

THE PET TRADE PATHWAY TOOLKIT for Jamaica

*...A Strategy and Action Plan
for preventing pets from becoming
invasive alien species*

**Safeguarding pets
Protecting biodiversity &
human livelihoods**

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ACRONYMS AND ABBREVIATIONS

| | |
|-----------|---|
| <i>Bd</i> | <i>Batrachochytrium dendrobatidis</i> |
| CABI | CABI Caribbean and Latin America regional office |
| CBD | Convention on Biological Diversity |
| CIASNET | Caribbean Invasive Alien Species Network |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| COP | CBD Conference of the Parties |
| CRIASAP | Strategy and Action Plan for Invasive Alien Species in the Caribbean Region 2011-2016 |
| CSA | Critical Situation Analysis |
| EDRR | Early Detection and Rapid Response |
| GEF | Global Environment Facility |
| KAP | Knowledge, Attitudes, and Practices |
| IAS | Invasive Alien Species |
| IMO | International Maritime Organisation |
| IOJ/NHMJ | Institute of Jamaica/National History Museum of Jamaica |
| IUCN | International Union for the Conservation of Nature |
| IPPC | International Plant Protection Organisation |
| Ja CHM | Jamaica's Clearing-House Mechanism |
| JCDT | Jamaica Conservation and Development Trust |
| MTIASIC | Mitigating the Threats of Invasive Alien Species in the Insular Caribbean |
| MoAF | Ministry of Agriculture and Fisheries |
| NEPA | National Environment and Planning Agency, Jamaica |
| NIASSAP | National Invasive Alien Species Strategy and Action Plan |
| NRCA | Natural Resources Conservation Authority |
| IE | World Organisation for Animal Health |
| SIDS | Small Island Developing States |
| SPAW | Specially Protected Areas and Wildlife Protocol |
| SPS | Sanitary and Phytosanitary |
| UNCLOS | United Nations Convention on Law of the Sea |
| WTO | World Trade Organisation |

GLOSSARY OF TERMS¹

| | |
|---------------------------|--|
| Alien Species: | A species, subspecies or lower taxon, introduced outside its natural past or present distribution; includes any part, gametes, seeds, eggs, or propagules of such species that might survive and subsequently reproduce |
| Alien Invasive Species: | See invasive alien species |
| Biodiversity: | See biological diversity |
| Biological Diversity: | The variability among living organisms from all sources including, <i>inter alia</i> , terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems |
| Biological Invasion: | The process that occurs when an alien species is introduced to a new ecosystem (different from its origin) and proceeds to establish, naturalise, spread, and cause harm to biodiversity (and possibly human health, livelihoods, and development opportunities) |
| Control: | Containment of the entire population of non-native organisms within a specific ecosystem or other defined area ² |
| Ecosystem: | A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit |
| Eradication: | Removal of the entire population of non-native organisms from a specific ecosystem of other defined area ³ |
| Establishment: | The process of an alien species in a new habitat successfully producing viable offspring with the likelihood of continued survival |
| Intentional Introduction: | The deliberate movement and/or release by humans of an alien species outside its natural range |
| Invasive Alien Species: | An alien species whose introduction and/or spread threatens biological diversity |

¹ Unless otherwise noted, the definitions provided are those commonly used within the context of the Convention on Biological Diversity (CBD): <http://www.cbd.int/invasive/terms.shtml>

² Not defined by the CBD. Definition provided by project consultant

³ Not defined by the CBD. Definition provided by project consultant

| | |
|----------------------------|--|
| Native Species: | A species, subspecies, or lower taxon, occurring within its natural range (past or present) and dispersal potential (i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or care by humans ⁴ |
| Non-native Species: | See alien species |
| Pathway: | Any means that allows the entry or spread of an invasive alien species ⁵ |
| Precautionary Approach: | Under the Rio Declaration, stated in Principle 15 as “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation” |
| Risk Analysis: | (a) The assessment of the consequences of the introduction and of the likelihood of establishment of an alien species using science-based information (i.e., risk assessment), <i>and</i> (b) the identification of measures that can be implemented to reduce or manage these risks (i.e., risk management), taking into account socio-economic and cultural considerations ⁶ |
| Spread | Expansion of the geographical distribution of an alien species within an area ⁷ |
| Unintentional Introduction | All other introductions which are not intentional |

