This project has been ongoing since the early 1990s and involves about 17 islands.

Table 6. List of active projects on invasive species

COUNTRY	PROJECT	MAIN AGENCY	OTHER AGENCIES
ANGUILLA	▪ National Caribbean Amblyomma Project	Ministry of Agriculture	Anguilla National Trust Physical Planning Department (Government)
ANTIGUA & BARBUDA	▪ Antiguan Racer Conservation Project (ARCP) – Removal of exotics to save the native antiguan racer snake (www.antiguanracer.org) ▪ National Biodiversity Framework Project (Under the Cartagena Protocol) ▪ National Caribbean *Amblyomma* (ticks) Project ▪ Pink Hibiscus Mealybug Management (FAO TCP)	Environmental Awareness Group (eag.candw.ag) Ministry of Tourism and Environment Ministry of Agriculture, Land and Fisheries (plants@antiguabarbuda.net)	
BAHAMAS	▪ National Invasive Species Strategy ▪ BEST Commission's alien species data project ▪ Animal control program ▪ Vector program ▪ Rat control ▪ IABIN 13N	Bahamas Environment, Science and Technology Commission (BEST) (www.best.bs) ▪ Department of Agriculture ▪ Department of Environmental Health Services'	▪ IABIN ▪ Florida Exotic Pest Plant Council (www.fleppc.org) ▪ Bahamas National Trust ▪ FORFAR Field Station ▪ San Salvador Field Station ▪ College of The Bahamas ▪ Bahamas National Trust ▪ Bahamas Reef Environmental Educational Foundation (BREEF)
BARBADOS	▪ PHMB control ▪ Papaya Mealybug control ▪ National Caribbean *Amblyomma* (ticks) Project	Ministry of Agriculture and Rural Development (MARD) MARD MARD	▪ Ministry of Physical Development and Environment (CBD location). ▪ Environment Unit ▪ Coastal Zone Management Unit ▪ Environmental Specials Project Unit ▪ Environmental Engineering Unit ▪ National Conservation Commission ▪ Town and Country Planning Department ▪ Fisheries Division ▪ The Caribbean Agricultural Research and Development Institute ▪ The West Indies Sugar Cane Breeding Station ▪ The University of the West Indies ▪ The Barbados National Trust

COUNTRY	PROJECT	MAIN AGENCY	OTHER AGENCIES
			▪ The Barbados Marine Trust ▪ The Caribbean Conservation Association ▪ The Blellairs Research Institute ▪ The Barbados Advocate
BERMUDA	▪ Bermuda Biodiversity Project ▪ Darwin Initiative ▪ Attempts are being made to control feral cats, feral chickens, wild red-eared slider terrapins, pigeons, the Indian Laurel tree		▪ Environmental NGO's ▪ Bermuda Zoological Society Department of Environmental Protection ▪ Ministry of the Environment ▪ Fauna and Flora International ▪ Department of Conservation
BRITISH VIRGIN ISLANDS	▪ Rat control ▪ National Caribbean *Amblyomma* (ticks) Project	Ministry of Agriculture	
COM. OF DOMINICA	National Caribbean *Amblyomma* (ticks) Project	Ministry of Agriculture, Forest and Fisheries	
CUBA	Papaya mealybug control		
DOMINICAN REPUBLIC	▪ PHMB control ▪ IABIN 13N	Ministry of Agriculture	
GRENADA	▪ Control of *Bufo marinius* on Carricaou island ▪ National Caribbean *Amblyomma* (ticks) Project	The Kido Foundation Ministry of Agriculture	▪ Ministry of Health and Environment ▪ National Science and Technology Centre ▪ Grenada Community Development Agency (GRENCODA) ▪ Agency for Rural Transformation (ART) ▪ Friends of the Earth
GUADELOUPE	Eradication of house sparrows	The Nature Conservancy (naturesxm@megatropic.com)	
HAITI	PHMB control	Ministry of Agriculture	
JAMAICA	▪ Invasive mammal control to protect biodiversity in the Hellshire Hills ▪ Control of green-lipped mussel and redclaw crayfish ▪ IABIN 13N	▪ Institute of Jamaica (IOJ) (876-922-1147) ▪ National Environmental Protection Agency (NEPA)	▪ Iguana Specialist Group (IUCN ISG) ▪ Jamaica Institute of Environmental Professionals (http://jiep.org)

COUNTRY	PROJECT	MAIN AGENCY	OTHER AGENCIES
		(http://www.nepa.gov.jm)	
MARTINIQUE			Martinique and the French Ministere de l'Amenagement du Territoire et de l'Environennement (33-4-6850-3686)
MONTSERRAT	▪ Rat control in Montserrat Oriole ▪ National Caribbean *Amblyomma* (ticks) Project	Ministry of Agriculture	
NETHERLAND ANTILLES	A Netherlands Antilles Nature Conservation Initiative (NANCI) is being developed (???)		▪ The Curaçao Underwater Park ▪ Carmabi Foundation (Carmabi: Caribbean Research and Management of Biodiversity).
NEVIS	National Caribbean *Amblyomma* (ticks) Project	Department of Agriculture	
PUERTO RICO	▪ Biological control of whitefly ▪ Permanent surveys for Mediterrean fruitfly, Melon fruitfly, Mexican fruitfly, Mango Seed Weevil, Tropical Soda Apple ▪ Control of the Shiny Cowbird (*Molothrus bonairiensis*) – Removal of invasive bird to control the endangered, endemic yellow-shouldered blackbird (*Agelaius xanthomus*) ▪ Numerous species of invasives are being controlled/ eradicated on U.S. Fish and Wildlife Service Refuges in Puerto Rico: ▪ Cartegena National Wildlife Refuge (NWR), Cabo Rojo NWR, Culebra NWR ▪ "Partners for Fish and Wildlife" program whereby private landowners, groups, and municipalities are given incentives to eradicate invasive species ▪ *Rattus rattus* control on Monito Island		▪ Department of Natural and Environmental Resources ▪ Ornithological Society of Puerto Rico (URL http://www.avesdepuertorico.org/) ▪ Citizens of the Karst (enlacepr@caribe.net). ▪ US Fish and Wildlife Service
SABA	National Caribbean *Amblyomma* (ticks) Project	Ministry of Agriculture	Island Conservation Effort
ST. EUSTATIUS	National Caribbean *Amblyomma* (ticks) Project	Ministry of Agriculture	

COUNTRY	PROJECT	MAIN AGENCY	OTHER AGENCIES
ST. KITTS	National Caribbean *Amblyomma* (ticks) Project	Ministry of Agriculture	
ST. LUCIA	▪ St. Lucia Biodiversity Enabling Activity Project ▪ National Caribbean *Amblyomma* (ticks) Project	 Ministry of Agriculture, Forestry and Fisheries	
ST. MARTEEN	National Caribbean *Amblyomma* Project	Ministry of Agriculture	The Nature Foundation
ST. VINCENT & GRENADINES	National Caribbean *Amblyomma* Project	Ministry of Agriculture	
TRINIDAD & TOBAGO	▪ Pink Hibiscus Mealybug control ▪ Citrus Blackfly control (???citrus black fly?) ▪ National Caribbean *Amblyomma* (ticks) Project	Ministry of Agriculture, Land and Marine Resources (MALMR) MALMR MALMR	
USVI	▪ Invasive mammal control (feral cats, rats, pigs, goats, sheep), mongoose (USDA T-STAR programme) ▪ "Partners for Fish and Wildlife" program whereby private landowners, groups, and municipalities are given incentives to eradicate invasive species ▪ Weed management in cooperating parks (St. John, St. Croix)	U.S. Virgin Islands National Park Service	
GENERAL	Biological control of PHMB Papaya Mealybug control		

5.5 Legislative and regulatory frameworks invasive species

5.5.1 General status

Most of the countries perhaps with an exception of US and French Territories have not developed specific legislation on invasive species. Most of the legislation which refers to invasive species is embodied in other sectoral laws. A review of such legislation revealed a striking similarity across islands which is perhaps reflective of the colonial history. Most of the legislation that has reference to invasive species falls within a few sectoral acts reviewed below. The occurrence of the different acts across a representative number of islands is given in **Table 7**.

5.5.2 **Animals (Diseases & Importation) Act**

In all the countries surveyed, there is an act (name of act may vary) which gives powers to the Senior Veterinary Officer to grant licenses for the importation of animals, identifies countries from which animals may be imported and conditions under which such animals may be imported. Such imported animals may be quarantined for a set period of time and under such conditions that may be specified in any license. Animals such as cats, dogs, horses, cattle, pigs, sheep, goats, rabbits, and guinea pigs, can be imported based on conditions set.

In Antigua & Barbuda, Dominica, St. Kitts & Nevis, St. Lucia and St. Vincent and the Grenadines, there is subsidiary legislation – Animals (International Movement & Disease) Act which deals with the importation of animals alone and identifies countries from which animals can be imported and the conditions under which such animals can be imported.

Under the above legislation, birds, reptiles, and insects are prohibited entry into the state save under and in accordance with a license granted by an official of the Ministry of Agriculture.
In all these acts, Monkeys are not allowed entry.

5.5.3 **Importation of Fish (Importation) Act**

Importation of Fish (Importation) Act of Grenada ,Antigua & Barbuda and St. Lucia, prohibits the importation of certain fish species as indicated on a schedule. The Act confers on the Minister the powers to amend the schedule by adding and or deleting any species or subspecies of fish. Importation of any live fish is regulated by the granting of a license.

5.5.4 Plant Protection Act

In all countries surveyed, there is an Act (name may vary) which confers powers to provide for the protection of the agricultural resources from the introduction of plants, pests and diseases. Within this legislation definitions of plant / planting material and pests vary with certain countries having similar wording. This act also provides for the conditions under which such introductions may be deemed a notifiable pest, and outlines measures for control and eradication. All importation are based on the issuance of permits. For Dominica, Bermuda, St. Vincent and the Grenadines, importation based on lists of proscribed or schedules of commodities is in effect.

Table 7. List of Current Governmental Regulations related to Invasive Species reviewed by Country

List of Legal Documents Reviewed	Anguilla	Antigua & Barbuda	Barbados	Bermuda	British Virgin Islands	Dominica	Grenada	Jamaica	St. Kitts & Nevis	St.Lucia	St. Vincent	Trinidad & Tobago
Animals(Diseases & Importation)	✓	✓	✓	✓ Agriculture(Control of Animal Diseases) Act	✓	✓Animal Diseases Act	✓	✓	✓	✓	✓	✓
Animals (International Movement & Disease)		✓				✓			✓	✓	✓	
Birds & Other Wildlife Protection	✓Wild Birds Protection Act		✓Wild Birds Protection Act	✓ Protection of Birds Act			✓	✓ Wild Life Protection		✓ Wild Life Protection		
Dogs Act	✓	✓	✓						✓			✓
Fisheries Act	✓ Fisheries Protection	✓	✓	✓	✓	✓	✓	✓Fishing Industry Act	✓	✓	✓	✓
Forest Act		✓ Forestry Act				✓		✓	✓		✓	✓
Forest Soil & Water Conservation					✓Protection of Trees & Conservation of Soil		✓			✓		
Plant Protection Act	✓	✓	✓ Plant Pest & Disease (Import control)Act		✓	✓Plant Protection & Quarantine Act	✓	✓ Plants (Quarantine) Act	✓	✓	✓	✓
National Trust	✓Anguilla National Trust						✓					
Marine Parks					✓							
National Parks		✓		✓ Bermuda National Parks Act	✓		✓ & Protected Areas					
Protection of Endangered Animals and Plants					✓							
Importation of Fish Act		✓					✓			✓		
Noxious Weed Act							✓					
National Conservation & Environment Protection Act									✓			
Turtle, Lobster and Fish Protection Act										✓		
Agriculture Act				✓								

5.5.5 Noxious Weed Act

This act of 1912 from Grenada is the only one of its kind and defines "noxious weeds" as any plant which the Minister may, from time to time with consent from the House of Representatives, signified by a resolution to that effect, declare by order published in the gazette to be a noxious weed, either throughout the whole of Grenada or in one or more districts or portions of districts thereof. The act allows for the clearance of noxious weeds, and prevents the introduction into Grenada or sale of any plant, seed or grain, which is likely to propagate or spread the growth of noxious weeds.

5.5.6 Other legislation

The Fisheries Act, Forest Act, Forest, Soil and Water Conservation Act, National Conservation and Environment Act, Watershed Protection Act all provide for the management of existing resources.

The Birds and Other Wild life Protection, Wild Life/ Birds Protection Act, Forestry and Wildlife Act, Protection of Birds Act, Conservation of Wildlife Act all seek to protect animals within defined sanctuaries and within specified periods. Schedules of protected animals and closed periods are in effect.

National Trust Ordinances or Acts also provide for the protection of flora and fauna in defined areas such as Marine Parks, archaeological or historical sites.

5.5.7 Analysis of gaps in current legislation re impact of invasive species

There is the absence of specific legislation to prevent the introduction of invasive alien species within the Caribbean region. Much of the existing legislation regulating plant and animal protection in the countries surveyed is outdated and does not reflect either modern sanitary and phytosanitary concepts or agreed-upon international norms. Notwithstanding the efforts to update some legislation by certain countries, the risk, however, is that piecemeal updating of legislation will not lead to true harmonisation but will instead mean that the existing patchwork legal framework is simply replaced by a more modern patchwork legal framework in the Caribbean region.

The existing plant and animal legislation does not however provide the necessary instruments to prevent the introduction, spread, and management of invasive species. It is clear therefore that there is an urgent need to address the formulation of appropriate harmonised legislation to prevent the introduction of invasive species which can complement and co-exist with the existing plant and animal legislation in the region.

The adoption of harmonised legislation which has been developed in a consistent manner based on international standards and conventions will enable Caribbean countries to meet the requirements of international conventions such as the World Trade Organisation (WTO) Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement), Convention on Biological Diversity and the International Maritime Convention and also have the necessary precautions in place to limit the introduction of invasive species.

6 DISCUSSION

The current project has provided a very valuable foundation for addressing the threat of invasive species in the Caribbean. The preliminary data gathering has provided the basis of a fundamental information resource, and the discussion forum created by the electronic workshop has stimulated hope and expectation of further work in this important area. One of the major accomplishments of this project has been the sensitization of the region's researchers and practitioners (via the electronic workshop and other networking) and politicians and policy makers (via direct communication). In these respects, the project has already contributed to much needed awareness-raising.

Lack of knowledge and access to information has been identified as major problems preventing countries from moving forward with solutions to invasive species problems at a national level. Many of the islands have insufficient resources to tackle existing invasive species problems, and this hinders governmental and non-governmental bodies wishing to mobilize solutions. Similar constraints apply to the establishment of effective mechanisms for preventing the introduction of invasive species. It was very clear from the project that the general ideas and recommendations of regional experts and practioners were very similar to the key findings of the GISP Phase 1 Synthesis Conference (McNeely *et al.*, 2001) which presented 10 strategic responses that address mitigating the threats of invasive alien species. Modified from the GISP toolkit for regional purposes, these strategies as suggested by the workshop participants are listed below. These are not listed in priority of importance.

- Building management capacity
- Building research capacity
- Promote national and regional cooperation and sharing of information
- Compile national lists of: biota, identified invasive species, projects on invasive species
- Institute a system of environmental risk analysis
- Build public awareness and engagement
- Prepare national strategies and plans
- Build invasive alien species issues into national and regional change initiatives

6.1 Building management capacity

Capacity building is necessary to ensure that effective action to prevent, mitigate or control invasive species problems can be taken. This is a high priority issue at the national regional and global arena of development of invasive species management systems. This is very important for all the countries in the region.

The foundation of this strategy is raising the awareness of all the stakeholders, which in turn will have a ripple-effect at the national and regional level such that resources are made available in a timely manner for the necessary training and acquisition of resource personnel and materials. This in turn will facilitate the development of the 'rapid response mechanisms' discussed in the GISP toolkit which will be developed by the trained personnel with the necessary technical support from the other countries and regulatory and financial support from the enlightened policy-makers and government officials.

As such, it is a priority to assist the islands to develop frameworks for capacity building and action with guidance from those with expertise in invasive species issues (including knowledge of international initiatives and conventions). The Bahamas, Dominican Republic and Jamaica in particular understand the importance of building capacity, mainly because of their membership in the IABIN Pilot Project. There were very clear responses from participants in these countries with respect to all issues, and a large amount of foundation work is already underway here, including raising stakeholder awareness and development and implementation of various other initiatives.

In the Bahamas for example, the activities conducted to date include a training workshop on invasive plant species, a public lecture on invasive animals and newspaper articles on the concept and principles of species invasions. It should be noted that the goals of the IABIN 13N project and of the The Bahamas Environment, Science and Technology Commission (BEST) are complementary, and include recommendations for the development of policy, legislation, mechanisms and other measures to facilitate the control of invasive species. Bermuda is another example of an island that is relatively advanced in recognizing the invasive species problem. Local NGOs and government representatives have already completed a comprehensive study on the local biota and wider environmental issues (Bermuda Biodiversity Country Study, 2001). In addition, Bermuda is also well advanced in developing specific strategies to deal with environmental issues like the invasive species problem. Like the Bahamas Islands, Bermuda has also mounted an awareness campaign, which includes workshops for the review and collation of invasive species information.

This supports one of the major points that emerged during the current project, that each country must accept national responsibility and begin the process of policy and strategy development. This was clearly expressed by Marina Fastigi (Kido Foundation) when she wrote:

" *The main challenge is that IF WE do not do it NO ONE else will and Bufo will likely destroy everything that moves in a few years!*"

It was clear from discussion that at the national level, there was limited capacity in terms of expertise to deal with invasive species issues. Enhanced national and regional communication was identified as important to support development of the necessary plans of action.

6.2 Building research capacity

The need for better national identification services which would facilitate a more effective invasive species management programme was identified as a key issue. Identification services underpin other areas of "knowledge producing" research, needed to inform many aspects of potential invasive species management strategies where knowledge gaps currently exist.

Such research is often conducted in cooperation with international donor agencies and is often conducted with a local partner. The outputs of these types of projects include activities that enable countries to set up and sustain their own research institutions and pays particular attention to setting up and training researchers. The aim will be to develop research and supervisory skills

in the critical areas such as risk assessment, environmental impact assessments and project management. Wittenberg and Cock (2001) specify additional areas such as:

- Strengthening research infrastructure for invasive species research in systematics, taxonomy, and ecology.
- Building the research capacity for assessment and prediction of invasive species
- Building the research capacity for improvements in early detection, assessment, prevention and control systems.

In the short and medium term there must be a firm commitment by policy makers and financiers for improvement in research capacity building. Either an increase or redeployment of the relevant budgetary allocations or more focused use of the existing budgets can be used to develop initiatives to kick-start endogenous research.

The challenge posed by inadequate research capability and the need to accurately identify and verify suspected invasive species within the country as a priority issue has been recognized by some countries such as the Dominican Republic (IABIN, 2002). The ability to screen, and identify potential invasive species from imported materials is a fundamental component in reducing the threat of unwanted introductions. In many Caribbean countries, there continues to be a real invasive species threat because of incomplete screening of import consignments containing soil. Although some measures have been taken (in the Cayman Islands, for example, by banning the importation of turf to limit unwanted introductions) soil borne invasive species remain a particular threat across the region because of the lack of trained resource personnel in this area. It should also be noted that the issue of identification is a very delicate one, since the presence of noxious organisms in particular consignments or countries can lead to trade restrictions, which can negatively affect a country's economy.

6.3 Promote national and regional cooperation and information sharing

The problem of invasive species within the region is severely compounded because of the lack of access to quantitative data on economic and ecological impacts (and management options) at a national and regional level. Some of the countries participating in the IABIN Pilot project notably the Bahamas and Dominican Republic both identified these challenges as major issues. (IABIN, 2002). Additionally, many workshop participants lamented the absence of a national central pool of information or a regional Caribbean pool.

The need for enhanced regional cooperation was highlighted, noting that effort should be made not to duplicate efforts. Against this background, possible roles for existing network mechanisms were discussed. First, the Caribbean Plant Protection Commission (CPPC). The CPPC is an FAO commission and is regarded as one of the several regional plant protection organisations recognised under Article IX of the 1997 New Revised Text of the International Plant Protection Convention (IPPC). In recent years however, this has become relatively moribund and, in December 1999, the CARICOM Ministers of Agriculture mandated the CARICOM Secretariat, FAO and IICA to develop the concept of a new independent body a functioning, self-sustainable, regional agricultural health agency. This concept later developed into the Caribbean Agricultural Health and Food Safety Agency (CAHFSA), the modalities of which are still being examined.

While technically the CPPC (or CAHFSA when it becomes operational) can take onboard activities related to invasive species, it must be borne in mind that CPPC and similar organisations had a previously strict mandate for plant pests and plant quarantine, in the traditional sense. As such, additional mechanisms and partnerships may be required to address the full breadth of invasive species issues. However, the development of additional networks has to be weighed against the potential 'overload' of networking in the region, especially when it is the same people who are involved. Overall however, it is clear that for invasive species issues to be given the prominence they require, a specific effort is required. Such cooperation will require a "buy in" at the regional political level, as well as by other stakeholders. The diverse nature of the region is seen as a particular challenge which needs to be overcome.

One of the biggest hurdles to the promotion of regional information sharing has already been overcome via this project: the question of '*how do we begin*?'. An informal network of resource persons, called 'carib_ias_threat', in which resides vast knowledge in all areas of invasive species has already been formed with experts and practitioners from within and outside the region. This network, might form the basis for the further development of the regional instrument for information sharing.

Quite apart from regional cooperation, the need for enhanced information sharing at the national level was apparent during the workshop. The invasive species problem is an issue to cuts across sectors, and improved communication and co-operation between government bodies and NGOs is essential if effective solutions are to be found. Unfortunately, despite its cross-sectoral character, the invasive species problem is currently one of many where communication between (for example) government departments is known to be poor. In the Cayman Islands for example, agricultural authorities release non-native biocontrol agents without consultation with environmental departments and interests. There is no legislation that requires that environmental assessments be conducted before such releases. Of course, in some islands strong cross-sectoral cooperation is evident, as in Trinidad and Tobago, where the relevant ministries work closely together.

6.4 Compile national lists of: biota, identified invasive species, projects on invasive species

Development of a dynamic data registry of species invasive species with all relevant information in areas such as biology, distribution, and ecological and economic impacts is vital for all countries. In a many cases, information on the invasive species present in particular countries was very scarce. Within the Caribbean region, for example, data on those species already established and posing environmental threats in the British Virgin Islands and the Turks & Caicos Islands is almost all anecdotal. In many more cases, information is available, but from a variety of disparate sources, in inconsistent formats.

Much information is now available electronically but there is a marked absence of any standardized format and integration of data. Searches conducted under this project revealed serious shortfalls in the data quality and information management. In many instances, basic information on species was lacking.