⁴ IUCN (2000)

⁵ Interpreted by the author from the definition used by the International Plant Protection Organisation (IPPC); www.ippc.org

⁶ Most other definitions of risk analysis also include: (c) risk communication - the interactive exchange of information among risk assessors, risk managers and other interested parties

⁷ Interpreted by the author from the definition used by the International Plant Protection Organisation (IPPC); www.ippc.org

ACKNOWLEDGEMENTS

This *Toolkit* is a product of a multi-stakeholder process facilitated by the National Environment and Planning Agency (NEPA). Sincere thanks are due to those who participated in the public consultations held on September 17, 18 (Kingston) and 20 (Montego Bay), 2013. The Invasive Alien Species Working Group finalized the Strategy and Action Plan. Their leadership on the IAS issue in Jamaica is greatly appreciated, and will be vital to the successful implementation of the vision and activities proposed herein.

EXECUTIVE SUMMARY

‘Invasive alien species’ (IAS) are alien (non-native) species whose introduction and/or spread threatens biological diversity. They are among the top drivers of biological diversity loss worldwide and place substantial constraints on sustainable development.

A ‘pathway’ is any means that allows the entry or spread of an IAS into a new ecosystem. The Possible means of IAS introduction through the ‘pet trade pathway’ include:

1. Intentional

- Release of unwanted pets or live pet food (e.g., feeder fish, crickets);
- Outdoor disposal of unwanted plant material associated with aquariums, terrariums, or water gardens that contain pets;
- Outdoor disposal of pet food containing viable seeds or rootable plant material;

2. Unintentional

- Escape of pets or live pet food that are poorly contained or when facilities are damaged, flooded, or destroyed (e.g., in extreme weather events, such as hurricanes);
- Introduction of pathogens and parasites that ‘hitchhike’ on pets or organisms used for live pet food that are released or escape; and
- Introduction of plant material, pathogens, or parasites when pet housing (e.g., aquariums/terrariums, bird cages), toys, feeding dishes, and other supplies are cleaned outdoors.

The pet trade is a young, but growing, industry in Jamaica. At this time, there are few regulations that directly address pet ownership or the commercial enterprises associated with the pet trade. Those regulations that are in place, were largely motivated by the need to protect human and animal health, endangered species in international trade, or environmental quality; they were not designed explicitly to prevent the introduction of IAS.

While dogs and cats have long been a part of the lives of Jamaicans, the sense of responsibility to them as individually-owned ‘family pets’ is relatively new. Dogs and cats have not been routinely confined to the owner’s property, collared or licensed. In many communities, these animals roam freely and may be given little care or affection. These circumstances make the pet trade pathway a high risk pathway for the introduction of IAS into Jamaica’s natural environment.

Examples of non-native species already established in Jamaica via the pet trade pathway include Indo-Pacific lionfish (*Pterois volitans* and *P. miles*), rose-ringed parakeets (*Psittacula krameri*), suckermouth catfish (*Pterygoplichthys pardalis*), and water hyacinth (*Eichornia crassipes*).

Substantial concerns exist for the further introduction of ornamental fish, parrots⁸, and reptiles/amphibians, especially with regard to potential impacts on Jamaica's endemic wildlife.

There is no single approach to addressing the pet trade pathway. The most effective efforts employ a combination of complementary activities in the regulatory and non-regulatory contexts. They are also stakeholder inclusive and 'fit to purpose' – in other words they are scientifically well-informed and motivated, tailored to reach specific audiences, carefully consider budgets and other logistical realities, monitored and revised as necessary to ensure success, and institutionalized in a manner that reflects a long-term commitment to achieving outcomes. The four goals for preventing the introduction of IAS via the pet trade pathway include:

1. Protect the natural environment and economy from the impacts of abandoned or escaped pets (i.e., potentially invasive alien species);
2. Identify 'high risk' species in the pet trade and proactively implement measures that effectively minimise this risk;
3. Ensure that pets are carefully selected and well cared for by their owners; and
4. Help pet owners find alternatives to the release of unwanted pets.

The first goal is achieved through the effective implementation of the other three goals.

This *Pet Trade Pathway Toolkit* is the first output under Jamaica's 2014-2020 National Invasive Alien Species Strategy and Action Plan (NIASSAP). It was developed through a multi-stakeholder consultation process, and is intended for use by the government in cooperation with partners in the private and non-profit sectors.

Although the primary motivation for the *Toolkit* is to minimise the impact of IAS on Jamaica's environment and natural resource-based economy, addressing the pet trade pathway has direct benefits for animal welfare and human livelihoods. Thus, the statement on the cover of the *Toolkit* that reads: "Safeguarding pets. Protecting Biodiversity & Human Livelihoods." These additional benefits will be discussed in detail at the end of the Introduction.

The opening sections of the document provide a brief overview of the IAS issue, pet trade as a pathway for biological invasion, and current status of the pet trade in Jamaica. This is followed by a summary of general approaches to preventing the introduction of IAS and associated organisms via the pet trade pathway. Emphasis is placed on prevention because it is the most cost-effective and, all too often, the only viable option for minimising the risk and impact of invasive alien vertebrates. Once these organisms are established in the natural environment, response measures typically require lethal approaches to eradication and control. This is often technically difficult, cost prohibitive, and not favoured from an animal welfare perspective. To be successful, pet trade pathway prevention efforts need to primarily target the riskiest aspect of the pathway, namely pet owners, and carefully consider the strong emotional connection that people have to their pets.

⁸ Also known as *psittacines*, are birds of the roughly 372 species in 86 genera that make up the order Psittaciformes. This includes birds commonly called parrots, parakeets, macaws, cockatoos, etc.

A ‘pet trade pathway strategy and action plan’ for Jamaica is contained in the third section of the *Toolkit*. This serves as a complement to Jamaica’s more comprehensive NIASSAP. The tools/activities listed herein are a subset of the available options outlined in Appendix II, and were chosen based on an understanding of what is most: a) needed for initial study and project implementation in Jamaica and b) likely to garner support from key stakeholders and donors (i.e. feasible to implement). This work will provide a foundation on which to build a more rigorous programme for the prevention of IAS in Jamaica – for the pet trade pathway and, likely, other pathways as well.

The Strategy and Action Plan is divided into eight components, each containing several specific projects to be implemented in the short-term (two years), medium-term (four years), long-term (six years), and/or in an ongoing manner. The eight specific strategies are to:

1. *Facilitate NIASSAP Implementation.* Institutionalise an effective mechanism for promoting, coordinating, and monitoring the implementation of Jamaica’s NIASSAPs
2. *Prevent, eradicate and control IAS.* Strengthen existing and establish new “on-the-ground” programmes⁹ to prevent the introduction of IAS, as well as to minimize their spread and impact.
3. *Improve Legal and Institutional Capacity.* Strengthen and establish legal and institutional frameworks to enable the effective prevention, eradication, and control of IAS at regional, national, and local (site-specific) levels.
4. *Build IAS Information Capacity.* Enable access to and the exchange of reliable information in order to facilitate the prevention, eradication, and control of IAS in a timely and cost-effective manner.¹⁰
5. *Conduct Research and Monitoring.* Facilitate an evidence-based approach¹¹ to the prevention, eradication, and control of IAS through information synthesis, scientific research, and ecological monitoring.
6. *Ensure effective communication, education, and outreach (CEO).* Strengthen and expand projects that raise awareness of the IAS issue and their potential impacts, as well as inspire and empower stakeholders to take the appropriate action to prevent, eradicate, and control IAS.
7. *Build Capacity.* Strengthen the capacity of individuals and institutions to prevent, eradicate, and control IAS.
8. *Make Funding Available.* Develop and implement a comprehensive fundraising plan that will secure adequate financing for NIASSAP activities.

The Appendix provides detailed information in support of the previous sections. The table in Appendix I briefly describes the regulations currently in place in Jamaica that pertain to the pet trade pathway and includes links to more detailed information. Since regulatory approaches are constantly evolving, we recommend using the table as point of reference, and going directly to the relevant government websites for the most up-to-date information. Appendix III provides a brief overview of three new social marketing campaigns identified in the Strategy and Action Plan. Finally, a list of references is located in Appendix IV.