In a Caribbean context, with limited financial, personnel and infrastructure resources it is particularly important that comprehensive and accurate information be easily accessible in a standardized format. The information collated under the present activity will be input in a standardized format, with the intention of making it available by appropriate media, with a system for regular updates in the long-term.

One of the outputs of this project is the prototype database of invasive species within the Caribbean region. This was recognized as important by participants in the electronic workshop. One suggestion was the formation of a Regional Information System on Invasive Species, based on the Internet, with descriptions of the relevant species, including their identification and other characteristics. Information collated as part of this project can be used in this way.

Direct access to this type of comprehensive information from national and regional knowledge bases, the challenge of effectively managing invasive species can be decreased. Relevant data (for example, which species are invasive or potentially invasive in particular habitats) can be easily accessed from a reputable source, and used in strategy development with the necessary support systems. In addition, the agencies responsible for national pest control could quickly determine if a species of interest has been invasive elsewhere. Legislation can ensure that importers of new non-native species (e.g., nurseries, botanical gardens and the pet industry) access accounts of experiences abroad in order to make responsible business choices that do not threaten the environment. In addition, land managers could learn about control methods that have been useful in other areas, reducing the need to commit resources for experimentation and increasing the speed at which control efforts can begin.

6.5 Institute a system of environmental risk analysis

The importance of utilizing risk analysis is widely recognized. At the regional level, progress has been made particularly with respect to fulfilling requirements of WTO. Thus standards prepared by the IPPC for this purpose are used. There has however been little effort at regional harmonization of these standards. Less has been achieved with respect to marine environments although guidelines have been prepared by the International Maritime organization. Generally, institutional problems, mainly to do with capacity are a hindrance. Clearly this is an area which requires attention particularly from a perspective of training.

6.6 Build public awareness and engagement

It was interesting that almost 50% of the project respondents were unaware of the issue surrounding invasive species. This unawareness is evident in the national programmes that exist across the region. Generally, at the government level at least, there is much more attention and effort being devoted to management of introduced pests which affect or threaten public health and agriculture than to those which mainly impact on indigenous biodiversity. This illustrates a lack of awareness amongst policy makers, politicians, financiers, etc. of the threats posed by such species to environmental sustainability.

However, in some of the countries the issue of invasive species is becoming more public due to the deliberate efforts on the part of ministries, NGO's and community groups. The workshop and training activities in the area of invasive species as well as public lectures conducted in the Bahamas Islands in 2001-2003 are good examples of the conduct of a public awareness campaign. This type of publicity is also being conducted in Barbados, Jamaica and Trinidad and Tobago through the print media. In addition the massive publicity campaigns that were conducted regionally for management of the Pink Hibiscus Mealybug highlighted the issues of invasive species incidence and importance in a restricted way.

In order to enhance awareness amongst policy-makers, it is prudent to devote attention to educating the public, as well as emphasising the serious economic consequences of failing to act against the widest range of potential invasive species. Such activities can have both national and regional dimensions.

6.7 Prepare national strategies and plans

The lack of national action plans has allowed some invasive species to spread to unprecedented extents, interfering with human livelihoods, causing ecosystem disruption and ultimately impacting on local economies. Where this pattern is repeated across neighbouring islands in the Caribbean, impacts soon become regional rather than national. It is often a particular crisis which results in changes in policy and practice; the spread of the PHMB through the Caribbean region led to a rapid development of expertise and cooperation both nationally and regionally. The experience has done much to enhance understanding of the nature and impacts of invasive species (albeit agricultural ones), and the need to have comprehensive national strategies and action plans.

Clearly the first step in the development of any national strategy is to assess the status of known invasive species, which is essential to develop any type of management programme. Some countries have already began to do this. The present effort is a start but this needs to be taken further particularly at the national level.

Considering the similarities of many of the countries in the Caribbean including resource limitations in the wider sense, the will be value in coordinated regional efforts in some areas. For instance, generic action plans can be developed which would then be adapted to suit each specific situation.

One of the obvious flaws in the existing infrastructure used for invasive species management, is the absence of suitable systems. Specific areas requiring attention include:

- Early Detection and Rapid Response - to monitor and detect new, potentially damaging species quickly and to respond to them rapidly while eradication is still possible.
- Control and Management - to coordinate ongoing efforts with local and possibly regional and international authorities to minimize impacts of existing invasions and prevent their spread.

- Public Outreach and Education - to educate the public about the seriousness of the threat and inform individual actions that can limit the introduction or spread of harmful, non-native species.
- Research and Monitoring - to invest in effective and environmentally sound control technologies and other tools, and in the biologists and biological research needed to ensure long-term success.

Whilst there are existing policies and programs that include some combination of the above necessary elements there were many gaps that were identified as listed below.

6.8 Build invasive alien species issues into national and regional change initiatives

The World Summit on Sustainable Development in Johannesburg 2002 was attended by more than 100 countries (including countries in the wider Caribbean region). The Summit reaffirmed sustainable development as a central theme of the international agenda and gave continued the fight to alleviate poverty and halt destruction of the environment. Within this international arrangement, Agenda 21 clearly identifies 'the inappropriate introduction of foreign plants and animals' as one of the four main causes of the loss of the world's biological diversity which has continued over the last 20 years. In addition, Article 8 of the Convention on Biological Diversity (Nairobi, 1992) identifies the need for parties 'to prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species.'

The impact of invasive species on biodiversity within the Caribbean region is therefore not an isolated phenomenon but falls into a framework of world sustainable development. It may be quite worthwhile, on a national basis, to begin, continue or find new impetus for implementation of the already established initiatives outlined in the pertinent agreements that have been ratified, by individual countries.

As a region it may be worthwhile to explore the mechanisms whereby national agriculture and biodiversity can be protected from alien species introduction and establishment. There are several partnerships and grant funding opportunities to assist in the area of biodiversity maintenance.

One of the most recent examples of funding availability was an email circulated via Caribbean Biodiversity listserver (caribbean-biodiversity@yahoogroups.com) on April 29, 2003. This communication identifies that in an amendment to the Foreign Assistance Act of 1961, the "Coral Reef and Coastal Marine Conservation Act of 2003" proposes to promote greater protection of remaining coral reefs and other coastal marine resources by "providing for the alleviation of debt in countries where these resources are located, thus allowing for the use of additional resources to protect and restore such habitats.

7 RECOMMENDATIONS

One of the interesting points arising from the workshop was the fact that, if not carefully defined, the issue of invasive species could get muddled. This is further exacerbated because invasive species issues involve a very broad range of stakeholders often with varying interests. Discussion and acceptance of relevant operational definitions will be useful with the understanding that these can evolve over time as more material becomes available.

The current status of invasive species issues at both the national and regional level is provided. This study also represents the first concerted semi quantitative effort to identify the main regional invasive species problems. However, while providing a very useful starting point, the results have to be interpreted with due consideration to the complexity of issues across islands and to the fact that, there is limited information available for many species.

This effort is only a beginning and it needs to be expanded and continued. For instance, the species database is a vital resource for the entire region. However, for the full benefits to be realized, the information must be accurate and as comprehensive as possible. The process for ascertaining this continues.

Clearly, there is interest from within and outside the region to address the problem of invasive species. The effort reported here must be seen as only a beginning. More critically, it needs to be continued in a structured manner. Towards this end, development of comprehensive strategies at the national and regional levels are a high priority. It is noteworthy that territories in the South Pacific have initiated a concerted, cooperative effort, which is worth examining for applicability/adaptation within the Caribbean context. Some of the key issues and actions needed to prevent/mitigate the impact of invasive species were encapsulated during the Sixth Meeting of the Conference of Parties in April 2002. These are encapsulated in Decision VI/23 and need to be addressed as a priority (http://www.biodiv.org/decisions/default.asp?lg=0&dec=VI/23).

While the individual eradication and control efforts are laudable and indeed some of the most successful examples of successful eradication and control efforts are from small islands, ultimately prevention of introductions is the most effective measure. Few countries have specific action plans for dealing with invasive species. Two elements are seen as crucial. First development of specific plans to deal with prevention and/or mitigation of new problems and second a specific plan focused on assessment of existing problems. This assessment will examine the environmental consequences of the introductions as far as possible and compare alternative methods of addressing the major issues.

Some countries have initiated steps to develop national policies and strategies for dealing with invasive species. However, most have not and assistance will be needed to expedite this is a priority area. The national strategy will include a prioritization of needs and problem, requirements for training and infrastructure, information management,

networking and cooperative linkages, specific actions for dealing with invasive species etc.

Networking at the regional level will be beneficial both in terms of ensuring that resources are not wasted through duplication but also, in realizing economies of scale particularly when dealing with common problems. Such a networking mechanism can also assist in mobilization of resources and start up of pilot activities in different territories. It is also noted that because of the crosscutting nature of many invasive species issues, it will be important to link with existing such as those linking with other conventions such as International Plant Protection Convention (IPPC), International Maritime Organization (IMO) etc.

As a broad area, there is need for capacity building. Training is required in specific priority areas and development/support to important areas such as taxonomy.

Implementation of strategies to deal with invasive species requires the necessary legislative and regulatory framework to be in place. The legislation in most of the territories in the region requires revision.

Awareness about the importance of invasive species issues among relevant policy-makers and other stakeholders is less than adequate. A broad programme of awareness-raising and education will serve to emphasise the cross-sectoral nature of the invasive species problem. This might include consultations, seminars as well as media briefings. The outreach programme should show the problems associated with invasive species, the short and long-term effects of the problem and how individuals can play a role in helping the national community resolve the problem.

Access to information was identified as a major constraint. There are several existing databases which might be useful but there are obvious problems with access, quality and suitability of information. This important area requires attention either through strengthening existing national/ regional mechanisms or creation/development of a specific initiative focused on the Caribbean, which might then link to hemispheric or global efforts.

- The databases established under this project should be further developed, made publicly available, and up-dated to provide essential baseline information on the distribution of invasive species (and relevant expertise) at a national and regional level throughout the Caribbean.
- A regional network for the exchange of information on invasive species issues should be formally established. The present electronic group <carib_ias_threat> might form a nucleus for such a network.

In order to set things in motion, it is recommended that a regional workshop be held. Such a workshop must include all key stakeholders. It would serve to clarify needs, build consensus and a concerted regional approach. The workshop should capitalize on valuable insights gained from experiences elsewhere in the world. For instance, it will be

useful to involve international entities such as the Global Invasive Species Programme (GISP).

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9 LIST OF ACRONYMS

BEST	The Bahamas Environment, Science and Technology Commission
CABI	CAB International
CAHFSA	Caribbean Agricultural Health and Food Safety Agency
CARICOM	Caribbean Community
CBD	Convention on Biological Diversity
CPPC	Caribbean Plant Protection Commission
FAO	Food and Agriculture Organization of the United Nations
GISP	Global Invasive Species Programme
IABIN	Interamerican Biodiversity Information Network
IAS	Invasive Alien Species
IICA	Inter-American Institute for Cooperation on Agriculture
IMO	International Maritime Organization
IPPC	International Plant Protection Convention
IS	Invasive species
ISSG	Invasives Specialist Group
IUCN	The World Conservation Union
PHMB	Pink Hibiscus Mealybug
SIDS	Small Island Developing States
SPREP	South Pacific Regional Environment Programme
TNC	The Nature Conservancy
UNEP	United Nations Environment Programme
WSSD	World Summit on Sustainable Development
WTO	World Trade Organization

10 ANNEXES

10.1 Appendix 1. Regional and extraregional institutions, and programmes involved in some aspect of invasive species in the Caribbean

Organization	Membership	General Information
Barbados Programme of Action (http://www.unep.ch/islands/dsidspoa.htm; http://www.antenna.nl/ecsiep/lome/barblome.html)	SIDS	At the Barbados Conference the areas of importance for sustainable development of small island developing countries were discussed. The special value of the Conference is that the fourteen priority areas are elaborated into a Programme of Action, which contains specific actions that are needed on the national, the regional and the international level.
BirdLife International (http://www.birdlife.net/)	Global Partnership of non-governmental organizations	The BirdLife International Partnership strives to conserve birds, their habitats and global biodiversity, working with people towards sustainability in the use of natural resources with NGO partners representing a unique geographic territory or country.
CAB International (http://www.cabi.org/))	Non-profit organization. Member states: Trinidad&Tobago, Guyana, Jamaica, Overseas territories, Bahamas, Canada, Colombia, Chile operating from six centres worldwide, in Kenya, Malaysia, Trinidad, Pakistan, Switzerland and the UK.	to tackling some of the world's most challenging problems in agricultural sustainability and biological diversity.
Caribbean Conservation Association (http://www.ccanet.net/)	Primarily an association of environmental NGO's; 86 Caribbean-based NGO's, 20 Caribbean governments, 17 non-Caribbean Institutions, and individual members.	To promote the conservation of the region's natural resources and cultural heritage. It works through its network of members, and collaboratively with other relevant agencies, and is directly responsible for implementation of a range of projects and programmes. Its particular areas of focus are: Environmental Awareness Building, Information Management, Communications, International Conventions Compliance. CCA programme areas are: Marine and Coastal Resources, Protected Areas, Water Resources Management, Land-based Sources of Marine Pollution, Trade and the Environment, Multi-lateral Environmental Agreements (MEAs), Cultural Heritage
Caribbean Natural Resources Institute (http://www.canari.org/)	Independent technical and research organization.	To analyze and promote participatory management of natural resources in the insular Caribbean. The three main areas of activities are applied research, analysis and advocacy. Themes considered under these areas include: Protected area management, Capacity building, Collaborative natural resource monitoring, Natural resource management and livelihood strategies

Organization	Membership	General Information
Caribbean Network for Integrated Rural Development **(CNIRD)(**http://www.cnird.org)	NGO	Exists to promote sustainable, integrated and environmentally sound development, using a participatory approach, to improve the quality of life of Caribbean people, particularly those in rural areas. CNIRD pursues this agenda by networking at a national and sub-regional level, and through research, training and publications in the areas of Research and analysis, Information and communication, Training and education, Business initiatives and funding, Community development.
Caribbean Regional Environment Programme **(CREP)** (http://crep.ccanet.net/)		Exists to promote co-operation and environmental awareness amongst the CARIFORUM countries. The 4-year programme commenced in 2001, and is being implemented by the CCA. CREP has four main areas of focus: Developing/strengthening regional information networks, Promoting public education and awareness, Institutional capacity building, Establishing sustainable, living demonstration sites
CARIFORUM ((http://cariforum.org/about.htm))	Intergovernmental organization: Full members: Antigua and Barbuda, The Bahamas, Barbados, Belize, Cuba, Dominica, the Dominican Republic, Jamaica, Grenada, Guyana, Haiti, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, and Trinidad and Tobago.	The main objectives are: "To manage and co-ordinate policy dialogue between the Caribbean Region and European Union so as to promote integration and co-operation in the Caribbean, including the DOMs and OCTs, and to co-ordinate the allocation of resources and manage implementation of Regional Indicative Programmes financed by the European Development Fund (EDF) and regional programmes financed by Member States of the European Union of any other source."
Food and Agriculture Organization of the United Nations (FAO)((http://www.fao.org)	One of the largest specialized agencies in the United Nations system An intergovernmental organization, FAO has 183 member countries plus one member organization, the European comm.	FAO has worked to alleviate poverty and hunger by promoting agricultural development, improved nutrition and the pursuit of food security - defined as the access of all people at all times to the food they need for an active and healthy life. The Lead UN agency for and the lead agency for agriculture, forestry, fisheries and rural development.
Global Strategy on Invasive Alien Species (GISP) http://globalecology.stanford.edu/DGE/Gisp/index.html	This programme is coordinated by the Scientific Committee in collaboration with the IUCN and CABI with financial support from several institutions.	The Global Invasive Species Programme and its Partnership Network has been created to meet the complex issues involved in Invasive Alien Species management.

Organization	Membership	General Information
Inter-American Biodiversity Information Network **(IABIN)** (http://www.iabin.net/)	32 countries (including a number in the Caribbean) have now designated their IABIN Focal Points.	An initiative that arose from the 1996 Santa Cruz Summit of the Americas (for which the OAS provides a secretariat function). It aims to provide the networking infrastructure, and to bring together currently scattered biodiversity data, for a hemisphere-wide information system. This facility can then be used to underpin decision making, particularly in relation to development and biodiversity conservation issues.
Invasive Species Specialist Interest Group **(ISSG)**(http://www.issg.org)	A global group: 146 scientific and policy experts on invasive species from 41 countries	Activities focus primarily on invasive species that cause biodiversity loss, with particular attention to those that threaten oceanic islands.
Island Resources Foundation **(IRF**)(http://www.irf.org/)	Independent non-profit research and education organization (NGO).	Dedicated to solving the environmental problems of development in small tropical islands.
Organization of American States **(OAS)**(http://www.oas.org/)	Intergovernmental organization: Cuba, Dominican Republic, Haiti, Barbados, Trinidad and Tobago (1967); Jamaica (1969); Grenada (1975); Dominica, Saint Lucia (1979); Antigua and Barbuda, Saint Vincent and the Grenadines (1981); The Bahamas (1982); St. Kitts and Nevis (1984);	This hemisphere-wide organization exists to foster co-operation across the Americas and the Caribbean, in relation to political, economic and cultural concerns.
Organization of Eastern Caribbean States **(OECS)**(http://www.oecs.org/about.htm)	Intergovernmental organization: Full members: Antigua & Barbuda, Commonwealth of Dominica, Grenada, Montserrat, St Kitts & Nevis, St Lucia, St Vincent & the Grenadines. Associate members: Anguilla, the British Virgin Islands	The Organisation exists to facilitate co-operation among member countries, at a regional and international level, and to promote economic and foreign policy integration and sustainable development among members. This is manifest in the shared currency of member countries, the Eastern Caribbean Dollar, and moves towards an OECS Single Market. In pursuing its objectives, the OECS works with other (sub-regional bodies and institutions.

Organization	Membership	General Information
The Association of Caribbean States **(ACS)**(http://www.acs-aec.org/)	Full members: Antigua & Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, St Lucia, St Kitts & Nevis, St Vincent & the Grenadines, Trinidad & Tobago. Associate Members: Aruba, France (on behalf of French Guiana, Guadeloupe and Martinique), the Netherlands Antilles. Eight other non-independent Caribbean countries are eligible for associate membership.	It exists to foster consultation, co-operation and concerted action amongst countries of the wider Caribbean. Its particular focus is on regional integration, preserving the environmental integrity of the Caribbean Sea, and promotion of sustainable development. Current themes of particular interest to the ACS are trade, transport, sustainable tourism and natural disasters.
The Caribbean Community and Common Market (CARICOM)(http://www.caricom.org/)	Intergovernmental organisation: Full members: Antigua & Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Surinam, Trinidad & Tobago.	key regional institution for the Caribbean. It exists to foster regional integration and co-operation, particularly in relation to trade and social and economic development (including international relations).
The Nature Conservancy **(TNC)(**http://nature.org)	Non-government organisation	To preserve the plants, animals and natural communities that represent the diversity of life. The current initiatives are in the areas of climate change, fire, freshwater, invasives species and marine mangagement. Ongoing work in science-based land protection, natural area management and sustainable development. Expanding programs outside the USA including focus on the Caribbean.

Organization	Membership	General Information
UK OT Environmental Charters (http://www.ukotcf.org/)		In a 1999 White Paper (Foreign & Commonwealth Office, 1999), the UK Government outlined its intentions for future relations with the UK Overseas Territories (OTs). Environmental Charters were signed by representatives of UK and the OT governments in 2001. A pilot project is underway in the Turks & Caicos Islands to development a strategy for implementation there; this includes provisions for dealing with invasive species. Similar strategies (and provisions) are likely to be developed for other UK Caribbean OTs.
UK Overseas Territories Conservation Forum (http://www.ukotcf.org/)	Non-government organisation	Supports the people, NGOs and governments of the UK OTs in efforts to conserve their environmental resources through regional Working Groups, which assist in the exchange of information and technical/strategic advice, and by liaising.
UN Economic Commission for Latin America and the Caribbean – Caribbean Development and Co-operation Committee (ECLAC)(http://www.eclacpos.org/Default.htm)	United Nations commission: Full members: Antigua & Barbuda, Bahamas, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, Surinam, Trinidad & Tobago. Associate members: Anguilla, Aruba, the British Virgin Islands, Montserrat, Netherlands Antilles, Puerto Rico, the United States Virgin Islands.	This is one of five economic commissions of the United Nations Economic and Social Council (ECOSOC). ECLAC exists to facilitate economic and social development in Latin America and the Caribbean, to promote co-operation within the region, and to foster good relations between the region and countries elsewhere. The Commission undertakes development projects, and makes recommendations to member governments based on regional economic and social assessments.
UNEP Caribbean Environment Programme and Cartagena Convention and SPAW Protocol (http://www.cep.unep.org/)		To promote regional co-operation in the protection and development of the marine environment of the Wider Caribbean and aims to: Provide assistance to all countries of the region, Strengthen national and sub-regional institutions, Co-ordinate international assistance, Stimulate technical co-operation among countries
World Conservation Union **(IUCN)**(http://www.iucn.org)	International consortium of States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: 980 members spread across some 140 countries	As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

Organization	Membership	General Information
World Wildlife Fund **(WWF)(**http://www.panda.org)	Privately supported international conservation fund	To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by conserving the world's biological diversity, ensuring that the use of renewable natural resources is sustainable and promote the reduction of pollution and wasteful consumption.

10.2 Appendix 2. Islands targeted in this report

Anguilla
Montserrat
British Virgin Islands
Turks & Caicos
Cayman Islands
Bermuda
Navassa
Hispaniola
Puerto Rico
US Virgin Islands
Navassa
Netherlands Antilles
Martnique
St. Lucia
St. Vincent & Grenadines
Grenada
Barbados
Trinidad & Tobago
Dominica
Guadeloupe
Antigua&Barbuda
St. Kitts & Nevis
Bahamas Islands
Cuba
Jamaica

10.3 Appendix 3 Project Questionnaire

Invasive Species Threats in the Caribbean

Many species of animals, plants and even micro-organisms have been introduced to the Caribbean, either accidentally or deliberately, for a variety of reasons. Some introduced species have spread rapidly and represent serious environmental and economic threats. In a few cases, environmental changes may have allowed indigenous species to spread rapidly in a similar way. The risks posed by such "invasive" species are particularly serious on islands. Recent experiences with a number of major invasive pests in the Caribbean have served to emphasize the regional nature of these threats.

We hope that you will take this opportunity to engage in a new regional initiative, supported by The Nature Conservancy and implemented by CAB International, which seeks to review invasive species issues across the islands of the Caribbean. We would be very grateful for your assistance in this exercise, which is intended to identify gaps in knowledge, as well as collating available information on invasive species, their impacts, and their management.

Please take a few moments to respond to any of the questions below, and do not hesitate to contact us if you have any thoughts on these important issues.