⁹ Including associated technical approaches and tools, as needed

¹⁰ Note: To the extent feasible, information will be verified by relevant experts prior to being made publically accessible

¹¹Integration of: (a) technical expertise/expert opinion, (b) scientific research findings, and (c) stakeholder values to provide high-quality information for NIASSAP implementation

INTRODUCTION

Toolkit Overview

The *Pet Trade Pathway Toolkit* is the first output under Jamaica’s 2014-2020 National Invasive Alien Species Strategy and Action Plan (NIASSAP). It was developed through a multi-stakeholder consultation process, and is intended for use by the government in cooperation with partners in the private and non-profit sectors.

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Invasive Alien Species

For the purpose of this document, ‘invasive alien species’ is abbreviated as IAS and defined as an alien (non-native) species whose introduction and/or spread threatens biological diversity¹². Simply put, IAS are organisms that have been relocated (intentionally or otherwise) from their native ecosystem to a new ecosystem where they establish, spread, and cause harm.

Examples of characteristics that make a species a particularly effective invader include:

- Rapid growth rate
- Strong dispersal capabilities
- Large reproductive output
- Broad environmental tolerance
- Well-developed predatory, parasitic, and/or competitive strategies

IAS are one of the major drivers of biodiversity loss worldwide, across all ecosystems. In freshwater environments and in the island context, they are often the most significant environmental challenge. IAS have been implicated in the endangerment and extinction of specific species; degradation of marine, aquatic, and terrestrial environments; and the alteration of ecosystem processes (e.g., water cycling, fire regimes).

The impacts of IAS are not limited to the environment, however. They can have devastating consequences for human, animal, and plant health as disease-causing organisms or vectors of disease. Many IAS are considered pests of agriculture and other economic enterprises based on natural resources (e.g., forestry, fisheries, outdoor recreation and tourism). Some species may also damage infrastructure with dangerous and costly consequences.

Ultimately, IAS can undermine human livelihoods, contribute to social instability, and foster economic hardship, thereby placing constraints on the conservation of biodiversity, sustainable development, and economic growth.

The globalization of trade, travel, and transport is greatly increasing the number of IAS (both individual animals and species) that are being moved around the world, as well as the rate at which they are moving. At the same time, changes in climate and land use are rendering some habitats more susceptible to biological invasion.

Geographically and evolutionary isolated ecosystems, including small island developing states (SIDS) such as Jamaica, are particularly vulnerable to biological invasion. As part of the NIASSAP development process, a critical situation analysis (CSA) of IAS was conducted for Jamaica. The findings indicate that:

- An unknown number of non-native plant and animal species have entered Jamaica through a wide variety of pathways (legal and illegal) have already become established in the country. Although few quantitative studies have been undertaken, it is readily evident

¹² For related definitions, see the Glossary of Terms

that several of these organisms are adversely impacting biodiversity at species- and ecosystem-levels.

- Jamaica’s current biodiversity information needs in the context of IAS include:
 - Field-based inventories of native and/or non-native species;
 - Data mining of relevant publications;
 - Ecological and socio-economic impact assessments of non-native species already established in Jamaica; and
 - Risk analyses for species being imported or proposed for importation into Jamaica.
- Invasion pathways of particular concern are: the trade and display of live animals, horticulture trade, shipping, fisheries/aquaculture, tourism, development assistance, the transportation of equipment, and subnational transportation activities.
- Priorities for near-term legal and institutional capacity building needs include development of:
 - A comprehensive law or strategic collective of laws that enable effective prevention, eradication, and control of IAS;
 - Voluntary codes of conduct that guide private sector efforts to prevent the introduction and spread of IAS through pathways of concern;
 - A comprehensive early detection/rapid response (EDRR) programme, including systems for the rapid reporting and identification of non-native organisms; and
 - A strategic programme for improving the detection of non-native species at ports of entry, including the hiring of more inspectors, enabling inspection of private vessels, providing identification tools and easy access to expert identifiers, and training staff in techniques for profiling smugglers.
- The Mitigating the Threats of Invasive Alien Species in the Insular Caribbean (MTIASIC) project has made substantial advances in education/outreach and social marketing in the context of IAS. This work needs to be continued and expanded upon.
- Research on IAS has been undertaken in Jamaica for decades, but generally in the agricultural sector under the topic of ‘quarantine pests.’ Although it is a relatively recent focus in the environmental context, several research projects are taking place in endangered species, fisheries conservation, and protected areas contexts. An incentives programme (e.g., small grants, student fellowships) could be employed to encourage additional research on IAS of priority concern.
- The government of Jamaica has already been successful in engaging a diversity of national and international stakeholders in its efforts to minimise the spread and impact of IAS. Existing relationships need to be fostered and new partnerships forged nationally, regionally, and at the global level, especially with other island nations.

The Pet Trade Pathway

Many people would not consider their family complete without a pet – whether it is a dog, cat, goldfish, or more unusual animal, such as a green iguana.

Pets bring considerable joy and security into people’s lives and studies show that their companionship can substantially benefit human health and wellbeing. The emotional bond between owner and pet can be as vital to the owner as many human relationships. And, pets have the potential to foster better people; through pet ownership, children can learn how to take responsibility, as well as extend care and love to others.

Unfortunately, for some pet owners, circumstances arise that prevent them from being able to properly care for their companions (Table 1). Some well-meaning pet owners try to solve such problems by setting their pets free, i.e., releasing them into the natural environment. Of course, there are also individuals who abandon pets as a result of callousness or boredom.

Table 1: Reasons people give up their pets

| |
|--|
| 1. A family member develops allergies |
| 2. The owner’s lifestyle changes unexpectedly |
| 3. Housing location and/or policies change |
| 4. The pet outgrows its housing |
| 5. The animal’s behaviour becomes problematic |
| 6. The pets reproduce and are too many to care for |
| 7. The animal becomes sickly (and costly) |
| 8. The pet’s needs are not compatible with the owner’s wants |
| 9. Children leave home or develop other interests |
| 10. Fear of zoonotic disease transmission |

For the pets, ‘freedom’ is often a traumatic experience; they may not be able to find adequate food and shelter, and may become vulnerable to other animals, traffic, and people who consider them a nuisance. Abandoned pets that do survive can cause significant harm to the environment by preying on or competing with native fish and wildlife, spreading pathogens and parasites, and destroying fragile habitats. In short, they can become invasive alien species (IAS; see the previous section).

Pet abandonment has become one of the most common pathways¹³ of vertebrate species introduction and one of the most challenging to address—once the animals become established. Eradication and control programmes face significant public scrutiny and are often challenged by ‘animal rights’ groups. In some cases, natural resource managers have been unable to eradicate or control these feral IAS due to interference and threats presented by ‘animal rights’ advocates. Prevention measures are thus the key to minimising the size and impacts of the ‘pet trade pathway.’

The pet trade pathway is complex (Diagram 1) and not merely limited to the abandonment of unwanted animals. Possible means of IAS introduction through the pet trade pathway include:

¹³ Pathways = Any means that allows the entry or spread of an invasive alien species

Intentional

- Release of unwanted pets or live pet food (e.g., feeder fish, crickets);
- Outdoor disposal of unwanted plant material associated with aquariums, terrariums, or water gardens that contain pets;
- Outdoor disposal of pet food containing viable seeds or rootable plant material;

Unintentional

- Escape of pets or live pet food that are poorly contained or when facilities are damaged, flooded, or destroyed (e.g., in extreme weather events, such as hurricanes);
- Introduction of pathogens and parasites that ‘hitchhike’ on pets or organisms used for live pet food that are released or escape; and
- Introduction of plant material, pathogens, or parasites when pet housing (e.g., aquariums/terrariums, bird cages), toys, feeding dishes, and other supplies are cleaned outdoors.