Please reply to: B.Ali@cabi.org

1. Do you have knowledge of invasive species problems on a particular Caribbean island(s)? If so, please give details.
2. Are you aware of any attempts to collate information on invasive species problems on a particular Caribbean island(s)? If so, please give details.
3. Are you aware of any initiatives towards the prevention and management of invasive species on a particular Caribbean island(s)? If so, please give details.
4. What do you see as the key challenges and opportunities for addressing the invasive species problem, either locally or regionally, in the Caribbean?
5. Can you suggest names of other people or institutions who you think we should contact?

Please note that our intention is to build a database of contacts, and may wish to follow up on these matters with you. If you are happy to be included in this process, please provide your contact details.

Moses Kairo
CAB International
Caribbean and Latin American Centre (CLARC)

La menace des espèces envahissantes dans les Caraïbes

Pour une variété de raisons, de nombreuses espèces d'animaux, de plantes et même de micro-organismes ont été volontairement ou accidentellement introduites aux Caraïbes. L'expansion de certaines de ces espèces a été rapide et elles constituent une menace environnementale et économique sérieuse. Dans quelques cas, des changements environnementaux ont pu avoir permis aux espèces indigènes de s'étendre rapidement d'une manière semblable. Les risques posés par ces espèces "envahissantes" sont particulièrement importants sur les îles et les expériences récentes avec un grand nombre de organismes invasifs principaux dans les Caraïbes, ont servi à souligner la nature régionale de ces menaces.

Nous espérons que vous saisirez cette occasion de participer à une nouvelle initiative régionale, soutenue par "The Nature Conservancy" et mise en place par "CAB International", qui cherche à passer en revue les aspects des espèces invahissantes à travers les îles des Caraïbes. Nous serions grandement reconnaissants de votre coopération dans cet exercice, qui est prévu pour identifier les lacunes dans la connaissance, aussi bien qu'assembler l'information disponible sur les espèces invahissantes, leurs impacts, et leurs gestion.
Veuillez prendre quelques instants pour répondre à n'importe quelles questions ci-dessous et n'hésitez pas à nous contacter avec vos idées sur ces points importants.

Veuillez contacter: B.Ali@cabi.org
1. Etes vous au courant de problèmes d'espèces envahissantes sur une, ou plusieurs, île(s) des Caraibes particulière(s)? Si oui, veuillez donner des détails.
2. Etes vous au courant de quelconques tentatives visant à assembler les connaissances sur les problèmes d'espèces invasives sur une, ou plusieurs, ile(s) des Caraibes particulière(s)? Si oui, veuillez donner des détails.
3. Tenez vous compte de quelconques initiatives vers la prévention et la gestion des espèces envahissantes sur une ou plusieurs ile(s) des Caraibes particulière(s)? Si oui, veuillez donner des détails.
4. A votre avis, quels sont les principaux défis et occasions pour addresser le problème d'espèces invasives, localement ou régionalement, dans les Caraïbes?
5. Pouvez vous suggérer les noms d'autres personnes/ institutions avec lesquels nous devrions entrer en contact?
Veuillez noter que notre intention est d'établir une base de données de contacts, et nous souhaiterons peut-être continuer ces discussions avec vous. Si vous êtes heureux d'être inclus dans ce processus, fournissez svp vos détails de contact.

Moses Kairo
CAB International
Caribbean and Latin American Centre (CLARC)

Especies invasoras que amenazan al Caribe

Una gran variedad de plantas, animales e incluso microorganismos han sido introducidos al Caribe por diferentes razones, ya sea de forma accidental o deliberada. Algunas de esas especies introducidas se han dispersado rápidamente a través de la Región y actualmente representan una seria amenazas económica y ambiental. Son muy pocas las ocaciones, en que cambios ambientales han permitido que las especies indígenas se multipliquen y dispersen de manera similar. Tales especies "invasivas" representan un mayor riesgo particularmente para las islas. Experimentos recientes con algunas de las mas importantes plagas invasivas en el Caribe han permitido enfatizar cuan dispersa en la región estan tales especies invasivas.

Deseamos que usted tome esta oportunidad para participar en una nueva iniciativa regional, financiada por "The Nature Conservancy" (La Conservación de la Naturaleza) y llevada a cabo por CABI INTERNATIONAL. Este estudio intenta revisar las especie invasivas reportadas al rededor de las islas del Caribe.

Le agradeceríamos mucho su colaboración en este projecto, que busca identificar todos la vacíos en conocimiento, al igual que colectar la información disponible sobre las diferentes especie invasora presentes en la región, su impacto, y técnicas de control aplicadas.

Por favor, tome algunos minutos para responder a cualesquiera de las siguientes preguntas he igualmente no vacile en contactarnos si desea compartir con nosotros alguna opinión o comentario relacionado con este importante tema.

Por favor responda: B.Ali@cabi.org

1 ¿Tiene usted conocimiento de problemas con **especies invasoras** en alguna(s) isla(s) del Caribe en particular? Si es así, por favor detalle.
2 ¿Está usted enterado de iniciativas o intentos de colectar información sobre problemas con especies invasoras en alguna(s) isla(s) del Caribe particular? Si es así, por favor detalle.
3 ¿Está usted enterado de iniciativas hacia la prevención y el control de especie invasoras el alguna(s) isla(s) del Caribe particular? Si es así, por favor detalle.
4 ¿Cual considera usted debe ser la clave y mayor desafío que se bede tomar en cuenta para el control y manejo efectivo de los problemas con especies invasoras a nivel local y regional en el Caribe?
5 ¿Puede usted sugerir nombres de personas o instituciones que considera deberíamos contactar para obtener mayor información sobre el tema?
Deseamos aclara que la intención en colectar esta información es de construir una base de datos "**De Contactos**" con nombres e instituciones de Caribe interesados en el area, y mantener contacto continuo con cada uno de los interesados. Si usted desea ser incluido en la base de datos por favor anexe nombre, dirección, area de trabajo y cualquier otro tipo de información que usted considere importante para este ejercicio.
Moses Kairo
CAB International
Caribbean and Latin American Centre (CLARC)

10.4 Appendix 4 Invitation to electronic workshop

Invasive Species Threats in the Caribbean

In the past few weeks a great deal of information has been provided in support of the new regional initiative on invasive species (IS) issues across the islands of the Caribbean. This initiative is supported by The Nature Conservancy (TNC) and being implemented by CAB International. The initial objective of cataloging IS within the region is now well advanced, in part due to your assistance. I take this opportunity to express sincere appreciation for the tremendous effort that has been made to date. In addition, I invite you to continue your involvement in the project as we enter the second and final phase of the project, which will assume the format of an electronic workshop.

Objective of the workshop: To identify priorities for action on IS at the national and regional levels.

Method: This electronic workshop will run for 2 weeks beginning March 31st and ending April 14th 2003. Dr. Moses Kairo, Director, Caribbean and Latin America Regional Centre of CAB International will be the moderator. Proposed discussion topics are outlined:

- Prioritization of invasives nationally/ regionally with respect to food production, biodiversity, tourism, marine health.
- Assesment and examination of existing legislation on invasive management and opportunities for improvement.
- Characterization of the threats and impacts of invasive species.
- Identification of gaps.
- Development of recommendations for improvements and opportunities for partnerships to reduce the threat of IS with special focus on those with multiple-site impact
- It is expected that all points generated during the first week of discussion will be collated, circulated and reviewed during the second week. The workshop will be conducted in English however all attempts will be made to facilitate non-English speakers as required.

If there are any issues, which you consider critical, that are not listed as discussion topics please do not hesitate to contact me. Also, please feel free to forward this email to anyone who may be interested in being part of the workshop. It would be appreciated if you can respond to this email by 31st March. We look forward to your continued participation in this very important area.
Please respond to Bibi Ali,
B.Ali@cabi.org

Moses Kairo
CAB International Caribbean and Latin American Centre (CLARC)

Amenazas de Especies Invasoras en el Caribe

En las semanas anteriores una gran cantidad de información ha sido proporcionada en soporte a la nueva iniciativa regional para los problemas con especies invasoras a través de las islas del Caribe. Esta iniciativa esta siendo apoyada por Nature Conservancy (La Conservación de la Naturaleza (TNC)) y puesta en ejecución por CAB internacional. El objetivo inicial de la catalogación de las especies invasoras a través de la región esta bien avanzada; en parte, debido a su valiosa colaboración. Tomo esta oportunidad para expresar mi sincero aprecio por el tremendo esfuerzo puesto hasta la fecha y además invitarle a que continúe apoyandonos ahora que estamos entrando en la segunda y final fase del proyecto. Esta fase será manejada en forma de taller electrónico.

Objetivo del taller: Identificar las prioridades de acción a tomar con las especies invasoras a nivel nacional y regional.

Método: Este taller electrónico funcionará por 2 semanas comenzando desde el 31 de Marzo y terminando el 14 de Abril de 2003. El Dr. Moses Kairo, Director de CABI en la Región del Caribe y Latino América será el moderador. Los tópicos de discusión propuestos son los siguientes:

- Prioritación de especies invasoras a nivel nacional / regional con respecto a la producción del alimento, la biodiversidad, turismo, y sanidad maritima etc.
- Evaluación y examinación de las legislaciones existentes para el control de especies invasoras y posibilidades para mejorarla.
- Caracterización de la amenaza é impacto que representan las especies invasoras en la región.
- Identificación de areas poco estudiadas.
- Desarrollo de recomendaciones que ayuden a mejorar y abran oportunidades de trabajo conjunto (sociedades) para reducir la amenaza de especies invasoras, con especial enfoque en aquellas especies que tienen un impacto en diversas areas.

Se espera que todos los puntos generados durante la primera semana de la discusión sean compaginados, circulados y repasados durante la segunda semana. El taller será conducido en inglés sin embargo todas las tentativas serán hechas para facilitar la participación de aquellos que no sean de habla inglesa de ser necesario.

Si hay algun tópico adicional que usted considere crítico, por favor, no vacile en contactarme. Igualmente, siéntase libre de enviar la presente notificación a cualquier persona que pueda estar interesado en tomar parte en el taller. Apreciaríamos si usted puede confirmarnos su deseo de participar antes del 31 de Marzo, por e-mail. Esperamos que continúe su participación y apoyo en esta area tan importante. Por favor responda: B.Ali@cabi.org.

Moses Kairo
CAB International
Caribbean and Latin American Centre (CLARC)

La menace des espèces envahissantes dans les Caraïbes

Au cours des dernières semaines, beaucoup d'informations ont été fournies à l'appui de la nouvelle initiative régionale sur les questions d' espèces envahissantes (EE) à travers les îles caraïbéennes. Cette initiative est soutenue par The Nature Conservancy (TNC) et mise en oeuvre par CAB international. L'objectif initial de cataloguer les EE dans la région est maintenant bien avançé, grâce, en partie, à votre aide. Je voudrais donc saisir cette occasion pour exprimer ma sincère satisfaction pour les efforts énormes déployés jusqu'ici.
D'autant plus, je vous invite à continuer votre participation à ce projet alors que nous entrons dans sa deuxième et finale phase, qui prendra la forme d'un atelier éléctronique.

Objectifs de l'atelier: Identifier les priorités d'action sur les EE aux niveaux national et régional.

Méthode: Cet atelier électronique se déroulera au cours de deux semaines, du 31 Mars au 14 Avril 2003. Le Dr. Moses Kairo, Directeur, Centre Regional des Caraïbes et de l''Amerique Latine, sera modérateur.

Les points de discussions proposés sont soulignés ci-dessous:

- Priorisation nationale/régionale des espèces envahissantes en ce qui concerne la production de nourriture, la biodiversité, le tourisme, santé maritime etc.
- Evaluation et examen de la législation existante sur la gestion des espèces envahissantes et occasions pour l'amélioration
- Charactérisation des menaces et impacts des espèces envahissantes.
- Identification des lacunes.
- Développement de recommendations pour l'amélioration et occasion de collaboration servant à réduire la menace des EE, accordant une attention spéciale à celle avec impact multi-secteur.

Nous anticipons que tous les points produits pendant la première semaine de la discussion seront assemblés, distribués et passés en revue pendant la deuxième semaine. L'atelier sera conduit en anglais cependant toutes tentatives seront faites pour faciliter les participants non-Anglais selon leurs besoin.

S' il y a des questions de discussion, que vous considérez cruciales, et qui ne sont pas énumérés ci-dessus, n'hésitez pas à me contacter. En outre, sentez-vous libre de faire suivre cet email aux personnes qui pourrait s'intéressées à participer à l'atelier. Nous vous serions reconnaissants de bien vouloir répondre à cet email d'ici le 31 mars.

Dans l'attente de votre participation continuée dans ce domaine important.

Bibi Ali
B.Ali@cabi.org

10.5 Appendix 5. Workshop objectives and operation

Invasive Species Threats in the Caribbean

Introduction

Welcome to the electronic workshop on **Invasive Species Threats in the Caribbean.** This is the second phase in the regional initiative on **Invasive Species (IS)** issues within the wider Caribbean region that is supported by The Nature Conservancy (TNC) and being implemented by CAB International. As mentioned before in the invitation, the objective of this workshop is the identification of priorities for action on IS at the national and regional levels.

OBJECTIVE

To identify priorities for action on *Invasive Alien Species* (IAS) at the national and regional levels.

Approach:

Dr. Moses Kairo, Caribbean and Latin America Regional Centre of CAB International will moderate this electronic workshop. The proposed discussion topics will include:-

1. Prioritization of invasives nationally/ regionally.
2. Assessment and examination of existing policy frameworks and legislation on invasive management and opportunities for improvement.
3. The possibility of using existing agricultural policies for IAS issues.
4. Characterization of the threats and impacts of invasive species.
5. Identification of knowledge gaps.
6. Development of recommendations for improvements and opportunities for partnerships to reduce the threat of IS with special focus on those with multiple-site impact.

It is expected that all points generated during the first week of discussion will be collated, circulated and reviewed during the second week. The workshop will be conducted in English however all attempts will be made to facilitate non-English speakers as required. Also, please feel free to forward this email to anyone who may be interested in being part of the workshop.

Background information

It is accepted that biological invasions will continue to occur especially due to expanding global trade that increases the volume of organisms being transported either directly or indirectly throughout the world. Although typically less than 10% of introduced species cause significant

damage, these damages can however be spectacular with enormous ecological and economic consequences.

With respect to the impact of invasive alien species on the natural community, these biological invasions have an impact at the ecosystem, species and genetic levels. The resultant cumulative effects are numerous and can result in changes in resource competition (food, space, reproductive areas), physical changes in habitat, limitation of resources (nutrients, light, oxygen), detrimental changes in the trophic web due to the introduction of a new and functional group, genetic effects on native species (hybridization, change in gene pool, loss of native genotypes), drastic reduction in population size or even extinction of native population and /or homogenization of the native population.

With respect to economic and socioeconomic impacts invasive alien species can negatively affect commercial and rural agricultural enterprises (terrestrial, marine and freshwater), tourism, environmental and human health. The direct socioeconomic costs are due to the financial costs incurred in prevention, control and mitigation programmes whilst the indirect impacts are on the 'more difficult to quantify' impacts on ecological services.

Now that the threat of IAS is being acknowledged as being immense and sometimes irreversible, the science and management of species is moving away from being reactive towards a more proactive approach to prevent or mitigate invasion threats. There is therefore the need to find mechanisms to deal with this threat in a practical, structured and effective method.

PART 1

The first phase of this project sought to identify as far as possible the invasives species that have already established in individual islands as well as the relevant resource persons and institution. This data is being used to develop prototypes of two (2) databases for contact and invasive species information.

The contact database contains information on individuals and organizations name, title, organization, address, telephone number, facsimile (fax) number, email addresses and a brief description of their work and areas of interest. Apart from collating information on the government agencies and projects in invasive species management, the project also focuses on obtaining information on those non-governmental organizations that are presently involved as well as those with the intention to become partners in invasive species management.

With respect to invasive species information the data capture is intended to be as accurate and as comprehensive as possible at an island level. It also seeks to obtain as much individual island information especially with respect to critical areas of interest such as pathway of entry into the territory, method of spread within the island, impacts and methods of management.

Within this list there is now the need to prioritize the IAS in order to determine which species poses the most imminent economic and ecological threats at national and regional levels. This information can be used to guide allocation of resources to develop relevant management programmes. This list can be used for prioritization of IAS in your individual country as well as the region. Any additional information/ suggestions / agreement/ disagreement of the species listings can be forwarded to B.Ali@cabi.org.

PART II

Since there is the potential for any introduced organism to become invasive, in the short term it may be practical to identify those species with exceptional high invasion and impact potential. In addition, because the ecological and economic costs of invasions are high, it is possible for resources to be allocated towards prevention of invasions as a priority. This can be facilitated by using the following:

1. Advance knowledge of invasion threats (via careful monitoring of information networks)
2. Available guidelines.

In addition, advanced information on invasives and potentially harmful organisms could provide valuable criteria for prevention strategies such as quarantine and import restrictions, allocation of resources, maximize detection and for guiding decision making on proposed introductions.

This type of advanced monitoring can be assisted by the development of a broadly accessible electronic inventory of invaders, which lists critical points of the IAS such as life history,

habitat requirements, dispersal patterns and control methods. Table 2a and b can be used to guide discussions with respect to the development of national / regional strategies to prevent or mitigate biological invasions.

It is stressed that this document is a draft and a work in progress and may contain errors. If you find errors please bring them to our attention.

Please send all queries to B.ALI@cabi.org.

10.6 Appendix 6 Workshop resource materials

WELCOME TO CAB INTERNATIONAL'S ELECTRONIC WORKSHOP ON INVASIVE SPECIES THREATS IN THE CARIBBEAN.

The information available at this site are as follows:

1. Phase 1 Questionnaire.
2. Invitation letter to the electronic workshop.
3. Background information for the electronic workshop.
4. Table 1: 'Invasive Species in the Caribbean.'
5. Table 2a: 'Key Issues and Challenges '
6. Table 2b: 'Status and Recommendations'

All data in Tables 1 and 2 has been compiled from information obtained in the questionnaires and literature searches conducted during Phase 1 of the project 'Invasives Species Threats in the Caribbean'.

The background information provided will guide the proposed discussions during this workshop.

In Table 2a, it is requested that you rate the status of certain critical issues in your country by highlighting the selected number.

It is stressed that this document is a draft and a work in progress and may contain errors.

All queries and request for additional information can be sent to: B.Ali@cabi.org

10.6.1 Appendix 6a. KEY ISSUES AND CHALLENGES

Country	Key Issues Addressed	Please rate the status of these critical issues in your country (1= lowest score 5 = highest score)				
		Legislation	**Public Education**	**Training**	**Research**	**Execution**
Anguilla	▪ Import regulations and infrastructure focused on agricultural trade ▪ Lacking in capacity ▪ Major import consignments enter the country more or less unscreened	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Antigua& Barbuda	▪ Threat of reinvasion, ▪ Loss/extirpation of local species ▪ Lack of protective legislation & enforcement ▪ Lack of education	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Bahamas Islands	▪ The paramount importance of political will ▪ Readiness to budget and spend money on the control of invasive species ▪ Regional sharing of experiences ▪ Individual island responsibility for IAS problems ▪ Education of the public and the decision makers ▪ Enacting legislation ▪ Enforcing legislation ▪ Research ▪ Capacity building for agencies and NGOs involved ▪ Accessing information ▪ Structured and effective communicating (agencies locally, regionally and internationally)	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Barbados	▪ The need to identify management measures needed to prevent over-					

Country	Key Issues Addressed	Please rate the status of these critical issues in your country (1= lowest score 5 = highest score)				
		Legislation	**Public Education**	**Training**	**Research**	**Execution**
	exploitation of biodiversity resources ▪ The need to develop management approaches to control alien species where studies have shown demonstrable negative impacts on indigenous biodiversity ▪ Ensuring adequate legal protection for critical habitats of key species and important ecosystems ▪ The lack of financial and human resource capacity to simultaneously implement all the recommendations ▪ Ascertaining funding for research, management and monitoring initiatives (local). ▪ Public awareness (local) of the dangers of alien invasive species. The growth of interest in exotic pets is potentially a significant problem in the region. ▪ Transboundary species management e.g. range expansion, and constituents of ballast water on marine vessels (regional). ▪ Lack of expertise to investigate certain species (local). ▪ Lack of baseline data on native invertebrate biodiversity. ▪ Development of policy to manage the problem (local/regional). ▪ Soliciting financial resources to remove invasive species from the local environment. ▪ Logistical constraints are also encompassed in this challenge. ▪ Limited staff to address quarantine requirements. ▪ Intentional and accidental smuggling via international transport.	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤

Country	Key Issues Addressed	Please rate the status of these critical issues in your country (1= lowest score 5 = highest score)				
		Legislation	**Public Education**	**Training**	**Research**	**Execution**
	▪ Lack of funds, education, general public, bureaucrats, real threats posed, lack of effective communication, dissemination of subject information					
Bermuda	▪ Lack of political will to deal with the problems of invasive species ▪ Higher priority human service needs (housing, health, education, waste management and other environmental issues).	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
British Virgin Islands	▪ Paucity of knowledge of the IAS that already occur ▪ Poor screening of imported consignments ▪ Handling of imported consignments traditionally managed by Customs personnel	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Cayman Islands	▪ Need to upgrade infrastructure ▪ Information needed with respect to environmental threats and difficult taxa such as soil organisms ▪ Absence of complete quarantine screening because of need for additional training ▪ Poorly regulated pet trade	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Com. Of	▪ Lack of funding	①	①	①	①	①

Country	**Key Issues Addressed**	Please rate the status of these critical issues in your country (1= lowest score 5 = highest score)				
		Legislation	**Public Education**	**Training**	**Research**	**Execution**
Dominica		② ③ ④ ⑤	② ③ ④ ⑤	② ③ ④ ⑤	② ③ ④ ⑤	② ③ ④ ⑤
Cuba		① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Dominican Republic		① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Dutch Caribbean Isl.		① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
French Caribbean Isl.	▪ No invasive species control effort on St. Maarten ▪ no customs ▪ no real laws prohibited the importation of exotics ▪ Major tourist and yachting destination so countless possibilities for transfer of exotics	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Grenada		① ②	① ②	① ②	① ②	① ②

Country	Key Issues Addressed	Please rate the status of these critical issues in your country (1= lowest score 5 = highest score)				
		Legislation	**Public Education**	**Training**	**Research**	**Execution**
		③ ④ ⑤	③ ④ ⑤	③ ④ ⑤	③ ④ ⑤	③ ④ ⑤
Haiti		① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Jamaica		① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Monserrat	▪ Agriculture now recovering but under the threat of future volcanic activity; imported materials inspected	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Puerto Rico	▪ The immense and mostly illegal pet trade (in reptiles, amphibians, fish, birds, mammals, as well as exotic plants) ▪ Apathetic government.	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
St. Kitts & Nevis		① ② ③	① ② ③	① ② ③	① ② ③	① ② ③

Country	Key Issues Addressed	Please rate the status of these critical issues in your country (1= lowest score 5 = highest score)				
		Legislation	**Public Education**	**Training**	**Research**	**Execution**
		④ ⑤	④ ⑤	④ ⑤	④ ⑤	④ ⑤
St. Lucia		① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
St. Vincent & Grenadines		① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Trinidad & Tobago	▪ Training and equipping of Quarantine Officers and Crop Protection personnel ▪	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
Turks & Caicos	▪ Very little in the way of regulatory frameworks or infrastructure ▪ Local government has no Ministry/ Department of Agriculture ▪ Although Customs ordnances can be rapidly amended and implemented this is mainly for agricultural imports ▪ Effective implementation cannot be relied upon	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤	① ② ③ ④ ⑤
US Virgin Islands	▪ Import restrictions are lacking ▪ Problem of unregulated pet stores	① ② ③ ④	① ② ③ ④	① ② ③ ④	① ② ③ ④	① ② ③ ④

Country	Key Issues Addressed	Please rate the status of these critical issues in your country (1= lowest score 5 = highest score)				
		Legislation	**Public Education**	**Training**	**Research**	**Execution**
		⑤	⑤	⑤	⑤	⑤
General	▪ Importation of tropical Pacific invertebrates and vertebrates so use in home aquaria ▪ Need for money for basic information gathering and research. ▪ Need for money for programs to reach the right people that can make a difference (policy makers, inspection/enforcement officials, etc.). ▪ Need for time and personnel to do the above. ▪ Lack of taxonomic support for rapid and reliable identification.					