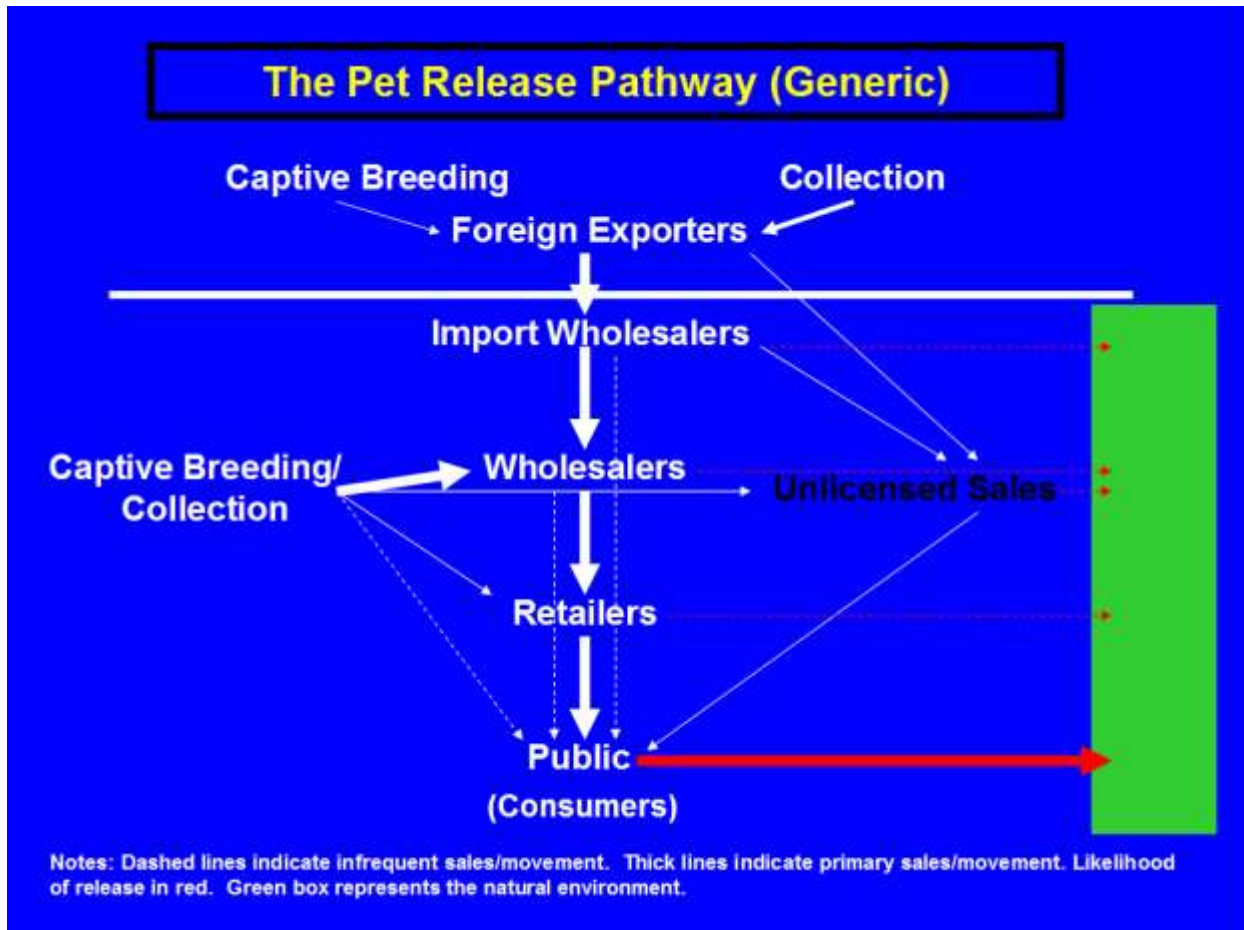


Figure 1: Schematic diagram depicting the pet release pathway.

The greatest risks for the introduction of animals through the pet trade pathway are likely to be associated with:

- Release by/escape from consumers (pet owners). Commercial businesses have an economic interest in protecting their ‘inventory;’
- Non-regulated direct sales – such as sales through the internet and newspapers, hobbyist shows, flea markets, etc. This is a rapidly growing segment of the pet industry. People who purchase pets in this manner may be making ‘spontaneous purchases’ that are not well thought through and they may be more likely to receive animals that are in poor condition (i.e. more likely to have pathogens or parasites);
- Pets that are free or inexpensive. Because there is relatively little financial investment in these animals, the owners may be more inclined to release them when they no longer wish to care for them;
- Species which grow large, reproduce easily and in large numbers in captivity, have specialized dietary or other husbandry requirements, and have aggressive temperaments. These animals require a relatively greater investment of care and money. Owners who are not prepared to meet the animal’s needs may choose to release them; and
- Species ecologically suited to the geographic region in which they are maintained as pets. When these animals enter the natural environment they have the potential to survive the weather conditions. If they can successfully reproduce, they might establish a viable population and spread.

Escaped/released pets can predate upon and compete with native wildlife, threatening entire ecosystems. They can also spread pathogens and parasites to people, livestock, pets, and wildlife. In some cases, former pets have become pests of agricultural and fisheries.

When plants (including seeds) associated with pet care enter the natural environment, they can establish and spread to such an extent that they outcompete native plants and cause wide-scale disruptions to ecological systems. Some invasive aquatic plants have become so abundant that they hinder boating, recreational fishing, and fisheries production. They can also facilitate the growth of mosquito populations and associated diseases.

The Pet Trade in Jamaica

The pet trade is a young, but growing, industry in Jamaica. At this time, there are few regulations that directly address pet ownership or the commercial enterprises associated with the pet trade. Those regulations that are in place (Appendix I), were largely motivated by the need to protect human and animal health, endangered species in international trade, or environmental quality; they were not designed explicitly to prevent the introduction of IAS.

While dogs and cats have long been a part of the lives of Jamaicans, the sense of responsibility to them as individually-owned ‘family pets’ is relatively new. Dogs and cats have not been routinely confined to the owner’s property, collared or licensed. In many communities, these animals roam freely and may be given little care or affection.

Veterinary clinics can be found in the larger cities in Jamaica, but veterinary care is cost-prohibitive for many Jamaicans. This is one of the reasons that dogs and cats are rarely spayed or neutered. The overpopulation of these animals can be a substantial challenge, and one that is largely addressed by abandoning or killing unwanted animals.

Jamaica's economy and standard of living have, however, been improving in recent years and this is resulting in numerous changes to pet ownership. For example:

- Pure bred dogs are becoming popular as pets and guardians. They are, in part, a status symbol. The demand for these animals is translating into both a higher volume of dog imports, but also economic opportunities for local people who breed them. Because there is a financial investment in these animals and they are vulnerable to theft, people are increasingly making an effort to contain, leash, and collar dogs in a manner that specifies ownership. They are also more likely to ensure that the animals receive veterinary care.
- Expensive, 'exotic' animals are also becoming popular among the wealthiest Jamaicans. They are kept both as pets and in private 'zoo' collections. Some of these animals are undoubtedly entering Jamaica as illegally traded wildlife [e.g., monkeys, which are prohibited under the Animals Diseases (Importation) Control Regulations].
- Interest in the type of animals more commonly kept as pets is diversifying to include aquarium fish, birds, small mammals, reptiles and amphibians from around the world. These animals are largely imported into Jamaica, but small-scale breeding of some species also occurs in-country.
- Pet shops and internet-based retailers are becoming viable commercial enterprises in Jamaica. Many of these are small scale, family-owned and operated businesses.
- Development assistance programmes are now in place to support the ornamental fish farming as an economic opportunity in Jamaica. This may provide a starting point for other aspects of the pet industry to become established in Jamaica, and for the country to become an exporter of certain types of pets.
- Hobbyist groups with interests in specific dog breeds or other types of animals are emerging in Jamaica and are using social media to draw in members, advertise available animals for sale, and educate the public on animal care.
- Animal welfare and animal rights are increasing as issues of concern, and there is a growing trend among the more wealthy Jamaicans to ensure that pets receive adequate veterinary care and attention.

Although the pet industry and traditional pet ownership are not yet well-developed in Jamaica, there has been sufficient time for several species in the pet trade to become established in Jamaica as IAS. Examples of non-native species that were likely introduced into Jamaica's natural environments through the pet trade pathway can be found in the case studies included herein (Boxes 1-5). With the exception of the lionfish, none of these species are being studied in

detail, nor are there eradication or control programmes in place to minimise their impact on Jamaican biodiversity and human livelihoods.

Case Study 1: Lionfish Invasion

In the marine environment, the Indo-Pacific Lionfish (*Pterois volitans* and *P. miles*) has become a 'poster child' for biological invasion. Lionfish are kept by marine aquarists, and it is generally surmised that several of these fish were intentionally dumped in the coastal waters of the United States by individuals who no longer wished to keep them as pets. These fish survived, reproduced, and now lionfish are well-established from the mid-Atlantic region southward into the Caribbean – in staggering numbers at some locations. Lionfish were first documented in Jamaica in 2008 and have been the focus of study and public outreach through the National Lionfish Project¹. They are voracious predators that feed on a wide variety of smaller fish, shrimp, and crabs. Studies indicate that they are already having adverse impacts on fish stocks and thus the livelihoods of commercial and subsistence fishers. They also have venomous spines which put marine recreationists and fisherman at risk of injury. The fear of being stung by lionfish may keep tourists from entering Jamaican waters, and thus lionfish pose a threat to reef-based tourism.