Appendix 5b: Status and recommendations

10.6.2 Appendix 6b. STATUS AND RECOMMENDATIONS

Country	What exists	What needs to be done - prioritize
Anguilla	▪ Some studies done on Cuban Tree Frog and Common Iguana by Fauna and Flora International, The Anguilla National Trust (Iguana Iguana) and Avila College from Kansas USA (Cuban Tree Frog) ▪ An eradication programme to eliminate Iguana iguana in 1999 was conducted but not many were caught when compared to the known population. ▪ Arrived on island on natural rafts (iguana) ▪ Good cooperation from the Water Lab Unit of the Primary Health Care Department wrt controlling the Cuban Tree Frog and assisting with dissemination of information in public campaigns since it was important	▪ Need for appropriate effective applicable and affordable legislation that is enforced to curb the flow of invasive species locally and regionally. ▪ The regions political directorate needs to be seriously informed on the issue and the urgency of the matter so that the middle managers and policy makers can deal with the essentials of the problem.

Country	What exists	What needs to be done - prioritize
	to secure valuable drinking and bathing water. ▪ The Department of Agriculture has put in place a very effective monitoring and certificate issuing system to allow or reject persons or companies bringing in particular animals, pets and plants on the island.	
Antigua& Barbuda	▪ The Antiguan Racer Conservation Project (ARCP) has been working since 1995 to eradicate rats from numerous (11 to date) offshore islands in an effort to conserve the Critically Endangered Antiguan racer snake (Alsophis antiguae) and also for hte benefit of local lizards, nesting seabirds, vegetation, and other species ▪ The ARCP maintains a network of permanent bait stations on islands cleared of rats around Antigua. These are designed to prevent reintroduction of rats to these uninhabited islands.	
Bahamas Islands	▪ Currently working on a National Invasives Species Strategy ▪ Funding obtained to conduct work as part of InterAmerican Biodiversity Network to catalog invasive species. ▪ BEST project working to identify invasive species in The Bahamas. ▪ There are a number of initiatives including the Department of Agriculture's animal control program; the Department of Environmental Health Services' vector program and the Bahamas Environment, Science and Technology Commission's alien species data project. ▪	Also a policy. Priority is to finalize Strategy and get Cabinet Approval for both Policy and Strategy. Funds from UK High Commission Priority is to prepare legislation for invasive species and to critically review and carry out risk assessments on candidate species, and determine strategy for individual species already present and deemed invasive. Priority is to determine where, how much and what level of threat present invasive species pose, and to then determine as strategy and action. Priority is within each initiative or programme to determine priorities for specific projects and activities. Animal control needs to include raccoons esp. in Abaco, feral goats, dogs and cats.
Barbados	▪ Specialized units already present in the The Ministry of Agriculture and Rural Development to address the prevention and management of invasive species in agriculture in Barbados. ▪ Public awareness campaign is ongoing with an aim to educate persons on the impacts of invasive species within agriculture ▪ The National Biodiversity Strategy and Action Plan for Barbados include the following alien (invasive) species	

Country	What exists	What needs to be done - prioritize
	research activities: ▪ Research on the presence, distribution and abundance of alien and genetically modified species and the development of a GIS compatible database. ▪ Development/support of monitoring projects designed to assess impacts of exploitation, habitat loss, pollutants, and alien species on the distritbution and abundance of terrestrial, marine and freshwater biodiversity, alien, indigenous and rare species. ▪ Experiments conducted to reduce the black tilapia ▪ The culling of a number of mongooses was also conducted ▪ Vegetation Restoration Programme to positively control parasitic and other foliage considered to be invasive.	
Bermuda	▪ Problems of IAS well recognized ▪ Biota and wider environmental issues relatively well studied ▪ Relatively well advanced in developing strategy to deal with environmental issues including IAS ▪ Local knowledge and expertise identified and included in national programmes ▪ Legislation is currently being drafted to cover minimizing entry of invasive species via ballast water. ▪ Attempts are being made to control feral cats, feral chickens, wild red-eared slider terrapins, pigeons, the Indian Laurel tree, etc. ▪ There are regulations governing types of plants and animals that can be imported. ▪ Launching a Biodiversity Action Plan to better protect the Island's biodiversity which includes actions to raise public awareness about invasive species as well research and management/control/monitoring.	
British Virgin Islands	▪ The ARCP maintains a network of permanent bait stations on islands cleared of rats in one of the cleared islands - designed to prevent reintroduction of rats to these uninhabited islands. ▪ Some certification required for imported ornamentals	

Country	What exists	What needs to be done - prioritize
	▪ Recent inclusion of an agricultural officer at ports of entry to inspect import consignments	
Cayman Islands	▪ Department of Agriculture responsible for phytosanitary issues ▪ Reasonably well informed with respect to potential agricultural pests ▪ Good cooperation between Agricultural officers and Customs personnel ▪ Exported materials also inspected ▪ Banning of threatening commodities (eg turf) ▪ Increasing restrictions in other areas particularly with respect to agricultural commodities	
Com. Of Dominica	▪ Monitoring the spread of Anolis cristatellus and conducting studies on the interaction of invasive species and native endemic with a view to controlling the invasion	
Cuba		
Dominican Republic	▪ Funding obtained to conduct work as part of InterAmerican Biodiversity Network to catalog invasive species.	
Dutch Caribbean Isl.		
French Caribbean Isl.	.	some of the offshore islets are small enough to control or eradicate exotics.
Grenada		
Haiti		
Jamaica	▪ Invasive mammal control (cats, rats, mongooses) to preserve biodiversity in the Hellshire Hills, Jamaica ▪ Green-lipped mussel (Perna viridis) and Redclaw Crayfish (Cherax quadricarinata) management by Institute of Jamaica and the National Environmental and Planning Agency (NEPA) ▪ Some legislation controlling imports ▪ The Clearing House Mechanism for the CBD ▪ Funding obtained to conduct work as part of InterAmerican Biodiversity Network to catalog invasive species.	▪ Plentiful opportunities to conduct research on invasive species, and to address issues of control and eradication ▪ International legislation to sterilize ballast water would be useful.
Monserrat	▪ Import licences needed for certain commodities	
Puerto Rico	▪ U.S. Fish and Wildlife Service and one	▪ A public awarenes campaign should be planned/enacted to educate the people on the

Country	What exists	What needs to be done - prioritize
	of the agency's priorities is the eradication of invasive and introduced species (Exotics) ▪ Known removal/control efforts are being conducted in Cartegena National Wildlife Refuge (NWR), Cabo Rojo NWR, and Culebra NWR. ▪ Promotion of a "Partners for Fish and Wildlife" program whereby private landowners, groups, and municipalities are given incentives to eradicate these and other species of invasives. ▪ Biological Control for Pink Hibiscus Mealybug ▪ Biological control for whitefly ▪ Chemical control to eradicate Tropical Soda Apple ▪ Permanent surveys for the detection of Mediterranean, Oriental, Melon and Mexican Fruitflies, Mango Seed Weevil,	risks of exotic animals and plants being introduced into the islands. ▪ Within protected areas (US Fish and Wildlife Service National Wildlife Refuges) securing funding (having someone to research funding opportunities and submit proposals) to either conduct the work or promote the need to those who are willing to volunteer labor and equipment. ▪ Input needed on the best methods to be utilized, both environmentally and socioecomically. ▪ Site-specific basis and done by people that have a working knowledge of specific island and habitat ▪ Identify characteristics and site-specific socioeconomic factors ▪ Site-specific outreach efforts to share info on the threats, socioeconomic impacts, and environmental damages caused by the presence of invasives. Outreach is needed for protected areas as well, because these sites can be utilized as models of how removal of invasives ▪ Restoration of formally invasive-occupied sites can be beneficial both environmentally, aesthetically, and socioeconomically (ecotourism).
St. Kitts & Nevis	▪ Biological Control for Pink Hibiscus Mealybug	
St. Lucia		
St. Vincent & Grenadines	▪ The main challenge is that IF WE do not do it NOONE else ▪	▪ Address issue within an NGO regional program such as TNC Grenadines is beginning to operate now ▪ Allow for easier burocratic access, visibility and effectiveness oif environmental education at both school and executive level. ▪ Develop relevant databases and methodology on containment ▪ A timely study on Bufo in Carriacou is much in our own interest for a successful conservation of biodiversity in the Grenadines.
Trinidad & Tobago	▪ Biological Control for Pink Hibiscus Mealybug	▪ To catalogue existing flora and fauna so that countries know what is indigenous and what is an invasive ▪ Putting in place a surveillance system(s) to monitor possibly introductions of invasives ▪ Identification of invasive species, particularly non-pest species and plant species. For insect pests, most countries will quickly tell what has been introduced ▪ To develop action plans to deal with invasive species - either on a country basis or as a regional effort
Turks & Caicos	▪ Customs ordnances can be rapidly amended and implemented ▪ UK OTCF is currently facilitating the development of a strategy for the implementation of the Environmental	

Country	What exists	What needs to be done - prioritize
	Charter which identifies IAS as a major concern and recognizes that gaps exist in the existing facilities. ▪ Recognition of the need to review/ list current/ potential problem species/ control/ eradicate problem species and prevent new introductions of problem species ▪ Ongoing initiative to control feral dogs	
US Virgin Islands	▪ The VI National Park is currently attempting to reduce populations of cats, rats, mongoose, hogs, goats and sheep from park lands. ▪ Cooperation with US Dept. of Agriculture, Animal Plant Health Inspection Service, Wildlife Services Division. ▪ Priority of U.S. Fish and Wildlife Service and one of the agency's priorities is the eradication of invasive and introduced species (Exotics)	▪ A public awarenes campaign should be planned/enacted to educate the people on the risks of exotic animals and plants being introduced into the islands. ▪ Within protected areas (US Fish and Wildlife Service National Wildlife Refuges) securing funding (having someone to research funding opportunities and submit proposals) to either conduct the work or promote the need to those who are willing to volunteer labor and equipment. ▪ Input needed on the best methods to be utilized, both environmentally and socioecomically. ▪ Site-specific basis and done by people that have a working knowledge of specific island and habitat ▪ Identify characteristics and site-specific socioeconomic factors ▪ Site-specific outreach efforts to share info on the threats, socioeconomic impacts, and environmental damages caused by the presence of invasives. Outreach is needed for protected areas as well, because these sites can be utilized as models of how removal of invasives ▪ Restoration of formally invasive-occupied sites can be beneficial both environmentally, aesthetically, and socioeconomically (ecotourism).

10.7 Appendix 7. Feedback to electronic workshop

Feedback 1……

1. Introduction

Thank you for keeping the discussion moving. Many points have been raised and this is a first attempt to synthesize the key elements and to highlights some of the areas which require attention. e. The points are discussed around some of the key topics. Please note this is not meant to be a comprehensive review but a means to highlight some of the key issues and hopefully to guide further inputs. I must emphasize however, that we will keep the discussion open, and if there are any points that you think should be covered, please raise them!

- Characterization of the threats and impacts of invasive species (IS) and prioritization those species which require action at the national and regional level
- Assessment of existing policy and legislative frameworks with respect to invasive species and identification of opportunities for improvement
- Development of recommendations for further action

2. Characterization of the threats and impacts of invasive species, and prioritization of species which require action

2.1 List of species:

We continue to receive additional information for inclusion. As Chris Berg has pointed out, we request that you examine the existing list and send us any additional information. We are including information/links from other databases. Clearly this is a continuing process as we continue to obtain more information which will be included.

Invasive species are known to disperse quickly within the Caribbean for various reasons. For instance the hibiscus mealybug moved from Grenada to almost the entire region over a period of about seven years!. Therefore the need for sharing information is noted. It is also noted that IS present in Florida and other continental areas of the Caribbean Basin will be of interest.
There is a paucity of quantitative information on impacts of IS. Thus prioritization of species will be based on both qualitative and quantitative information.

Action

We would appreciate information on any studies, which have not been formally published, which will assist in this process.

3. Assessment of existing policy and legislative frameworks with respect to invasive species and identification of opportunities for improvement

3.1 Definitions

Several issues have been raised with regard to definition of invasive species. This is an important point in order to bring a collective agreement on what we are talking about. The reality though, is that we have several definitions which are pertinent to different international agreements such as the IPPC. Clearly what is important is that the definition adopted ***encompasses all invasions across taxa and ecosystems.***

However, for the purpose of the present workshop, it is not anticipated that the matter will be resolved. Thus as the debate continues, it will be useful to list all the definitions as referenced in different key international agreements. This will be included in the final report.

Action

Assumption of a broad based definition which will allow fulfillment of the various international agreements.

Main discussion points:

- Is 'pest as defined by IPPC' enough to cover all categories of invasives - invasive alien weeds, invasive alien species harmful to animals, invasive species directly harmful to humans (for example *Aedes aegypti* and the various dengue viruses).
- It was noted that almost all the animals, plants and microorganisms in Table 1 of this workshop can be defined under the IPPC provisions.
- However, it is clear that the IPPC definition does not satisfy all international agreements.

3.2 Policy framework

Traditionally, Ministries of Agriculture have taken a lead in matters to do with IS. However, with the recognition of the importance of IS across taxonomic groups and ecosystems, it is clear that official policy which brings together the different stakeholders is required.

Most countries in the region do not have a stated policy recognizing the problem with IS. However there is a continuing effort to fulfill requirements of international conventions/agreements such as CBD, WTO SPS which bring these matters to the fore..

Action

Support for development of national and regional policy frameworks.

3.3 Legislative and regulatory framework

Is the existing legislative and regulatory framework adequate for dealing with invasive species?

Existing systems are not adequate to deal with IS issues. However, we should not re-invent the wheel: Approaches taken by other regions might be relevant to Caribbean territories.

Most Caribbean territories, are grappling to deal with requirements of WTO SPS Agreements and other international agreements.

References

Existing guidelines: Participants attention is drawn to Shine S., N. Williams and L. Gündling (2000). A Guide to Designing Legal Institutional Frameworks on Alien Invasive Species. IUCN, Gland, Switzerland, Cambridge and Bonn. 138pp. The goal of this Guide is to provide national law and policy makers with practical information and guidance for developing and/or strengthening legal and institutional frameworks on alien invasive species, consistently with Article 8(h) of the Convention on Biological Diversity, as well as pertinent obligations under other international instruments. It provides a structured framework for dealing with alien invasive species issues and contains illustrations and practical examples to assist in understanding the impact of alien species introductions. It complements the work of scientists, ecologists, and economists by demonstrating how laws and institutions can mutually support efforts to control and mitigate the impact of alien invasive species.

Action

Many countries in the region need to develop a legislative/regulatory framework to deal with IS. It is noted that this does not require re-inventing the wheel as there is scope for use of model regional laws or adapting frameworks from other regions such as the South Pacific. However a concerted effort is required to discuss these isses at the regional level.

Main discussion points:

- It may not be necessary to create new legislative structures for IS since most of the concerns are being dealt with by quarantine legislation (animals and plant) although a review is necessary and may result in some modifications.
- Drafting of separate legislation for IS maybe difficult since in most SIDS the responsibility for approval of importation of any plant, animal or species is already given to quarantine authorities. Within the existing legislation there may be the need to identify/ create new activities at strategic, tactical and operational levels to enable control over IS
- Need to determine internal policies concerning ‘naturalized invasives’ especially with respect to removal.
- The problem of feral animals which roam and threaten or endanger species. The need to control domestic livestock to prevent uncontrolled grazing which is a threat to many native species and which may allow only specific species to survive and so decrease biodiversity.
- Regulations to establish discreet ownership of livestock with regulations for control and responsibility. Take home message - A need for Animal Control Regulations/Legislation Exists in the Caribbean!

3.4 Institutional frameworks

The need for regional cooperation has been alluded to. The Caribbean Plant Protection Commission (CPPC) has remained relatively ineffective. A new entity, CAHFSA, the Caribbean Agricultural Health and Food Safety Agency has been proposed and is still in gestation.

Action

A regional mechanism to foster partnerships in IS issues is required. However, the development of additional networks has to be weighed against the 'overload' of networking in the region, especially when it is the same people who are involved. Overall however, it is clear that for IS issues to be given the due prominence they require, a specific effort might be required?

Such a cooperation will require a buy in by the regional political mechanisms as well as other stakeholders. The diverse nature of the region is seen a s a challenge which can be overcome.

3.4.1 National Level

Evolution of existing "Plant Protection Boards" or "Plant Quarantine Board" suffice for IAS threats?

Main discussion points:

- A good plant protection law will have a "Plant Protection Board" or "plant quarantine board".
- This authority generally has as its mandate the provision of advice to the Minister responsible for agriculture on all matters related to plant protection in the country, including suggesting and preparing regulations, and determining the criteria for the declaration of a phytosanitary emergency.
- The Board will have as members representatives of the Ministry of agriculture, Ministry of the environment, Ministry of trade, Customs Department, defence forces, universities, research institutes. (Depending on its exact role it might also have importers, exporters, growers, and nursery owners, and legal experts.)
- As such, isn't this the venue to address the threats of invasive alien species, especially given the fact that the plant protection legislation also generally gives the Board the power to set up all the technical committees it wants, to help it in its deliberations?
- A slightly different view: Existing quarantine boards appear to address only plants (and plant diseases and plant pests) whilst in IAS management there is the need to review all potential invasives inclusive of animals and micro-organisms.
- Should these existing national authority/boards be modified to a "National Alien Species Review Board" with the necessary expertise and the necessary powers of enforcement?

Regional Level

- Caribbean nations should go far beyond strengthening their domestic safeguarding capabilities. Dealing with invasive species has something to do with mitigation at source as well as at port of entry
- Howard Frank offers some pragmatic steps in dealing with the problems with biosystematics and exchange of information.

- An example of trying to stem the influx of exotic pests into the U.S.A there was a shift from primary reliance on exclusion at the port of entry to off-shore actions such as pest risk mitigation in the areas of production and elsewhere, certification at the point of origin, and pre-clearance at the port of export.
- Promotion of regular monitoring of the region (possible link with existing monitoring / pest alert systems) in the form of a complement of national efforts?
- A regional authority should have legislation, activities and technical expertise to do the following:
  - Identifies the nature and significance of invasives already in the Region.
  - Identifies significant external biological threats to the Region's ecosystems.
  - Builds public and private coalitions around immediate and more distant threats.
  - Establishes equivalent risk management and safeguarding systems throughout the Region.
  - Develops and implements regional surveillance strategies for dangerous invasive organisms.
  - Fosters research and development in support of programs against dangerous invasive organisms of concern to the Region.
- The legislative framework of the Pacific Plant Protection Organization (PPPO) can be used as a starting point for our region since there are many similarities to the Caribbean (Small Island Developing States SIDS) with respect to existing individual country border control via Agricultural Quarantine Services and resource constraints.
- In this model members determined that they should develop a regional bio-security legislative framework to harmonize regulatory control over trade in plants and animals and to include IAS and LMOs. This was due to the regional initiatives to harmonize under the WTO, and the push towards free trade areas.
- Within this legislation framework IAS are not identified as requiring any special treatment since they can be included within the system of risk assessment, management, approval, restriction, containment and eradication once identified in the law (generally in lower level regulations).
- In this framework, government agencies other than agriculture have a technical input into the decisions on management of these species after a consultative process has been put in place.

Conclusions

It is great to be discussing IS issues at the regional level. There is no doubt that this is useful and essential. Unfortunately, there is a time constraint for the present discourse. We anticipate concluding the present discussion one-week today. However, this is seen as only a beginning and perhaps if there is interest participants may wish to continue further discussion as a group.

A report of the present discussions will be produced on the 30th April.

Feedback 2……

Caribbean Invasive Species Threats

OVERVIEW

These notes provide an update to the electronic workshop on Caribbean Invasive Species Threats. Additional information on other elements of the ongoing effort to collate information on the subject is provided.

UPDATE ON ELECTRONIC WORKSHOP AND OTHER ACTIVITIES

Many thanks for participation in this electronic workshop. Invasive species are a serious threat to the region and this is clearly indicated through the discussions. Several priority issues are raised and action is now needed to ensure a comprehensive effort is instituted to deal with invasive species. The success of such an effort will very much depend on linking together the diverse range of stakeholders at the national, regional and international level. The electronic workshop and other activities are a very useful first step in identifying the key issues as well as acting as a forum to bring different stakeholders together.

This effort represents the first concerted attempt to collate available information on threats posed by the diverse range of invasive species in the insular Caribbean. Here I provide a synthesis of some of the key outputs of the effort. This is based on discussions during the workshop as well as direct interaction and input from other stakeholders throughout the region. The full project report, which is currently being drafted, will (as far as possible) incorporate ALL the issues that have been raised by workshop participants..

A contact database listing over 200 of the region's resource personnel and areas of interest and expertise has been compiled and will be available via the web shortly.

The invasive species prototype database has been developed, at this time it is reflective of the status of current knowledge and as such needs to be updated to include the necessary additional information.

A SUMMARY OF THE DISCUSSIONS AND OTHER PROJECT INFORMATION IS PROVIDED BELOW:

1. Whilst the lack of clarity with respect to the definition of fundamental terms attracted substantial discussion, the project adopted a pragmatic approach based on 'loose definitions' as listed below.

- ***Invasive species*** are those whose establishment and (often rapid) spread threatens ecosystems, habitats or species.

- ***Alien species*** are those that are non-native, non-indigenous, foreign or exotic having been deliberately or accidentally introduced to an area from their native range or from another site of introduction.

- Alien species can become ***naturalized*** rather than invasive and establish themselves without posing a threat to local biodiversity.

- Both indigenous and alien species (whether previously naturalized or not) can become invasive.

2. It is recognized that the problem of invasive species is a national, regional and international environmental and sustainable development issue. (This is acknowledged, for example, by explicit reference to invasive species in Article 8h of the CBD, and other international conventions).

3. It is acknowledged that in the Caribbean region, there already exists a range of regional and extra-regional institutions, instruments and programmes that could assist in the development and implementation of any regional initiative against invasive species.

4. This region is regarded as one of the world's biodiversity 'hotspots', and the problem of invasive species poses the greatest threat to biodiversity in island ecosystems like those that make up the insular Caribbean.

5. In terms of solutions, there is little doubt that prevention, early detection and early eradication are more practical and less costly than tackling well-advanced species invasions and their ecological consequences.

A considerable amount of information has been collated to date see Table 1 and 2 for an overall picture of species numbers/groups. It should be noted that there are problems in collation of data with respect to: species misidentifications; conflict in attribution of status (exotic *vs* native); confusion over natural range extensions vs human introductions; inconsistency in the use of common names; and ambiguity in the use of scientific species names when referring to complexes of taxonomically similar species.

6. The major points of the workshop are in Table 3

7. The major issues discussed during the questionnaire and workshop sessions on invasive species threats in the Caribbean are similar to those revealed in the development of the draft regional strategy for the Pacific region (Sherley, 2000):
   - Lack of awareness of the breath of problem of invasive species and in particular impacts on indigenous biodiversity
   - Shortage and inaccessibility of scientific information

- Insufficient networking mechanisms for dissemination of information particularly to relevant decision-makers and government officials
- Poorly developed mechanisms for co-ordinated and collaborative action across the region
- Failure to address invasive species impacts on biodiversity in existing legislative and regulatory frameworks and cross-sectoral policies
- Inadequate enforcement of existing legislation (in some cases)
- Inadequate capacity both in terms of technically trained personnel as well as quarantine and risk assessment infra-structure
- Insufficient funding to develop infra-structure, train personnel and develop risk assessment and invasive species management mechanisms

8. The major recommendations arising from the workshop discussions are in the areas of:
   - Building management and research capacities
   - Promotion of national and regional information sharing
   - Compilation of national and regional lists of biota, invasive species and invasive species projects
   - Institution of a system of environmental risk analysis
   - Building public awareness and engagement
   - Preparation of national plans and strategies
   - Building the IAS issue into national and regional change initiatives

SUMMARY OF RECOMMENDATIONS

The overall recommendations of the project include the following:

- The databases established under this project should be further developed, made publicly available, and up-dated as part of an on-going initiative to provide essential baseline information on the distribution of invasive species (and relevant expertise) at a national and regional level throughout the Caribbean.

- A regional network for the exchange of information on invasive species issues should be formally established, initially (at least) through the on-going operation of the <carib_ias_threat> discussion group.

- National and regional strategies for the management of invasive species threats should be developed. A useful first step would be to hold a regional workshop to clarify needs and opportunities. This process should take account of the following:

  - Valuable insights can be gained from experience elsewhere in the world. International support is available through the Global Invasive Species Programme (GinvasivespeciesP) and the Invasive Species Specialist Group (invasive speciesSG) of the IUCN/Species Survival Commission, and full advantage should be taken of the facilities that these groups have to offer.

- Invasive species threats represent a cross-sectoral issue. The most effective action to address these threats will come through greater co-operation between government, non-government and commercial bodies, and through greater co-operation between those concerned with agriculture, environment, tourism, trade and other relevant activities. Currently, communication between major stakeholders is often poor.

- Enhancement of capacity to deal with invasive species threats (either nationally or regionally) will involve development of legislative/regulatory frameworks, as well as development of human and physical infra-structure. Where some capacity already exists (generally in the agricultural sector) this should be built upon, but this process must take account of the cross-sectoral nature of the problems to be addressed.

- One immediate need is for greater awareness-raising effort, to emphasise the socio-economic and environmental consequences of species invasions. Awareness needs to be raised amongst policy-makers (to facilitate political action), those directly engaged in relevant activities "on the ground" (including civil servants and commercial operators), and the general public. A broad programme of awareness-raising activities would help to emphasise the cross-sectoral nature of the invasive species problem, and should be used to stress the message that prevention (or early action) is more effective than attempts to deal with species invasions in their later stages.

Please feel free to comment on the above summary. Also, if you have any specific recommendations or mechanisms that you think can be used to facilitate action on the recommendations (by country or regionally) you can submit to the workshop site for continued discussion.

We look forward to your continued participation in this very important area.

Moses Kairo and Bibi Shanaz Ali
CAB International
Caribbean and Latin America Regional Centre
Gordon Street, Curepe
Trinidad and Tobago

Table 1. Alien species in the Caribbean by territory

10.7.1.1 Country	**Exotic In**	**Naturalized or Naturalized and Invasive In**
Antigua-Barbuda	45	18
Anguilla	9	9
Aves I.	0	0
British Virgin I.	9	5
Guadeloupe	31	5
Montserrat	26	3
Netherlands Leeward I.	0	0
St. Kitts-Nevis	5	2
St. Martin	2	2
US Virgin I.	42	11
Barbados	60	30
Dominica	34	7
Grenada	37	5
Martinique	37	7
St. Lucia	37	4
St. Vincent	32	2
Haiti	63	18
Navassa	0	0
Bonaire	4	2
Curacao	41	31
Aruba	5	3
Bahamas	159	93
Bermuda	73	68
Cayman I.	7	2
Cuba	60	8
Dominican Republic	186	147
Jamaica	102	52
Puerto Rico	182	157
Turks-Caicos I.	8	6
Trinidad-Tobago	61	23

TABLE 2. ALIEN SPECIES IN THE CARIBBEAN BY GROUP

Organism type		Exotic	Naturalised and / or invasive
Plants	**Total**	**327**	**281**
	Aquatic	4	3
	Cattail	1	0
	Climber	17	17
	Fern	5	5
	Grass	28	26
	Herb	35	34
	Sedge	1	1
	Shrub	16	16
	Tree	220	179
Invertebrates	**Total**	**121**	**66**
	Crustacean	2	2
	Earthworm	1	0
	Insect	90	45
	Jellyfish	1	1
	Mite	8	8
	Mollusc	17	10
	Solifugud	1	0
	Tunicate	1	0
Vertebrates	**Total**	**100**	**95**
	Amphibian	8	8
	Bird	20	19
	Fish	37	35
	Mammal	20	18
	Reptile	15	15
Others	**Total**	**4**	**4**
	Fungi	2	2
	Diseases	2	2
All species	**Total**	**552**	**446**

Table 3. Summary of key points from the electronic workshop

Topic	Main points	Main output
Information sharing	• Introduced pests eventually spread throughout the region and as such information sharing may be beneficial to all • Importance of proximity to continental areas of the Caribbean Basin	▪ Request for information on any studies, which have not been formally published ▪ Contribution to list of invasive species
Definitions	• The numerous definitions on invasives which relate to different international agreements • The final definition adopted should encompass all invasions across taxa and ecosystems • Assumption of a broad based definition which will allow fulfillment of the various international agreements.	List all the definitions as referenced in different key international agreements
Policy and legislative frameworks	• Traditional role of ministries • Importance of invasive species across taxonomic groups and ecosystems • Absence of invasive species legislation in most countries in the region • The continuing effort to fulfill requirements of international conventions/agreements • Approaches taken by other regions might be relevant to Caribbean territories	Explore the need to develop a legislative/regulatory framework to deal with invasive species possibly using model regional laws or adapting frameworks from other regions such as the South Pacific. However a concerted effort is required to discuss these issues at the regional level
Institutional frameworks	• The role and function of Caribbean Plant Protection Commission (CPPC) • The role and function of the new entity CAHFSA • The need for a regional mechanism to foster partnerships in invasive species issues	Explore methods to overcome the challenged posed by the diverse nature of the region
National Level	• Evolution of existing "Plant Protection Boards" or "Plant Quarantine Board" for IAS threats • The bias towards agricultural pests in traditional plant quarantine boards whilst in IAS management there is the	A discussion on whether these existing national authority/ boards should be modified to a "National Alien Species Review Board" with the necessary expertise and the necessary powers of

	need to review all potential invasives inclusive of animals and micro-organisms	enforcement
Regional Level	• Caribbean nations should go far beyond strengthening their domestic safeguarding capabilities.	Explore all aspects of the formation or a regional body using and modifying existing models

10.8 Appendix 8 A list of species reported exotic, naturalized or naturalized and invasive in the Caribbean.

(Exotic = known to be present in the Caribbean in cultivation, captivity or in the wild. Naturalised = known to be established in the wild in at least one Caribbean country. Invasive = established in the wild and reported to be spreading, and / or regarded as a threat to a native species, ecosystem or causing a socio-economic impact.)

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Disease			Zeeappelsterfte; "sea apple death disease";	Marine	Curacao;		Curacao;
Disease			Bunchy top virus; BTV;	Terrestrial	Curacao;		Curacao;
Fungus	Mycophaerella fijiensis		Sigatoka negra (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic;
Fungus	Peronspora tabacina		Moho azul del Tabaco (DR);blue mould;	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Crustacean	Artemia cysts		Brine shrimp;	Marine	Bahamas Islands;		Bahamas Islands;
Invertebrate - Crustacean	Macrobrachium rosenbergii		Freshwater prawn;	Freshwater	Jamaica;		Jamaica:
Invertebrate - Earthworm	Pontoscolex corethrurus		Amazonian earthworm;	Terrestrial	Puerto Rico		
Invertebrate - Insect	Aleurocanthus woglumi		Citrus blackfly; Mosca negra de los citricos (DR);	Terrestrial	Jamaica; Bahamas Islands;Dominican Republic;		Jamaica;Dominican Republic;
Invertebrate - Insect	Aleurodicus dispersus		Spiraling whitefly;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Invertebrate - Insect	Aleurothrixus floccosus		Woolly whitefly	Terrestrial	Bahamas Islands;		Bahamas Islands;
Invertebrate - Insect	Allotrope sp.			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Anastrepha obliqua		West Indian fruit fly;	Terrestrial	Dominican Republic;Barbados;		Dominican Republic;Barbados;
Invertebrate - Insect	Anastrepha suspensa		Caribbean fruit fly	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Aphenlinus disapids		Golden chaclid;	Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Aphis gossypii		Melon aphid;cotton aphid	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Aphis nerii		Oleander aphid	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Aphis spiraecola		Spirea aphid;	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Apis melifera scutellata		Africanised Honey Bee	Terrestrial	Puerto Rico;		Puerto Rico
Invertebrate - Insect	Aulacaspis yasumatsui		Asian White Scale;sago palm scale;cycad aulacaspis scale	Terrestrial	Puerto Rico;St. Thomas;Barbados;		Puerto Rico;St. Thomas;Barbados;

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Invertebrate - Insect	Bemisia tabaci		Mosca blanca (DR);	Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Insect	Bephratelloides paraguayensis		Chalcid fly	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Bermisia tabaci		Mosca Blanca Dominican Republic); White fly (Dominican Republic);Tobacco whitefly;Silverleaf;Sweet Potato whitefly;	Terrestrial	Curacao;St. Kitts-Nevis;Puerto Rico;Dominican Republic;		Curacao;St. Kitts-Nevis;Puerto Rico;Dominican Republic;
Invertebrate - Insect	Bucida bueeras				Bahamas Islands;		
Invertebrate - Insect	Callosobruchus sp.?		Barrenador semillas de palma (DR);	Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Insect	Camponotus sp.		Carpenter ant	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Clastoptera unduata			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Coccus hesperidium		soft brown scale;	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Coccus viridis		Green scale	Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Coelophor inaequalis				Bahamas Islands;		
Invertebrate - Insect	Conotelus fuscipennis	C. punctatus Schaeffer		Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Contarinia maculipennis		Mosquita de flores orqiudea (DR);Blossom midge;	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Corythucha gossypii		cotton lace bug	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Cosmopolites sordidus		Banana borer (Jamaica);	Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Cryptotermes domesticus		termite;	Terrestrial	Trinidad-Tobago;		Trinidad-Tobago;
Invertebrate - Insect	Dactylosternum abdominale			Terrestrial	Jamaica; Bahamas Islands;		Jamaica:
Invertebrate - Insect	Dactylosternum hydrophiloides			Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Diaphania nitidalis		Pickleworm	Terrestrial	Barbados;		Barbados;
Invertebrate - Insect	Diaphorina citri		Psilido de los citricos (DR);Asiatic citrus psyllid;	Terrestrial	Bahamas Islands;Dominican Republic;Barbados;		Bahamas Islands;Dominican Republic;Barbados;
Invertebrate - Insect	Diaspis boisduvalii		Boisduval scale	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Diatraea spp.		Small moth borer (Jamaica);	Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Drosophila nebulosa			Terrestrial	Bahamas Islands;		

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Invertebrate - Insect	Dysdercus spp.		Cotton stainers (Jamaica);	Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Ephestiodes sp.			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Erechthias minus			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Eretmocercus serious		Eddy wasp	Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Erinnyis ello		sphinx moth;	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Europhoria sepulcratis		scarab beetle	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Gynaicothrips ficorum		Tripido del laurel (DR);thrips	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Heliothrips rubrocinctus		Cacao thrips (Jamaica);	Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Hemiberlesia lataniae		Latania Scale	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Hypothenemus hampeii		Coffee Bean Borer; Broca del café (DR);	Terrestrial	Dominican Republic;Cuba;		Dominican Republic;Cuba;
Invertebrate - Insect	Hypsipyla grandella		Barrenador de la caoba (DR);	Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Insect	Icerya purchasi		Cottony cushion scale;	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Ips sp.		Barrenador del pino (DR);bark beetle;	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Leptopharasa sp.				Bahamas Islands;		
Invertebrate - Insect	Leucopis ocellaris			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Liothrips varicornis			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Lipaphis pseudobrassicae		Indian mustard aphid	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Lycoriella sp.			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Macronellicoccus hirsutus		Cochinilla rosada del Hibiscus (DR); hibiscus mealybug;pink mealybug	Terrestrial	Dominican Republic;Grenada; 24 Caribbean Islands;Puerto Rico;Trinidad-Tobago;Curacao;St. Vincent-Grenadines;St. Lucia;Bahamas Islands;St. Kitts-Nevis;Barbados;	New Providence (Bahamas);	Dominican Republic;Grenada;24 Caribbean Islands;Puerto Rico;Trinidad;Curacao;St. Vincent-Grenadines;St. Lucia;Bahamas Islands;St. Kitts-Nevis;Barbados;
Invertebrate - Insect	Melanagromyza obtusa		Minador de vaina del	Terrestrial	Dominican		Dominican Republic;

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
			guandul (DR);podfly		Republic;		
Invertebrate - Insect	Metopololphium dirhodum		cereal aphid;	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Neophyllaphis brimblecombei			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Nipaecoccus nipae		coconut mealybug	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Ocyptamus sp.			Freshwater	Bahamas Islands;		
Invertebrate - Insect	Olla v-nigrum		Ladybird beetle	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Pachyneuron aphidis			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Palmiculator palmarum				Bahamas Islands;		
Invertebrate - Insect	Paracoccus marginatus		Cochinilla de la lechoza (DR);papaya mealybug;	Terrestrial	Dominican Republic;Antigua-Barbuda;British Virgin Islands;Nevis;Puerto Rico; St. Barthelemy;St. Kitts;St Martin;US Virgin Islands;Bahamas Islands;St. Lucia;Barbados;Cuba;		Dominican Republic;Antigua-Barbuda;British Virgin Islands;Nevis;Puerto Rico; St. Barthelemy;St. Kitts;St Martin;US Virgin Islands;Bahamas Islands;St. Lucia;Barbados;Cuba;
Invertebrate - Insect	Parasaissetia longicorni			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Parasaissetia nigra		Nigra scale	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Paratrechina longicorni			Terrestrial	Bahamas Islands;British Virgin Islands?		
Invertebrate - Insect	Phyllocnistis citrella		Minador de los citricos (Dominican Republic);citrus leaf miner;	Terrestrial	Dominican Republic;Curacao; Barbados;		Dominican Republic;Curacao;Barbados;
Invertebrate - Insect	Pinnaspis strachani		Hibiscus snow scale	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Placsius avanus		Java beetle	Terrestrial	Jamaica;		Jamaica:
Invertebrate - Insect	Platypus sp.		Barrenador - Acacia mangium (DR);Ambrosia beetle	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Ploceus cucullatus		Madam saga (DR);	Terrestrial	Dominican		Dominican Republic

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Republic;		
Invertebrate - Insect	Protopulvinaria pyriformis		Pyriform scale	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Pseudacysta perseae		Chinche encaje del aguacate (DR);	Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Insect	Pseudaulacaspis cockerelli		False Oleander Scale;	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Pseudaulacaspis pentagona		White Peach Scale;	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Pulvinaria sp.		scale	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Pyroderces rileyi		Pink scavenger caterpillar;	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Sassetia miranda			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Schizocosa avis			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Solenopsis invicta		Red imported fireant;	Terrestrial	Bahamas Islands;British Virgin Islands;US Virgin Islands;Turks-Caicos Islands;Antigua-Barbuda;Trinidad-Tobago;Puerto Rico		Bahamas Islands;British Virgin Islands;US Virgin Islands;Turks-Caicos Islands;Antigua-Barbuda;Trinidad-Tobago
Invertebrate - Insect	Solenopsis richteri		imported fire ant	Terrestrial	Puerto Rico		
Invertebrate - Insect	Spodoptera sp.			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Sternochetus mangiferae		Mango Seed Weevil	Terrestrial			
Invertebrate - Insect	Tetraleurodes fici			Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Thrips palmi		Tripido de la berenjena (DR);thrips	Terrestrial	Dominican Republic;Curacao; St Kitts-Nevis;Cuba;		Dominican Republic;Curacao;St Kitts-Nevis;Cuba;
Invertebrate - Insect	Tibraca limbativentris		Hiede vivo del arroz (Dominican Republic);	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Toxoptera citricidus		Afido marron de citricos (DR);brown citrus aphid	Terrestrial	Bahamas Islands;Dominican		Bahamas Islands;Dominican

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Republic;Guadeloupe;Haiti;Martinique;Puerto Rico;St. Croix;St Thomas;Trinidad; US Virgin Islands;Cuba;Jamaica		Republic;Guadeloupe;Haiti;Martinique;Puerto Rico;St. Croix;St Thomas;Trinidad;US Virgin Islands;Cuba;Jamaica
Invertebrate - Insect	Trialeurodes vaporariorum		Mosca blanca de invernadero (DR);	Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Insect	Umbonia crassocornis		Thornbug	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Insect	Vinsonia stellifera		Stellate scale	Terrestrial	Bahamas Islands;		
Invertebrate - Insect	Wasmannia auropunctata		Little fire ant (Bahamas Islands);	Terrestrial	Bahamas Islands;		Bahamas Islands;
Invertebrate - Insect	Xyleborus sp.		Barrenillo del cacao;Ambrosia beetle;	Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Jellyfish	Chrysoara quinquechirra		Sea nettle;	Marine	Bahamas Islands;		Bahamas Islands;
Invertebrate - Mite	Aceria anonae		Acaro de la guanabana (DR);	Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Mite	Aceria guerreronis		Acaro del coco (DR);coconut mite	Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Mite	Aculops lycopersici		Tomato russet mite	Terrestrial	Barbados;		Barbados
Invertebrate - Mite	Eriophyes sp		Acaro del Hibiscus (DR);Gall-mite;	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Mite	Polyphagotarsonemus latus		Arana blanca de los invernaderos (DR);Broad mite (Barbados);	Terrestrial	Dominican Republic;Barbados;		Dominican Republic;Barbados;
Invertebrate - Mite	Rhizoglyphus robini			Terrestrial	Dominican Republic;		Dominican Republic
Invertebrate - Mite	Steneotarsonemus spinki		Acaro del vaneamiento del arroz(Dominican Republic);	Terrestrial	Dominican Republic;		Dominican Republic;
Invertebrate - Mite	Varroa destructor	Varroa jacobsoni	Acaro de las abejas (DR);varroa mite	Terrestrial	Dominican Republic;Curacao; Barbados;St. Lucia;		Dominican Republic;Curacao;Barbados;St. Lucia;

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Invertebrate - Mollusc	Achatina fulica		Giant African Land Snail;	Terrestrial	Barbados;		Barbados
Invertebrate - Mollusc	Amerianna carinata			Freshwater	Martinique		
Invertebrate - Mollusc	Ampullaria glauca		Caracol del arroz (Dom Rep);	Terrestrial	Dominican Republic;Haiti;		Dominican Republic;Haiti;
Invertebrate - Mollusc	Anodonta sp.		Caracol (Dom Rep);	Freshwater	Dominican Republic;		Dominican Republic
Invertebrate - Mollusc	Biomphalaria straminea			Freshwater	Martinique		
Invertebrate - Mollusc	Crassostrea virgnica		American oyster;	Marine	Bahamas Islands;		Bahamas Islands;
Invertebrate - Mollusc	Dreissena polymorpha		Zebra mussel;	Freshwater	Jamaica;		Jamaica:
Invertebrate - Mollusc	Galagno succineta		lesser grilled triton;	Marine	Curacao		
Invertebrate - Mollusc	Gyraulus sp.			Freshwater	Martinique		
Invertebrate - Mollusc	Helisoma duryi			Freshwater	Martinique		
Invertebrate - Mollusc	Marisa cornuarietis			Freshwater	Martinique		
Invertebrate - Mollusc	Melanoides amabilis			Freshwater	Martinique;		Martinique
Invertebrate - Mollusc	Melanoides tuberculata			Freshwater	Martinique		Martinique
Invertebrate - Mollusc	Oenebra muricoides		Adam's dward triton;	Marine	Curacao		
Invertebrate - Mollusc	Perna viridis		Green-lipped mussel; Green mussel;	Marine	Jamaica; Trinidad;		Jamaica: Trinidad;
Invertebrate - Mollusc	Tarebia granifera			Freshwater	Martinique;		
Invertebrate - Mollusc	Thiara granifera			Freshwater	Martinique		Martinique;
Invertebrate - Mollusc	Zachrysia provisoria				Barbados		Barbados;
Invertebrate - Solifugid (wind scorpion)	Ammotrechella stimpsoni		Caribbean solifugid;	Terrestrial	Bahamas Islands;		
Invertebrate - Tunicate	Tridemnum solidum		Benthic colonial ascidian	Marine	Curacao;Bonaire;		
Micro-Algae	Nannochloropsis oculata		Algae;	Marine	Bahamas Islands;		Bahamas Islands;
Plant - Aquatic	Eichhornia crassipes	Piaropus crassipes;Pontaderia crassipes;Pontederia crassipes;Eichhornia speciosa;Heterantheraformosa;Piaropus mesomelas	Water hyacinth; Lila de agua (Dominican Repbulic);Jacinto de agua (Puerto Rico);	Freshwater	Jamaica; Bahamas Islands; Dominican Republic;Puerto Rico;Bermuda;Cuba;		Jamaica;Bahamas Islands;Puerto Rico;Bermuda;Cuba; Dominican Republic
Plant - Aquatic	Hydrilla verticillata		Hydrilla;water thyme;	Freshwater	Puerto Rico?;		
Plant - Aquatic	Pistia stratiotes		Lechuguilla de agua; water lettuce;	Freshwater	Puerto Rico		Puerto Rico;

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Plant - Aquatic	Salvinia molesta	Salvinia rotundifolia;	Giant salvinia;Water Fern;Kariba weed;Aquarium watermoss;Floating moss;	Freshwater	Puerto Rico?;Bermuda;		Bermuda;
Plant - Cattail	Typha domingensis	Typha angustata	Eneas (Puerto Rico); cat-tail (Puerto Rico);southern cattail;southern reedmace;	Terrestrial*	Puerto Rico;		
Plant - Climber	Abrus precatorius		Rosary pea	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Climber	Antigonon leptopus		Coral vine (Bahamas Islands);	Terrestrial	Bahamas Islands;Domican Republic;Haiti;		Bahamas Islands;Dominican Republic;Haiti
Plant - Climber	Asparagus setaceus	Asparagopsis setacea;Asparagus plumosus;Proasparagus plumosus;	Ornamental asparagus;plumosa;climbing asparagus fern;	Terrestrial	Bermuda;		Bermuda;
Plant - Climber	Clematis flammula		Traveller's joy;Fragrant Virgin's Bower;	Terrestrial	Bermuda;	Bermuda;	
Plant - Climber	Cryptostegia grandiflora			Terrestrial	Aruba;Bonaire;St. Martin;Curacao;	Aruba;Bonaire;St Maarten;Curacao	Caribbean
Plant - Climber	Dioscorea alata		Winged yam; Air potato (Bahamas Islands);	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Climber	Epipremnum pinnatum cv. Aureum		Pothos vine;	Terrestrial	Bermuda;		Bermuda;
Plant - Climber	Jasminum fluminense		Azores jasmine;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Climber	Jasminum sambac		Arabian jasmine	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Climber	Jasminum simplicifolium		Jasmine	Terrestrial	Bermuda;	Bermuda;	
Plant - Climber	Lonicera japonica		Madreselva (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Climber	Macfadyena unguis-cati		Cat's claw vine	Terrestrial	Bahamas Islands;Bermuda;	Bermuda;	Bahamas Islands;
Plant - Climber	Mucuna pruriens	Dolichos purirens;Stizolobium purirens;Stizolobium deeringianum;Stizolobium aterrimum;	Cow Itch;Velvet bean;Bengal bean;Mauritius bean;	Terrestrial	Bahamas Islands;		Bahamas Islands;

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
		Stizolobium niveum;					
Plant - Climber	Passiflora biflora		Two flowered passion flower;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Climber	Passiflora foetida		Passion flower;Love-in-a-mist;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Climber	Solandra maxima	Solandra hartwigii;Solandra nitida;	Chalice cup vine;	Terrestrial	Bermuda;	Bermuda;	
Plant - Climber	Tecomaria capensis		Cape Honeysuckle;	Terrestrial	Bermuda;	Bermuda;	
Plant - Fern	Nephrolepis cordifolia	Polypodium cordifolium;	Boston fern;Fishbone fern;erect swordfern; tuberous swordfern	Terrestrial*	Barbados;		Barbados;
Plant - Fern	Nephrolepis multiflora		Asian sword fern; Helecho camaron (Dom Rep);	Terrestrial	Bahamas Islands;Dominican Republic;		Bahamas Islands;Dominican Republic
Plant - Fern	Phymatosorus scolopendria		creeping fern;Maile-scented fern;	Terrestrial	Bermuda;		Bermuda;
Plant - Fern	Pteridium aquilinum		Bracken	Terrestrial	Jamaica; Bahamas Islands;		Jamaica:
Plant - Fern	Pteris longifolia		Long Leaved Brake;	Terrestrial	Bermuda;	Bermuda;	
Plant - Grass	Arundo donax		Cow cane;giant reed	Terrestrial	Bermuda;Dominican Republic;Haiti;		Bermuda;Dominican Republic;Haiti;
Plant - Grass	Bambusa sp.		Bamboo	Terrestrial	Puerto Rico		
Plant - Grass	Bambusa vulgaris		Bamboo (Jamaica);	Terrestrial	Jamaica;Puerto Rico;Tobago	Puerto Rico	Jamaica;Tobago
Plant - Grass	Bothriochloa pertusa	basonym = Andropogon pertusus	Yerba hurrican (Puerto Rico);Hurricane grass (Puerto Rico);Pajon haitiano (Dominican Republic);	Terrestrial	Puerto Rico;Dominican Republic;		Puerto Rico;Dominican Republic;
Plant - Grass	Brachiara decumbens		Brachiara (Jamaica);	Terrestrial	Jamaica;		Jamaica:
Plant - Grass	Brachiaria arracta		Yerba Tanner (Puerto Rico);	Terrestrial	Puerto Rico;		Puerto Rico;
Plant - Grass	Cymbopogon nardus	Andropogon nardus	Citronella grass;	Terrestrial	Antigua-Barbuda;		Antigua-Barbuda;
Plant - Grass	Cynodon dactlyon		Bermuda grass	Terrestrial	Bermuda;	Bermuda;	
Plant - Grass	Dendrocalamus strictus	Bambusa stricta	Bamboo;	Terrestrial	Puerto Rico		Puerto Rico
Plant - Grass	Echinochloa crus-galli		Quita credito (Dominican Republic); Semilla de Maria (Dominican	Terrestrial	Dominican Republic;		Dominican Republic

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
			Republic);Tumba credito (Dominican Republic)				
Plant - Grass	Eleusine indica			Terrestrial	Dominican Republic		Dominican Republic;
Plant - Grass	Heteropogon contortus	basonym = Andropogon contortus	Yerba torcida (Puerto Rico); Twisted grass (Puerto Rico);	Terrestrial	Puerto Rico;		Puerto Rico;
Plant - Grass	Hyparrhenia rufa		Yaragua falsa (Puerto Rico);	Terrestrial	Puerto Rico;Dominican Republic?		Puerto Rico;Dominican Republic?
Plant - Grass	Ischaemum rugosum		Yerba de popo (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Grass	Melinis minutiflora		Wynne grass (USA); Molasses grass (Jamaica);Yaruga (DR);	Terrestrial	Jamaica;Dominican Republic;		Jamaica;Dominican Republic;
Plant - Grass	Neyraudia reynaudiana		Burma reed; Cane grass;silk reed;false reed;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Grass	Panicum barbinode	Panicum purpurescens;Panicum muticum;Bracheri mutica;	Para grass;	Terrestrial	Bermuda;	Bermuda;	
Plant - Grass	Panicum dichotomiflorum		Cane grass;Fall Panic grass;	Terrestrial	Bermuda;	Bermuda;	
Plant - Grass	Panicum repens		Torpedo grass;	Terrestrial	Bahamas Islands;Puerto Rico;		Bahamas Islands;Puerto Rico;
Plant - Grass	Paspalum fasciculatum		Yerba Venezolana (Puerto Rico);	Terrestrial	Puerto Rico;		Puerto Rico;
Plant - Grass	Pennisetum ciliare		Yerba Buffel (Puerto Rico);	Terrestrial	Puerto Rico;		Puerto Rico;
Plant - Grass	Pennisetum purpureum		Napier grass (Bahamas Islands);Yerba elefante (Puerto Rico);Elephant grass (Puerto Rico);	Terrestrial	Bahamas Islands;Puerto Rico;		Bahamas Islands;Puerto Rico;
Plant - Grass	Pennisetum setaceum	Phalaris setaceae;	Yerba de fuente (Puerto Rico); pampas grass (erroneously Puerto Rico);	Terrestrial	Puerto Rico;		Puerto Rico
Plant - Grass	Rhynchelytrum repens?		Natal grass;Natal redtop;	Terrestrial	Dominican Republic		Dominican Republic

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Plant - Grass	Rottboelia exaltata		Cebada fria (Dom Rep);itchgrass;	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Grass	Rottboellia cochinchinensis		Yerba picante (Puerto Rico); caminadora (Puerto Rico);	Terrestrial	Puerto Rico;Dominican Republic;		
Plant - Grass	Sorghum halepense		Yerba Johnson, Johnson grass	Terrestrial	Puerto Rico;		Puerto Rico
Plant - Grass	Urochloa maxima	basonym = Panicum maximum	Guinea grass (Jamaica;Puerto Rico); Pangola (Dom Rep);Yerba de Guinea (Puerto Rico);	Terrestrial	Jamaica;Dominican Republic;Puerto Rico;Bermuda;	Bermuda;	Jamaica;Puerto Rico;Dominican Republic
Plant - Herb	Alpinnia allughas			Terrestrial	Jamaica;		Jamaica:
Plant - Herb	Alternanthera philoxeroides		Yerba Caiman;Alligator weed;	Freshwater	Puerto Rico;		Puerto Rico;
Plant - Herb	Alysicarpus vaginalis		Alyce clover;One-leaf clover;White moneywort;	Terrestrial	Domincian Republic;		Domincian Republic;
Plant - Herb	Asparagus densiflorus	Asparagus sprengeri;	Asparagus fern;asparagus;Sprengeri fern;	Terrestrial	Bahamas Islands;Bermuda;		Bahamas Islands;Bermuda;
Plant - Herb	Asparagus officinalis		Asparagus;Long leaf Aspagus fern;	Terrestrial	Bermuda;		Bermuda;
Plant - Herb	Bryophyllum pinnatum	Kalanchoë pinnata	Flopper;Life plant;	Terrestrial	Bermuda;	Bermuda;	
Plant - Herb	Cleome gynandra		Masambey (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Herb	Cleome viscosa			Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Herb	Clerodendrum sp.		Clerodendrum;Glory Bower;	Terrestrial	Bermuda;		Bermuda;
Plant - Herb	Colocasia esculenta	Arum esculentum;	Wild Taro;Dasheen;Elephant Ear;	Terrestrial	Bahamas;		
Plant - Herb	Emilia coccinea		Pincel de amor (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Herb	Emilia fosbergii			Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Herb	Emilia sonchifolia		Red tassel flower; Flora's paintbrush;Consumption weed;	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Herb	Eupatorium		Glandular Eupatorium;	Terrestrial	Bermuda;	Bermuda;	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
	adenophorum						
Plant - Herb	Eupatorium riparium	Ageratina riparia;	small white Eupatorium;	Terrestrial	Bermuda;	Bermuda;	
Plant - Herb	Fragaria vesca		Fesa (Dominican Republic);Wood strawberry;wild strawberry;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Herb	Gaillardia pulchella		Blanket flower;	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Herb	Hedychium coccineum		Orange bottle brush ginger;Red butterfly ginger;	Terrestrial	Jamaica;		Jamaica:
Plant - Herb	Hedychium coronarium		White ginger lily (Jamaica);Garland flower;Butterfly lilly	Terrestrial	Jamaica;		Jamaica:
Plant - Herb	Malva rotundifolia		Malva (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Herb	Polygonum chinense		Red Bush (Jamaica);Chinese Knotweed;	Terrestrial	Jamaica;		Jamaica:
Plant - Herb	Rhoeo discolor	Tradescanthia discolor;	Canoe plant;	Terrestrial	Bermuda;	Bermuda;	
Plant - Herb	Rhoeo spathacea	Tradescanthia spatacea	Oyster plant;Moses-in-the-boat;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Herb	Solanum torvum		Turkey berry;Susumber	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Herb	Solanum viarum		Tropical Soda Apple	Terrestrial	Puerto Rico;		Puerto Rico;
Plant - Herb	Solidago sempervirens		Espiga de oro (Dom Rep);seaside goldenrod;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Herb	Sonchus asper		Lenmuguilla (Dom Rep);spring sowthistle;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Herb	Sphagneticola trilobata;	Wedelia trilobata;Silphium trilobatum;Thelechiticonia trilobata	Wedelia (Bahamas Islands);;trailing daisy;Singapore daisy; creeping ox-eye	Terrestrial	Bermuda;Bahamas Islands;		Bermuda;Bahamas Islands;
Plant - Herb	Sphenoclea zeylanica		Broadleaf gooseweed;	Terrestrial	Dominican Republic		Dominican Republic
Plant - Herb	Stachytarpheta urticifolia	Stachytarpheta urticaefolia;	Vervain;Nettleleaf vervain;Dark blue snakeweed;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Herb	Syngonium podophyllum	Syngonium angustatum;	Arrowhead vine;goosefoot plant;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Herb	Tradescantia		Wandering Jew;	Terrestrial	Bermuda;	Bermuda;	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
	fluminensis						
Plant - Herb	Vernonia cinerea		Yerba morada (Dominican Republic);	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Herb	Xanthium strumarium		Cadillo de sato (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Herb	Youngia japonica	Crepis japonica;	Oriental false hawksbeard;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Sedge	Cyperus alternifolius		Umbrella sedge;Umbrella flat sedge;	Terrestrial	Bermuda;	Bermuda;	
Plant - Sedge	Cyperus esculentus	Cyperus melinorhizus;Pycereus esculentus;	Yellow nutsedge;Chufa flatsedge;	Terrestrial			
Plant - Shrub	Ardisia acuminata	Ardisia guianensis		Terrestrial	Bermuda;		Bermuda;
Plant - Shrub	Buddleia madagascariensis		Buddleia	Terrestrial	Bermuda;		Bermuda;
Plant - Shrub	Cestrum diurnum		Day jessamine;day jasmine	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Shrub	Cestrum nocturnum		Cestrum (Lady of the Night);	Terrestrial	Bermuda;		Bermuda;
Plant - Shrub	Codiaeum variegatum			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Shrub	Colubrina asiatica		Lather leaf;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Plant - Shrub	Indigofera jamaicensis			Terrestrial	Dominican Republic;		Dominican Republic
Plant - Shrub	Macroptilium atropurpureum			Terrestrial	Bahamas Islands; Cuba; Dominican Republic; Jamaica;		Bahamas Islands;
Plant - Shrub	Moghania strobilifera	Flemingia brachteata;Flemingia fruticulosa; Hedysarum strobiliferum;Zorrisa strobiliferum;	Wild Hops (Jamaica);Camarones;Luck plant;Napoleon plant;	Terrestrial	Jamaica;		Jamaica:
Plant - Shrub	Nerium oleander		Oleander	Terrestrial	Bermuda;	Bermuda;	
Plant - Shrub	Ricinis communis		castor oil plant;	Terrestrial	Curacao	Curacao	
Plant - Shrub	Scaevola sericea		Half flower;Beach naupaka	Terrestrial	Bahamas;		Bahamas
Plant - Shrub	Scaevola taccada	Lobelia taccada;Scaevola faurei;Scaevola frutescens;Konenigli plumeroides;	Scaevola; Queensland umbrella tree;Half flower;	Terrestrial	Bahamas Islands;		Bahamas Islands;

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Plant - Shrub	Sida acuta	Sida carpinifolia var. acuta	Escobilla (Puerto Rico);Escoba blanca (Puerto Rico); wire weed (Puerto Rico);Fanpetals (USA)	Terrestrial	Puerto Rico;		Puerto Rico
Plant - Shrub	Sida rhombifolia		Escoba colorada (Puerto Rico);	Terrestrial	Puerto Rico		Puerto Rico
Plant - Shrub	Triphasia trifolia		sweet lime	Terrestrial	Barbados;		Barbados;
Plant - Succulent	Agave americana		Green Century Plant;Century Plant;Maguey;American Aloe;	Terrestrial	Bermuda;	Bermuda;	
Plant - Succulent	Agave americana "marginata"		Yellow edge century plant;	Terrestrial	Bermuda;	Bermuda;	
Plant - Succulent	Agave sisalana		sisal;Sisal Hemp	Terrestrial	Curacao;Bermuda;	Curacao;Bermuda;	
Plant - Succulent	Euphorbia lactea		cactus surnam;Candelabra cactus;false cactus;dragon bones;white ghost	Terrestrial	Curacao	Curacao;	
Plant - Succulent	Sansevieria hyacinthoides	Sansevieria angustiflora; S. grandis; S. guineensis; S. metallica; S. thyrsiflora; S. spicata; Cordyline hycianthoides;	Mother-in-law's tongue;Bowstring Hemp;	Terrestrial	Bahamas Islands;Barbados; US Virgin Islands;Puerto Rico;		Barbados;Bahamas Islands;
Plant - Succulent	Sansevieria trifasciata		Mother-in-law's tongue;snakeplant	Terrestrial	Bermuda;		Bermuda;
Plant - Tree	Acacia aulacocarpa			Terrestrial	Puerto Rico;		
Plant - Tree	Acacia auriculformis			Terrestrial	Bahamas Islands;Cuba;Haiti;Jamaica;St. Vincent-Grenadines;Trinidad-Tobago;		
Plant - Tree	Acacia crassicarpa			Terrestrial	Dominican Republic;		
Plant - Tree	Acacia decurrens			Terrestrial	Haiti;		
Plant - Tree	Acacia farnesiana		Aroma (Puerto Rico);Cashia	Terrestrial	Guadeloupe;Marti	Bahamas	Puerto Rico

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
			(Puerto Rico); Rayo (Puerto Rico);Sweet Acadia (USA);		nique;Antigua-Barbuda;Bahamas; Barbados;Cayman Islands;Cuba;Dominica;Grenada;Jamaica;Montserrat;Puerto Rico;	Islands;	
Plant - Tree	Acacia holosericea			Terrestrial	Cuba;Dominican Republic;Haiti;Jamaica;		
Plant - Tree	Acacia leptocarpa			Terrestrial	Haiti;Montserrat;		
Plant - Tree	Acacia mangium		Acacia;	Terrestrial	Cuba;Puerto Rico; Dominican Republic;	Puerto Rico	Dominican Republic
Plant - Tree	Acacia melanoxylon			Terrestrial	Haiti;		
Plant - Tree	Acacia neriifolia			Terrestrial	Haiti;		
Plant - Tree	Acacia nilotica			Terrestrial	Caribbean;Jamaica;Antigua;Barbuda; Anguilla;Puerto Rico	Puerto Rico	Antigua;Barbuda;Anguilla;
Plant - Tree	Acacia polyacantha			Terrestrial	Antigua-Barbuda;Barbados;Grenada;Guadeloupe;Jamaica;Puerto Rico;St. Vincent;		
Plant - Tree	Acacia polystachya			Terrestrial	Cuba;Dominica;Montserrat;		
Plant - Tree	Acacia salicina			Terrestrial	Bahamas;Bermuda;St.Vincent-Grenadines;	Bahamas Islands;	
Plant - Tree	Acacia shirleyi			Terrestrial	Dominican Republic;		
Plant - Tree	Acacia spp.		Wild tamarind (Jamaica);	Terrestrial	Jamaica;		Jamaica:
Plant - Tree	Acacia torulosa			Terrestrial	Dominican Republic;		
Plant - Tree	Acacia tumida			Terrestrial	Dominican Republic;		

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Plant - Tree	Adenanthera pavonina			Terrestrial	Puerto Rico;Antigua-Barbuda;Bahamas; Barbados;Cayman Is;Dominica;Dominican Republic;Grenada; Guadeloupe;Haiti; Jamaica;Martinique;Montserrat;St Kitts-Nevis;St Lucia;St Vincent;	Bahamas Islands; Puerto Rico;Barbados; Antigua-Barbuda;Cayman Islands;Commonwealth of Dominica;Dominican Republic;Grenada;	Dominican Republic;
Plant - Tree	Agathis robusta			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Albizia adinocephala			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Albizia lebbeck		Woman's tongue (Bahamas Islands); Cha-cha (Dom Rep);Acacia amarilla (Puerto Rico);Aroma (Puerto Rico);Thibet tree (Puerto Rico);black ebony (Bermuda);	Terrestrial	Bahamas Islands; Antigua-Barbuda; Barbados;Cuba;Dominica;Dominican Republic;Grenada; Jamaica;Puerto Rico;St. Lucia;St Vincent-Grenadines;Bermuda;	West Indies;Bahamas;Bermuda;	Bahamas Islands;Caribbean;Puerto Rico;Dominican Republic
Plant - Tree	Albizia procera		Acacia blanca (Puerto Rico); Albicia (Puerto Rico);Tall Albizia (Puerto Rico);	Terrestrial	Antigua-Barbuda;Bahamas; Barbados;Cuba;Dominica;Dominican Republic;Grenada; Guadeloupe;Haiti; Jamaica;Martinique;Netherlands Antilles;Puerto Rico;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;Trinid	Virgin Islands, Puerto Rico, Bahamas Islands;	Puerto Rico

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					ad-Tobago;US Virgin Islands;		
Plant - Tree	Aleurites fordii		Javilla extranjera (Dom Rep);	Terrestrial	Puerto Rico;Dominican Republic;	Puerto Rico	Dominican Republic
Plant - Tree	Aleurites moluccana		Avellano (Dom Rep);	Terrestrial	Antigua-Barbuda; Bahamas;Barbados;Cuba;Dominica; Dominican Republic; Grenada;Guadeloupe;Haiti;Jamaica;Martinique;Montserrat;Netherlands Antilles; Puerto Rico;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands;	Puerto Rico	Dominican Republic
Plant - Tree	Aleurites trisperma		Javillo (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Annona squamosa			Terrestrial	Puerto Rico;		
Plant - Tree	Ardisia solanacea	Ardisia elliptica;Ardisia humilis;Ardisia squamulosa;		Terrestrial	Puerto Rico;		Puerto Rico
Plant - Tree	Artocarpus altilis			Terrestrial	Antigua-Barbuda;Barbados;Cuba;Dominica;Dominican Republic;Grenada; Guadeloupe;Haiti; Jamaica;Martinique;Montserrat;Netherlands Antilles;Puerto		Puerto Rico

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Rico;St Kitts-Nevis;St Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands		
Plant - Tree	Artocarpus heterophyllus			Terrestrial	Caribbean;Puerto Rico	Puerto Rico	
Plant - Tree	Artocarpus integer			Terrestrial	Jamaica;		
Plant - Tree	Averrhoa carambola			Terrestrial	Dominican Republic;Trinidad-Tobago;	Puerto Rico	
Plant - Tree	Azadirachta indica		Nim (Dom Rep);Margosa (Puerto Rico);Neem (Puerto Rico;Antigua-Barbuda);	Terrestrial	Antigua-Barbuda;Barbados;Cuba;Dominica;Dominican Republic;Haiti; Jamaica; Puerto Rico;Trinidad-Tobago;US Virgin Islands		Puerto Rico;Antigua-Barbuda;Dominican Republic
Plant - Tree	Balanites aegyptica			Terrestrial	Caribbean;Curacao		Curacao;Caribbean
Plant - Tree	Barringtonia asiatica		Sea poison tree;fish poison tree	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Tree	Bauhinia monandra		Pata de vaca (Dom Rep);	Terrestrial	Puerto Rico; Dominican Republic:	Puerto Rico	Dominican Republic
Plant - Tree	Bauhinia multinervia			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Bauhinia purpurea			Terrestrial	Barbados;Martinique;Puerto Rico;St Lucia;	Puerto Rico	
Plant - Tree	Bauhinia tomentosa			Terrestrial	Antigua-Barbuda;Barbados;Cuba;Dominica;Guadeloupe;Martinique;Montserrat;Pu	Puerto Rico	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					erto Rico;St Kitts-Nevis;St Lucia;		
Plant - Tree	Bauhinia variegata		Poor man's orchid; Orchid tree (Bahamas Islands);	Terrestrial	Bahamas Islands; Dominican Republic;Grenada; Haiti;Puerto Rico;St Lucia;	Bahamas;Puerto Rico	Bahamas Islands;
Plant - Tree	Bertholettia excelsa		Nues de Brasil (Dom Rep);Brazil nut;castanho verdadiero;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Bixa orellana			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Boussingaultia leptostachys		Yerba o bojuco de cuaresma (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Tree	Bursera simaruba		west indian birch (Bermuda);Gumbolimbo;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Caesalpinia pulcherrima			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Calliandra calothyrsus		Caliandra (DR);Powderpuff;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Calliandra surinamensis			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Callinectes sapidus		Blue crab;	Marine	Bahamas Islands;		Bahamas Islands;
Plant - Tree	Calophyllum inophyllum			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Calotropis procera		Calotropis (Puerto Rico);Algodon de seda (Puerto Rico);Giant Milkweed (Puerto Rico);	Terrestrial	Antigua-Barbuda;Bahamas; Barbados; Cuba;Curacao;Dominica;Dominican Republic;Grenada; Guadeloupe;Haiti; Jamaica;Martinique;Montserrat;Netherlands Antilles;Puerto Rico;St. Kitts-Nevis;St. Lucia;St.	Curacao	Puerto Rico

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands		
Plant - Tree	Cananga odorata			Terrestrial	Caribbean;Jamaica;Puerto Rico	Puerto Rico	
Plant - Tree	Carapa guianensis			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Carica papaya			Terrestrial	Antigua-Barbuda;Bahamas;Barbados;Cuba;Commonwealth of Dominica;Dominican Republic;Grenada;Guadeloupe;Haiti;Jamaica;Martinique;Montserrat;Netherlands Antilles;Puerto Rico;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands;		
Plant - Tree	Cassia javanica	Cassia bacillus; Cassia megalantha;Cassia nodosa;Canthartocarpus javanicus;	Cassia rosada (Dom Rep);Apple Blossom Cassia;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Cassia siamea		Cassia amarilla;kussod tree; Cassod tree;popcorn tree;Siamese senna;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Castilla elastica			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Casuarina cunninghamiana		Walking Casuarina (Bermuda);	Terrestrial	Bahamas Islands;Bermuda;	Bahamas;Bermuda;	
Plant - Tree	Casuarina equisetifolia		Casuarina (Jamaica); Australian pine (Bahamas	Terrestrial	Antigua-Barbuda; Jamaica; Bahamas	Bahamas;Puerto Rico	Jamaica;Bahamas Islands;Puerto

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
			Islands);Pino australiano (Puerto Rico);		Islands; Bermuda;Commonwealth of Dominica; Dominican Republic; Grenada;Cuba;Guadeloupe;Haiti;Jamaica; Martinique;Montserrat; Netherlands Antilles;Puerto Rico;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines; Trinidad-Tobago;US Virgin Islands;Bermuda;		Rico;Bermuda;Dominican Republic
Plant - Tree	Casuarina glauca		Suckerling Australian Pine (Bahamas Islands);	Terrestrial	Dominican Republic;Haiti; Puerto Rico;Bahamas	Bahamas	Bahamas Islands;
Plant - Tree	Casuarina jungimiana			Terrestrial	Bahamas	Bahamas	
Plant - Tree	Casuarina sp.		Casuarina;Mile tree;	Terrestrial	Barbados;Bahamas;	Bahamas;	Barbados;
Plant - Tree	Cherax quadricarinatus	Cherax quadricarinata	Red claw;Australian freshwater crayfish;Australian red claw crayfish;north Queensland yabby	Freshwater	Bahamas Islands;Jamaica;		Bahamas Islands;Jamaica;
Plant - Tree	Chrysalidocarpus lutescens			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Chrysophyllum cainito			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Chukrasia tabularis			Terrestrial	Puerto Rico;		
Plant - Tree	Cinnamomum camphora			Terrestrial	Cuba;Dominican Republic;Haiti;Pue		

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					rto Rico;		
Plant - Tree	Cinnamomum zeylanicum	Cinnamomum verum		Terrestrial	Jamaica		
Plant - Tree	Citharexylum spinosum		Fiddlewood;	Terrestrial	Bermuda;		Bermuda
Plant - Tree	Citrus aurantifolia	Citrus limetta		Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Citrus aurantium			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Citrus limon			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Citrus medica			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Citrus sinensis			Terrestrial	Haiti;Puerto Rico	Puerto Rico	
Plant - Tree	Citrus X paradisi		Grapefruit	Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Clitoria fairchildiana		Clitoria (Puerto Rico);	Terrestrial	Dominican Republic;Puerto Rico	Puerto Rico	Puerto Rico
Plant - Tree	Cnidoscolus aconitifolius			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Cochlospermum vitifolium			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Cocos nucifera			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Coffea arabica			Terrestrial	Dominican Republic;Jamaica; Martinique;Puerto Rico;		Puerto Rico
Plant - Tree	Copaifera officinalis		Amacey	Terrestrial	Dominican Republic;Puerto Rico;	Puerto Rico	Dominican Republic
Plant - Tree	Cordia obliqua		Cordia (Puerto Rico)	Terrestrial	Puerto Rico	Puerto Rico	Puerto Rico
Plant - Tree	Cordia sebestena			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Couroupita guianensis		Muco (Dom Rep);	Terrestrial	Dominican Republic;		Dominican Republic;
Plant - Tree	Crescentia cujete		kalebas;	Terrestrial	Curacao;Caribbean	Curacao	
Plant - Tree	Cupaniopsis anacardioides		Carrotwood;	Terrestrial	Bahamas		
Plant - Tree	Cupressus lusitanica			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Dalbergia sissoo			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Delonix regia		Flambollan (Dom	Terrestrial	Barbados;Curacao;		Puerto

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
			Rep);Flamboyan (Puerto Rico);Flamboyant (Barbados);		Jamaica;Puerto Rico;Dominican Republic;		Rico;Barbados;Dominican Republic
Plant - Tree	Dialium guianense			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Dichrostachys cinerea		El Marabu (Cuba)	Terrestrial	Cuba;Jamaica		Cuba
Plant - Tree	Eleagnus angustifolia		Russian olive;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Enterolobium cyclocapum			Terrestrial	Cuba;Dominican Republic;Haiti;Jamaica;Puerto Rico	Puerto Rico	
Plant - Tree	Eriobotrya japonica		Loquat (Japanese);	Terrestrial	Trinidad-Tobago;Bermuda;	Bermuda;	
Plant - Tree	Erythrina berteroana			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Erythrina fusca			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Erythrina poeppigiana			Terrestrial	Puerto Rico;Barbados;Grenada;Guadeloupe;Jamaica;Martinique;Montserrat, St. Lucia	Puerto Rico	
Plant - Tree	Eucalyptus globulus			Terrestrial	Haiti;		
Plant - Tree	Eucalyptus robusta			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Eugenia uniflora		Suriname cherry (Bahamas Islands);	Terrestrial	Bahamas Islands;Bermuda		Bahamas Islands;Bermuda;
Plant - Tree	Falcataria moluccana	Paraserianthes falcataria;Peraserianthes falcatorica;		Terrestrial	Haiti;		
Plant - Tree	Ficus retusa	Ficus microcarpa; Ficus nitida;	Indian Laurel;Chinese Banyan;Malayan Banyan;Cuban Laurel Fig;	Terrestrial	Bermuda;		Bermuda;
Plant - Tree	Flacourtia indica			Terrestrial	Antigua-Barbuda;Barbados;Dominican Republic;Grenada;Jamaica;Puerto Rico;St. Kitts-Nevis;St. Lucia;St Vincent-		

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Grenadines;Trinidad- Tobago;US Virgin Islands		
Plant - Tree	Flemingia strobilifera		Camarones secos;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Fraxinus uhdei			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Funtumia elastica			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Gliricidia sepium			Terrestrial	Antigua-Barbuda;Bahamas;Barbados;Cuba;Commonwealth of Dominica;Dominican Republic;Grenada;Guadeloupe;Haiti;Jamaica;Martinique;Montserrat;Netherlands Antilles;Puerto Rico;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands	Puerto Rico	
Plant - Tree	Grevillea robusta		Silky Oak (Jamaica);	Terrestrial	Jamaica;		Jamaica;
Plant - Tree	Haematoxylum campechianum		Logwood (Jamaica);	Terrestrial	Jamaica;Puerto Rico;Dominican Republic;	Puerto Rico;Dominican Republic?;	Jamaica;
Plant - Tree	Hevea brasiliensis			Terrestrial	Dominican Republic;		
Plant - Tree	Hibiscus elatus			Terrestrial	Puerto Rico;West Indies;Grenada;St Lucia;Trinidad-Tobago;	Puerto Rico;West Indies	
Plant - Tree	Hibiscus pernambucensis	Hibiscus tiliaceus var. pernambucensis		Terrestrial	Puerto Rico;US Virgin Islands	Puerto Rico	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Plant - Tree	Hymenaea courbaril			Terrestrial	Bahamas;Grenada; Montserrat;Netherlands Antilles; St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;US Virgin Islands		
Plant - Tree	Hyphaene thebaica			Terrestrial	Curacao	Curacao	
Plant - Tree	Inga quaternata			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Inga vera			Terrestrial	Bahamas Islands;Barbados; Cuba; Commonwealth of Dominica;Grenada; Guadeloupe;Martinique;Montserrat; Netherlands Antilles;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands		
Plant - Tree	Jacaranda mimosifolia			Terrestrial	Antigua-Barbuda;Bahamas Islands; Barbados;Cuba;Commonwealth of Dominica;Dominican Republic;Grenada; Guadeloupe;Haiti; Jamaica; Martinique;Montserrat;Netherlands Antilles;Puerto Rico;St. Kitts-		

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Nevis;St. Lucia;St. Vincent-Grenadines;		
Plant - Tree	Jatropha curcas			Terrestrial	Antigua-Barbuda;Bahamas Islands;Barbados; Cuba;Dominica;Dominican Republic;Grenada; Guadeloupe;Haiti; Jamaica;Martinique;Montserrat;Netherlands Antilles;Puerto Rico;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands	Puerto Rico	
Plant - Tree	Khaya anthotheca			Terrestrial	Cuba		
Plant - Tree	Khaya nyasica			Terrestrial	Cuba;Puerto Rico	Puerto Rico	
Plant - Tree	Khaya senegalensis			Terrestrial	Cuba;Puerto Rico;	Puerto Rico	
Plant - Tree	Lantana camara		Lantana; Shrub verbean; Angel lips, Big sage; Blacksage; White sage; Prickly lantana;wild sage;	Terrestrial	Bahamas Islands;Barbados; Dominican Republic;Haiti	Bahamas Islands	Bahamas Islands;Barbados [86];Dominican Republic;Haiti
Plant - Tree	Leucaena diversifolia			Terrestrial	Antigua-Barbuda;Bahamas; Cuba;Dominica;Dominican Republic;Grenada; Guadeloupe;Haiti; Jamaica;Martinique;Montserrat;Netherlands Antilles;Puerto Rico;St. Kitts-	Caribbean	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Nevis;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands		
Plant - Tree	Leucaena leucocephala		Leucaena;Lino criollo (Dominican Republic);Zarcilla (Puerto Rico);Acacia palida (Puerto Rico); wild tamarind (Puerto Rico);Jumbie bean (Bermuda);wild mimosa (Bermuda);	Terrestrial	Bahamas Islands;Guadeloupe;Dominican Republic;Anguilla;Antigua-Barbuda;Aruba;Bahamas;Barbados;Bermuda;British Virgin Islands;Cayman Islands;Cuba;Curaçao;Dominica;Dominican Republic;Grenada;Haiti;Jamaica;Montserrat;Netherlands Antilles;Puerto Rico;Saint Kitts-Nevis;Saint Lucia;Saint Vincent-Grenadines;Trinidad-Tobago;Turks-Caicos Islands;US Virgin Islands;		Jamaica;Bahamas Islands;Haiti;Puerto Rico;Bermuda;Dominican Republic;
Plant - Tree	Ligustrum lucidum		Green Privet	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Livistona chinensis		Chinese Fan Palm;	Terrestrial	Bermuda;		Bermuda;
Plant - Tree	Luehea speciosa			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Lysiloma latisiliqua			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Maesopsis eminii			Terrestrial	Puerto Rico	Puerto Rico	Puerto Rico;
Plant - Tree	Malaleuca spp.		Bottlebrush (Jamaica);	Terrestrial	Jamaica;		Jamaica:
Plant - Tree	Malpighia emarginata			Terrestrial	Puerto Rico	Puerto Rico	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Plant - Tree	Mangifera indica			Terrestrial	Antigua-Barbuda;Cuba;Curacao;Dominica;Dominican Republic;Grenada;Jamaica;Puerto Rico;St Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands	Curacao;	Antigua;Puerto Rico
Plant - Tree	Manilkara zapota	Achras zapota	Sapodilla (Bahamas Islands);	Terrestrial	Bahamas Islands;Antigua-Barbuda;Barbados;Bermuda;Cayman Islands;Commonwealth of Dominica;Grenada;Jamaica;Montserrat;St Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands		Bahamas Islands;
Plant - Tree	Melaleuca quinquenervia		Melaleuca (Puerto Rico); Paper bark (Puerto Rico);	Terrestrial	Bahamas Islands;Antigua-Barbuda;Barbados;Cuba;Dominican Republic;Grenada;Guadeloupe;Haiti;Jamaica;Martinique;Montserrat;Netherlands Antilles;Puerto Rico;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;Trinid	West Indies;Bahamas	Bahamas Islands;Puerto Rico;Dominican Republic

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					ad-Tobago;US Virgin Islands;West Indies		
Plant - Tree	Melia azedarach		Chinaberry(Berhmuda);Lilac neem (Antigua-Barbuda);Pride of India (Bermuda);	Terrestrial	Bahamas Islands;Cuba;Dominican Republic;Jamaica;Puerto Rico;Antigua-Barbuda;Bermuda;	Bahamas;Puerto Rico;Bermuda;	Bahamas Islands;Antigua-Barbuda;
Plant - Tree	Melicoccus bijugatus		Ackee (Barbados);	Terrestrial	Puerto Rico;Barbados;	Puerto Rico	Barbados
Plant - Tree	Miconia calvescens			Terrestrial	Jamaica;Dominican Republic;	Jamaica;	Dominican Republic
Plant - Tree	Mimosa arenosa		Ceiba (Puerto Rico);	Terrestrial	Puerto Rico;US Virgin Islands	Puerto Rico	
Plant - Tree	Mimosa pigra	Mimosa pellita	Catclaw (Puerto Rico);Mimosa (Puerto Rico);	Terrestrial	Jamaica;Puerto Rico;		Puerto Rico
Plant - Tree	Mimosa scabrella			Terrestrial	Jamaica;		
Plant - Tree	Morinda citrifolia			Terrestrial	Puerto Rico;Dominican Republic;Haiti	Puerto Rico	Dominican Republic;Haiti
Plant - Tree	Moringa oleifera			Terrestrial	Haiti;Puerto Rico	Puerto Rico	
Plant - Tree	Morus nigra			Terrestrial	Cuba;Dominican Republic;Haiti;Puerto Rico;	Puerto Rico	
Plant - Tree	Muntingia calabura			Terrestrial	Puerto Rico		Puerto Rico
Plant - Tree	Murraya paniculata		Mock orange;Orange jessamine;Chinese Box;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Myroxylon balsamum			Terrestrial	Dominican Republic;Puerto Rico;Trinidad-Tobago	Puerto Rico	
Plant - Tree	Neolamarckia cadamba	Anthocephalus chinensis;		Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Noronhia emarginata		Madagascar Olive	Terrestrial	Bermuda;	Bermuda;	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Plant - Tree	Nypa fruticans			Terrestrial	Trinidad;	Trinidad	
Plant - Tree	Olea europea		Olive; European olive;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Oncoba echinata			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Pachira acuatica	Pachira aquatica?;	Carolina (Dominican Republic);	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Pachira insignis	Bombax spruceanum;Carolinea insignis;Pachira spruceana;	Malabar chestnut;Provision tree; Guinea chestnut;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Pandanus utilis		Screw Palm;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Parkia biglobosa			Terrestrial	Antigua-Barbuda;Barbados;Cuba;Dominica;Dominican Republic;Grenada;Haiti;Jamaica;Puerto Rico;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands;West Indies		
Plant - Tree	Parkia timoriana			Terrestrial	Caribbean;Puerto Rico;		
Plant - Tree	Parkinsonia aculeata		Aroma extranjera (Dom Rep);	Terrestrial	Cuba;Dominican Republic;Guadeloupe;Haiti;Jamaica;Martinique;Netherlands Antilles;Puerto Rico;	Puerto Rico	Dominican Republic
Plant - Tree	Peltophorum pterocarpum			Terrestrial	Puerto Rico;Barbados;Guadeloupe;St Lucia;	Puerto Rico	
Plant - Tree	Persea americana			Terrestrial	Puerto Rico;Antigua-	Puerto Rico	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Barbuda;Barbados;Cuba;Dominican Republic;Grenada;Jamaica;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands		
Plant - Tree	Phoenix reclinata		Senegal Date;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Phyllanthus acidus			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Pimenta dioica	Pimenta officinalis;Myrtus dioica;Myrtus pimenta;	Allspice	Terrestrial	Bermuda;		Bermuda;
Plant - Tree	Pinus caribaea		Pino hondureno (DR);	Terrestrial	Jamaica;Puerto Rico;Dominican Republic;	Puerto Rico	Dominican Republic
Plant - Tree	Pinus merkusii			Terrestrial	Puerto Rico;		
Plant - Tree	Pinus patula			Terrestrial	Puerto Rico;		
Plant - Tree	Pithecellobium dulce			Terrestrial	Cuba;Haiti;Jamaica;Puerto Rico;US Virgin Islands		Puerto Rico
Plant - Tree	Pittosporum tenuifolium		Thin Leaved Pittosporum	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Pittosporum tobira		Pittosporum (Japanese);Victoria Box;Australian Laurel;Mock Orange;	Terrestrial			
Plant - Tree	Pittosporum undulatum		Wild coffee (Jamaica); Mock orange (Jamaica);Pittosporum (undulating);	Terrestrial	Jamaica;Bermuda	Bermuda	Jamaica;
Plant - Tree	Podocarpus macrophyllus "Maki"		Japanese Yew;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Procambarus clarkii		Camaron del diablo (DR); Red swamp crayfish;American crayfish;	Freshwater	Dominican Republic;		Dominican Republic
Plant - Tree	Prosopis chilensis		Mesquite (Jamaica);Chilean	Terrestrial	Jamaica;		Jamaica;

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
			mesquite;				
Plant - Tree	Prosopis juliflora		Bayahonda (DR); Cambron (DR);Mesquite (Puerto Rico);Bayahonda (Puerto Rico);	Terrestrial	Bahamas Islands;Barbados; Bermuda;British Virgin Islands;Cayman Islands; Cuba; Commonwealth of Dominica; Dominican Republic;Grenada; Haiti;Jamaica;Puerto Rico;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands	Dominican Republic?	Puerto Rico
Plant - Tree	Prosopis nigra			Terrestrial	Haiti		
Plant - Tree	Prosopis pallida	Acacia pallida;		Terrestrial	Puerto Rico;		Puerto Rico
Plant - Tree	Psidium guajava		Guava;Guayaba silvestre (Puerto Rico);	Terrestrial	Bahamas Islands; Cuba; Dominican Republic; Haiti;Puerto Rico;Bermuda;	Bahamas	Bahamas Islands;Puerto Rico;Bermuda;
Plant - Tree	Pterocarpus indicus			Terrestrial	Puerto Rico;Cuba;Trinidad-Tobago;	Puerto Rico	
Plant - Tree	Pterocarpus macrocarpus			Terrestrial	Puerto Rico;Trinidad;Cuba	Puerto Rico	
Plant - Tree	Ptychosperma elegans		Solitaire palm;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Ptychosperma macarthurii		Macarthur palm (Barbados)	Terrestrial	Barbados;		Barbados;
Plant - Tree	Samanea saman	Albizia saman		Terrestrial	Puerto Rico;Haiti;	Puerto Rico	
Plant - Tree	Schefflera actinophylla		Umbrella tree;Umbrella plant;Octopus tree;Queensland Umbrella	Terrestrial	Bahamas Islands;Bermuda;	Bahamas;Bermuda;	Bahamas Islands;

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
			Tree;				
Plant - Tree	Schinus molle			Terrestrial	Dominican Republic;Haiti;		
Plant - Tree	Schinus terebinthifolius		Brazilian pepper (Puerto Rico); Pimienta de Brasil (Puerto Rico);Brazil pepper;Mexican pepper;	Terrestrial	Bahamas Islands; Cuba; Puerto Rico;Bermuda;	Puerto Rico	Bahamas Islands;Puerto Rico;Bermuda;
Plant - Tree	Schizolobium parahyba			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Senna multijuga			Terrestrial	Martinique;British Virgin Islands;Cuba;Puerto Rico;Trinidad-Tobago;US Virgin Islands;	Puerto Rico	
Plant - Tree	Senna siamea	Cassia siamea;		Terrestrial	Caribbean;Dominican Republic;Puerto Rico		Puerto Rico
Plant - Tree	Senna spectabilis			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Senna tora	Cassia tora		Terrestrial	Jamaica;	Jamaica	
Plant - Tree	Sesbania bispinosa			Terrestrial	Antigua-Barbuda;Bahamas Islands;Barbados; Cuba;Commonwealth of Dominica; Dominican Republic; Grenada;Guadeloupe;Haiti; Jamaica; Martinique; Montserrat; Netherlands Antilles; Puerto Rico;St. Kitts-Nevis; St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US		

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Virgin Islands		
Plant - Tree	Sesbania grandiflora			Terrestrial	Cayman Is;Cuba;Dominican Republic;Guadeloupe;Haiti;Jamaica;Martinique;Puerto Rico;	Puerto Rico	
Plant - Tree	Simarouba amara			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Spathodea campanulata		Flame of the forest; African tulip tree; Amapola (DR);Tulipan africano (Puerto Rico)	Terrestrial	Bahamas Islands;Cuba;Jamaica;Puerto Rico;Dominican Republic;		Bahamas Islands;Puerto Rico;Dominican Republic
Plant - Tree	Spondias dulcis			Terrestrial	Puerto Rico;Jamaica;Cuba;Haiti;Dominica;Trinidad;	Puerto Rico	
Plant - Tree	Spondias mombin			Terrestrial	Curacao	Curacao	
Plant - Tree	Spondias purpurea			Terrestrial	Puerto Rico;Guadeloupe;Anguilla;Antigua-Barbuda;Barbados;Grenada;Saint Lucia; Saint Vincent-Grenadines;	Puerto Rico	
Plant - Tree	Sterculia apetala		Anacaguita (Puerto Rico);	Terrestrial	Bermuda;Puerto Rico;Trinidad-Tobago;Barbados;Cuba;Jamaica;Montserrat;Saint Kitts-Nevis	Jamaica;Trinidad;Bermuda;Puerto Rico	Puerto Rico
Plant - Tree	Sterculia foetida			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Swietenia macrophylla			Terrestrial	Guadeloupe;Martinique;Haiti;Jamaica;Puerto	Puerto Rico	

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Rico;Trinidad-Tobago;Cuba;Lesser Antilles;		
Plant - Tree	Swietenia mahogoni			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Syzygium cumini			Terrestrial	Antigua-Barbuda;Bahamas; Barbados;Cuba;Dominica;Dominican Republic;Grenada; Guadeloupe;Haiti; Jamaica;Martinique;Montserrat;Netherlands Antilles;St. Kitts-Nevis;St. Lucia;St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands		
Plant - Tree	Syzygium jambos		Rose Apple (Jamaica); Pomo (DR);Pomarosa;	Terrestrial	Jamaica;Dominican Republic;Puerto Rico		Jamaica;Puerto Rico;Dominican Republic
Plant - Tree	Syzygium malaccense			Terrestrial	Puerto Rico;Jamaica	Puerto Rico	
Plant - Tree	Tabebuia chrysantha			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Tabebuia donnell-smithii			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Tabebuia heterophylla		Roble blanco (DR);	Terrestrial	Guadeloupe;Martinique;Anguilla;Antigua-Barbuda;Bahamas Islands; British Virgin Islands;Cayman Islands;Cuba; Commonwealth of Dominica, Dominican Republic;	Martinique;Anguilla;Antigua-Barbuda;Bahamas;British Virgin Islands;Cayman Islands;Cuba; Dominica;Dominican Republic;Gren	Dominican Republic

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Grenada;Haiti;Jamaica;Montserrat;Netherlands Antilles;	ada;Haiti;Jamaica;Montserrat;Netherlands Antilles;	
Plant - Tree	Tabebuia pallida	Tabebuia heterophylla;	white cedar;trumpet tree;	Terrestrial	Bermuda;	Bermuda;	
Plant - Tree	Tabebuia pentaphylla		Roble blanco (Dominican Republic);	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Tabebuia rosea			Terrestrial	Trinidad-Tobago		
Plant - Tree	Tamarindus indica			Terrestrial	Antigua;Curacao;Cuba;Dominican Republic;Haiti;Jamaica;Puerto Rico;	Curacao;Puerto Rico	Antigua
Plant - Tree	Tecoma stans	Bignonia stans;Stenolobium stans;	Sauco amarillo (Dominican Republic);Yellowbells;elder;trumpetbush;	Terrestrial	Dominican Republic;		Dominican Republic
Plant - Tree	Tectona grandis			Terrestrial	Cuba;Jamaica;Puerto Rico;Trinidad-Tobago;US Virgin Islands;		
Plant - Tree	Tephrosia candida			Terrestrial	Antigua-Barduda;Bahamas;Barbados;Cuba;Commonwealth of Dominica;Dominican Republic;Grenada;Guadeloupe;Puerto Rico;St. Kitts-Nevis;St. Lucia;St Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands;West Indies		
Plant - Tree	Terminalia catappa		West Indian almond (Barbados);	Terrestrial	Antigua-Barbuda;Bahamas;Barbados;Bermud		Puerto Rico;Barbados;

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					a;Cuba;Curacao;Commonwealth of Dominica; Dominican Republic;Grenada; Haiti;Jamaica;Netherlands Antilles;Puerto Rico;St. Lucia; St. Vincent-Grenadines;Trinidad-Tobago;US Virgin Islands		
Plant - Tree	Terminalia ivorensis			Terrestrial	Trinidad-Tobago;Puerto Rico	Puerto Rico	
Plant - Tree	Terminalia myriocarpa			Terrestrial	Puerto Rico;	Puerto Rico	
Plant - Tree	Terminalia oblonga			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Theobroma cacao			Terrestrial	Puerto Rico	Puerto Rico	
Plant - Tree	Thespesia populnea		Seaside mahoe; Cork tree; Spanish cork;	Terrestrial	Bahamas Islands; Cuba;Dominican Republic; Haiti; Jamaica; Puerto Rico;	Bahamas	Bahamas Islands;Puerto Rico
Plant - Tree	Thevetia peruviana		Yellow Oleander;Lucky Nut;	Terrestrial	Puerto Rico;Bermuda;	Puerto Rico;Bermuda;	
Plant - Tree	Vangueria madagascariensis			Terrestrial	Trinidad-Tobago		
Plant - Tree	Ziziphus mauritiana			Terrestrial	Barbados;Grenada;Guadeloupe;Jamaica;Martinique;Puerto Rico;	Barbados;Jamaica;Guadeloupe;Martinique;Puerto Rico	
Protozoa	Dunaliella sp.		Green algae;	Freshwater	Bahamas Islands;		Bahamas Islands;
Sea Anemone	Radianthus sp.		Sea anemone;	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Amphibian	Bufo marinus		Bullfrog;Maco toro (DR);Maco pempen (Dom	Freshwater	Jamaica;Dominican		Jamaica;Dominican Republic;Aruba;Ang

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			Rep);cane toad;Bufo Toad;Marine Toad;		Republic;Aruba;Anguilla;Barbados; Montserrat;St. Vincent-Grenadines;Haiti; Hispaniola;		uilla;Barbados;Montserrat;St. Vincent-Grenadines;Haiti;Hispaniola;
Vertebrate - Amphibian	Eleutherodactlyus planirostris		Greenhouse frog	Terrestrial	Guadeloupe;		Guadeloupe;
Vertebrate - Amphibian	Eleutherodactylus cocqui		Caribbean tree frog; Common coqui (Bahamas Islands);Puerto Rican treefrog(Puerto Rico);	Terrestrial	Bahamas Islands;US Virgin Islands;Puerto Rico;		Bahamas Islands;US Virgin Islands;Puerto Rico;
Vertebrate - Amphibian	Eleutherodactylus johnstonei		whistling frog;fluitkikker (Curacao;	Terrestrial	Jamaica;Bermuda; Trinidad;Curacao;		Jamaica;Curacao;Trinidad;
Vertebrate - Amphibian	Osteopilus septentrionalis		Cuban tree frog;	Terrestrial	St. Martin;		St. Martin
Vertebrate - Amphibian	Pleurodema brachyops	Pleuroderma brachyops	Dori maco (Curacao;Bonaire);froth-nest frog;Columbian Four-eyed frog		Curacao;Bonaire	Curacao;Bonaire	
Vertebrate - Amphibian	Rana catesbeiana		Rana toro (DR);North American bullfrog;	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Amphibian	Scinax rubra		Rana;	Terrestrial	St. Lucia;		St. Lucia;
Vertebrate - Amphibian	Xenopus laevis		African clawed frog;	Freshwater			
Vertebrate - Bird	Agapornis fischeri		Fishers Lovebird	Terrestrial	Antigua-Barbuda;	Antigua-Barbuda;	
Vertebrate - Bird	Amazona ochrocephala		yellow-crowned amazon parrot; yellow -crowned parrot;	Terrestrial	Curacao;Trinidad?	Curacao	
Vertebrate - Bird	Aratinga pertinax		Brown-throated parakeet	Terrestrial	Trinidad		Trinidad;
Vertebrate - Bird	Bubulcus ibis	Bulbucus ibis	Garza ganadera (DR);Cattle Egret;Afrikaanse koereiger	Terrestrial	Bahamas Islands;Turks-Caicos;Dominican Republic;Curacao; Aruba;Bonaire;		Dominican Republic;Turks-Caicos;Bahamas Islands;
Vertebrate - Bird	Columba livia		Rock dove;pigeon	Terrestrial	Bahamas Islands;Bermuda;T		Bahamas Islands;Bermuda;Tri

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					rinidad;		nidad;
Vertebrate - Bird	Estrilda astrild		Common waxbill;	Terrestrial	Trinidad;		Trinidad;
Vertebrate - Bird	Forpus passerinus		Green-Rumped Parrotlet;	Terrestrial	Trinidad;		
Vertebrate - Bird	Gallus gallus		chicken;domestic hen;	Terrestrial	Bermuda		Bermuda
Vertebrate - Bird	Lonchura malacca		Monjita tricolor (DR); Black-headed Munia	Terrestrial	Dominican Republic		Dominican Republic
Vertebrate - Bird	Lonchura punctulata		Pecho jabado (DR); Scaly Breasted Munia	Terrestrial	Dominican Republic;		Dominican Republic
Vertebrate - Bird	Melopsittacus undulatus		Periquito; Budgerigar	Terrestrial	Dominican Republic		Dominican Republic
Vertebrate - Bird	Molothrus bonariensis		Shiny cowbird; Pajaro vaquero (DR)	Terrestrial	Jamaica; Bahamas Islands;Dominican Republic;Curacao; Martinique;Barbados;Puerto Rico;		Jamaica: Bahamas Islands;Dominican Republic;Curacao;Martinique;Barbados;Puerto Rico;
Vertebrate - Bird	Passer domesticus		House sparrow; Gorrion domestico (DR);European house sparrow;Europese huismuis	Terrestrial	Bahamas Islands;Dominican Republic;Curacao; Bermuda; St. Martin;		Bahamas Islands;Bermuda;St. Martin;Curacao;Dominican Republic
Vertebrate - Bird	Pitangus sulphuratus		Great Kiskadee	Terrestrial	Tobago		Tobago;
Vertebrate - Bird	Porphyrula flavirostris		Azure gallinule;	Terrestrial	Trinidad;		Trinidad;
Vertebrate - Bird	Psittacidae sp.		Psittacid; parrot	Terrestrial	Puerto Rico		Puerto Rico
Vertebrate - Bird	Sicalis flaveola		saffraanvink;para di misa;	Terrestrial	Curacao;Aruba;		Curacao;Aruba
Vertebrate - Bird	Streptopelia decaocta		Eurasian collared dove;collared dove;	Terrestrial	Bahamas Islands;Antigua-Barbuda;St. Martin;Trindad;	Antigua-Barbuda;	Bahamas Islands;St. Martin;Trinidad;
Vertebrate - Bird	Thraupis palmarum		Palm Tanager	Terrestrial	Tobago		Tobago;
Vertebrate - Bird	Tiaris olivacea		Ciguita de hierba (DR); Yellow-faced Grassquit	Terrestrial	Dominican Republic;		Dominican Republic
Vertebrate - Fish	Amphiprion sp.		Clown fish (Bahamas Islands);	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Betta sp.			Freshwater	Dominican Republic;Haiti;		
Vertebrate - Fish	Betta splendens		Betta;Siamese Fighting Fish;	Freshwater	Dominican Republic;		Dominican Republic

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Vertebrate - Fish	Callionymus lyra		Dragonet;	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Chiloscyllium punctatum		Banded shark;	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Copina arnoldi		Splashing tetra	Freshwater	Trinidad		Trinidad
Vertebrate - Fish	Cyprinus carpio		Carpa (Dom Rep);	Freshwater	Dominican Republic;		Dominican Republic
Vertebrate - Fish	Dorosoma petenense		Threadfin Shad;	Freshwater	Dominican Republic;		Dominican Republic
Vertebrate - Fish	Epinephelus lanceolatus		Queenland grouper;	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Euxiphipops navarchus		Blue-girded angelfish;	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Euxiphipops xanthometopon		Yellow-faced angelfish;	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Gambusia affinis		Pez mosquito (DR);western mosquito fish;	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Gambusia holbrooki		Pez mosquito (DR);eastern mosquitofish	Freshwater	Dominican Republic;		Dominican Republic
Vertebrate - Fish	Hemiscylliidae sp.		Bamboo shark;	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Heterodontus zebra		Zebra bullhead shark;	Marine	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Ictalurus punctatus		Pez gato (DR);Channel Catfish	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Lebistes reticulatus		guppy	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Micropterus salmoides		Lobina-truche (DR); Largemouth Bass	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Oncorhynchus mykiss		Trucha arco iris (DR);rainbow trout;steelhead trout	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Oreochromis aurea		Tilapia aurea (DR); Blue Tilapia	Freshwater	Dominican Republic;		Dominican Republic
Vertebrate - Fish	Oreochromis hornorum		Tilapia hornorum (DR);	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Oreochromis mossambicus		Tilapia mossambica (DR);	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Oreochromis niloticus		Tilapia nilotica (DR);	Freshwater	Dominican Republic;US Virgin Islands		Dominican Republic

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
Vertebrate - Fish	Oreochromis placidus placidus		Black Tilapia	Freshwater	Barbados		Barbados
Vertebrate - Fish	Oreochromis sp.		Tilapia rojo (DR);	Freshwater	Dominican Republic;		Dominican Republic
Vertebrate - Fish	Oreochromis urolepis		Tilapia;Rufigi tilapia	Freshwater	Bahamas Islands;		Bahamas Islands;
Vertebrate - Fish	Poecilia latipinna		Sailfin molly	Freshwater	Dominican Republic;Bahamas Islands;		Bahamas Islands;Dominican Republic;
Vertebrate - Fish	Poecilia reticulata		Guppy;	Freshwater	Dominican Republic;Haiti		Dominican Republic;Haiti
Vertebrate - Fish	Poecilia sphenops		Liberty Molly	Freshwater	Trinidad		Trinidad
Vertebrate - Fish	Salmo gairdneri		Rainbow trout	Freshwater	Dominican Republic;		Dominican Republic
Vertebrate - Fish	Sarotheodon mossambicus		Tilapia mosambica (Dom Rep);	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Sarotheodon niloticus		Tilapia nilotica (Dom Rep);	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Serrasalmus natterei		Black piranha	Freshwater	Barbados		
Vertebrate - Fish	Tilapia sp.		Tilapia		Dominican Republic;Haiti;		Dominican Republic;Haiti;
Vertebrate - Fish	Trichogastger trichopterus		Gurami (DR);Blue Gourami	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Xiphophorus helleri		Colaspada (DR);	Freshwater	Dominican Republic;		Dominican Republic;
Vertebrate - Fish	Xiphophorus maculatius		Platy;	Freshwater	Dominican Republic		Dominican Republic
Vertebrate - Mammal			Deer sp.	Terrestrial	US Virgin Islands		US Virgin Islands
Vertebrate - Mammal	Bos taurus		Domestic cow;Holstein;	Terrestrial	Bahamas Islands;Turks-Caicos;		
Vertebrate - Mammal	Canis familiaris		Domestic dog;	Terrestrial	Bahamas Islands;Dominican Republic;British Virgin Islands;Turks-Caicos;Antigua-Barbuda;St.		Bahamas Islands;Dominican Republic;British Virgin Islands;Turks-Caicos;Antigua-Barbuda;St.

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Martin;Curacao;Jamaica;Haiti;		Martin;Jamaica;Haiti;
Vertebrate - Mammal	Capra hircus		Goat	Terrestrial	Jamaica; Bahamas Islands;Turks-Caicos;Antigua-Barbuda;Puerto Rico;Curacao;US Virgin Islands;Dominican Republic;Haiti;		Jamaica;Bahamas Islands;Turks-Caicos;Antigua-Barbuda;Puerto Rico;US Virgin Islands;Curacao;Dominican Republic;Haiti;
Vertebrate - Mammal	Cercopithecus aethiops sabaeus		African green monkey;green monkey	Terrestrial	Barbados;St Martin;St Kitts-Nevis;		Barbados;St Martin;St Kitts-Nevis;
Vertebrate - Mammal	Dasyprocta sp.		agouti;	Terrestrial	Curacao;Dominica;Montserrat;		Dominica;Montserrat;
Vertebrate - Mammal	Equus asinus		Donkey;burros (Virgin islands);	Terrestrial	Bahamas Islands;US Virgin Islands;Turks-Caicos;Antigua-Barbuda;Puerto Rico;		Bahamas Islands;US Virgin Islands;Turks-Caicos;Antigua-Barbuda;Puerto Rico;
Vertebrate - Mammal	Erythrocebus patas		Patas monkey	Terrestrial	Puerto Rico;		Puerto Rico;
Vertebrate - Mammal	Felis catus		Cat;Domestic cat;	Terrestrial	Jamaica; Bahamas Islands;Dominican Republic;Turks-Caicos;British Virgin Islands;Antigua-Barbuda;Bermuda;Puerto Rico;St. Martin;Curacao;US Virgin Islands;Barbados;Haiti;		Jamaica: Bahamas Islands;Dominican Republic;Turks-Caicos;British Virgin Islands;Antigua-Barbuda;Bermuda;Puerto Rico;St. Martin;Curacao;US Virgin Islands;Barbados;Haiti;
Vertebrate - Mammal	Herpestes auropunctatus		Small indian mongoose; Indian mongoose; Javan mongoose; Huron (DR)	Terrestrial	Antigua-Barbuda;Anguilla;Cuba;Dominican Republic;Puerto		Jamaica;Antigua-Barbuda;Anguilla;Cuba;Dominican Republic;Puerto

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					Rico;Jamaica;Dominican Republic;Bahamas;Barbados;Grenada;Guadeloupe;Puerto Rico;St.Martin;Trinidad-Tobago;US Virgin Islands;		Rico;Jamaica;Dominican Republic;Bahamas;Barbados;Grenada;Guadeloupe;Puerto Rico;St.Martin;Trinidad-Tobago;US Virgin Islands
Vertebrate - Mammal	Macaca mulatta		rhesus macaque; rhesus monkey;	Terrestrial	Puerto Rico		Puerto Rico
Vertebrate - Mammal	Mus musculus		Mouse; Biganuelo (DR); Raton casero (DR);house mouse;	Terrestrial	Bahamas Islands;Dominican Republic;Curacao; Dominica;Haiti;Trinidad-Tobago?		Bahamas Islands;Curacao;Dominican Republic;Curacao;Dominica;Haiti;Trinidad-Tobago?
Vertebrate - Mammal	Odocoileus virginianus		White-tailed deer;	Terrestrial	Jamaica;		Jamaica:
Vertebrate - Mammal	Ovis aries		Sheep;	Terrestrial	Bahamas Islands;Curacao;Antigua-Barbuda;US Virgin Islands;Dominican Republic;Haiti;		Bahamas Islands;US Virgin Islands;Dominican Republic;Haiti;
Vertebrate - Mammal	Procyon lotor		Racoon;	Terrestrial	Bahamas Islands;		Bahamas Islands;
Vertebrate - Mammal	Rattus norvegicus		Brown rat; Norway rat; Rata de noruega (DR);	Terrestrial	Jamaica; Bahamas Islands;Dominican Republic;Curacao; Dominica;Trinidad-Tobago;		Jamaica;Bahamas Islands;Curacao;Dominica;Trinidad-Tobago;Dominican Republic
Vertebrate - Mammal	Rattus rattus		Black rat, Roof rat (Jamaica); Ship rat (Bahamas Islands);Rato de tejado (DR);	Terrestrial	Jamaica; Bahamas Islands;Dominican Republic;Monito Island;Antigua-Barbuda;Dominica;Trinidad-Tobago;Curacao;B		Jamaica; Bahamas Islands;Dominican Republic;Monito Island;Antigua-Barbuda;Dominica;Trinidad-Tobago;Curacao;Bar

Organism Type	Species Name	Synonyms	Common Names	Broad Habitat	Exotic in	Naturalised In	Naturalised and Invasive In
					arbados;		bados;
Vertebrate - Mammal	Rattus sp.		rat;	Terrestrial	Dominican Republic;Haiti;		Dominican Republic;Haiti;
Vertebrate - Mammal	Sus scrofa		Pig (feral);hog	Terrestrial	Jamaica; Bahamas Islands;Curacao;Dominica;Puerto Rico;US Virgin Islands;		Jamaica: Bahamas Islands;Curacao;Dominica;Puerto Rico;US Virgin Islands;
Vertebrate - Mammal	Sylvilagus floridianus nigronuchalis		cottontail rabbit;	Terrestrial	Curacao;		
Vertebrate - Reptile	Anolis aeneus			Terrestrial	Trinidad;		Trinidad;
Vertebrate - Reptile	Anolis carolinensis			Terrestrial	Anguilla;		Anguilla;
Vertebrate - Reptile	Anolis cristatellus			Terrestrial	Dominica		Dominica
Vertebrate - Reptile	Anolis extremus			Terrestrial	Trinidad;		Trinidad;
Vertebrate - Reptile	Anolis richardii			Terrestrial	Tobago		Tobago;
Vertebrate - Reptile	Anolis sagrei			Terrestrial	Grenada		Grenada;
Vertebrate - Reptile	Anolis trinitatis			Terrestrial	Trinidad;		Trinidad
Vertebrate - Reptile	Anolis wattsi			Terrestrial	Trinidad		Trinidad
Vertebrate - Reptile	Chrysemys sp.		Jicotea (DR);pond turtle;painted turtle	Freshwater	Dominican Republic;		Dominican Republic
Vertebrate - Reptile	Elaphe guttata		Corn snake (Bahamas Islands);	Terrestrial	Bahamas Islands;Anguilla;Antigua;St. Barts;		Bahamas Islands;Anguilla;Antigua;St. Barts;
Vertebrate - Reptile	Hemidactylus mabouia		pegapega; cosmopolitan house gecko;wood slave; African wood slave;	Terrestrial	Curacao;		Curacao
Vertebrate - Reptile	Iguana iguana		common iguana	Terrestrial	Anguilla		Anguilla
Vertebrate - Reptile	Pelusios castaneus			Freshwater	Guadeloupe;		Guadeloupe;
Vertebrate - Reptile	Trachemys scripta		Red-eared slider terrapin; (Bahamas Islands);	Freshwater	Bahamas Islands;Bermuda		Bahamas Islands;Bermuda
Vertebrate - Reptile	Trachemys sp.			Freshwater	Dominican Republic;Haiti;		Dominican Republic;Haiti;
Vertebrate - Reptile	Trachemys stejnegeri						Guadeloupe;