Case Study 2: Jamaican Iguana Endangered

The Jamaican iguana (*Cyclura collei*), once declared extinct, was 're-discovered' in 1990 in the Hellshire Hills. It is now classified as 'Critically Endangered' by the IUCN Red List. The single most significant threat to the iguana's survival has been predation by the small Asian mongoose (*Herpestes auro punctatus*), an IAS that was originally introduced to Jamaica in 1872 as a form of rat-control. Although a mongoose trapping programme has been underway in the Hellshire Hills for more than a decade, this IAS continues to thrive. And, the mongoose is not the iguana's only predator: Feral dogs (*Canis lupus familiaris*) and cats (*Felis catus*) roam the Hellshire Hills and may kill young iguanas and/or dig up nests. Although these animals are currently being trapped as well, there is a continuous influx of feral animals from the nearest villages. Recently, destruction of habitat for charcoal production has become yet another major threat to survival of the Jamaican iguana.

Case Study 3: Parrots on the Loose

Several species of non-native Psittacines (parrots and their close relatives) have been imported into Jamaica (legally and illegally) for keeping as pets and in private collections. Several of these animals have escaped or been deliberately released into the natural environment. In 2007, measures were taken to eliminate a non-native yellow-naped Amazon (*Amazona auropalliata*) after it formed a pair-bond with an endemic yellow-billed parrot (*Amazona collaria*) in northern Cockpit Country; biologists feared the pair would hybridise and create long-term consequences for the genetic makeup of the endemic yellow-billed. Since that time, other yellow-naped Amazons have been reported in the wild in Jamaica. These are believed to be independent releases/escapes rather than evidence of an established breeding population. Rose-ringed parakeets (*Psittacula krameri*), a species native to Africa and Asia, were first spotted flying over the suburbs of St. Andrew in March 2008. They are now well established in urban Jamaica and exist outside their native range in other parts of the world as well, including Australia, Great Britain and the United States of America. Impacts of invasive parrot species have included competition with native birds for food and nest sites, as well as consumption of agricultural crops, especially grains, nuts, and fruits. The impacts of the rose-ringed parakeets are unknown. However, there is substantial concern that they will compete with and/or spread diseases to the native olive-throated parakeet (*Aratinga nana*), as well as yellow-billed (*Amazona collaria*) and black-billed (*Amazona agilis*) parrots. The species may also pose a threat to agricultural production, especially if their numbers continue to grow.

Case Study 4: Suckermouth Catfish Invading Freshwater Systems

In 1996, the suckermouth catfish (*Pterygoplichthys pardalis*) was discovered in the Black River, St. Elizabeth. The species is native to freshwater systems in South America and Panama, but popular in the aquarium and ornamental pond trades as an 'algae eater.' It is often called a 'janitor fish' or 'pond cleaner' in recognition of its habit of scraping away algae and detritus. The suckermouth catfish is well protected by its bony, armoured head and ability to reproduce in high numbers, even in water with low oxygen and high pollution levels. Impacts include burrowing into and collapsing riverbanks, competing with native fish for food, destroying the equipment of artisanal fisherman, and reducing fish catch due to trap crowding and reduced stocks of native fish. Faculty and students at the University of the West Indies are currently studying the ecology and impacts in the Black River systems (CABI 2012).

Case Study 5: Beautiful but Damaging Aquatic Plants

Ornamental water gardens and backyard ponds are considered attractive and serene landscaping features. However, the plants and animals introduced into these aquatic settings are often non-native species that can pose a threat to native ecosystems if they disperse on their own (e.g., tadpoles mature into frogs and move elsewhere) or are relocated from the site by people or other means (e.g., flood events). In Jamaica, ornamental aquatic water plants (e.g., the water hyacinth, *Eichornia crassipes*) have become established in a number of wetlands [including sites recognized by the Convention on Wetlands of International Importance (Ramsar Convention)¹⁴, e.g., Black River Lower Morass] where they are limiting water flow and may thus be contributing to sedimentation, flooding, clogged irrigation pipes, and increased reproductive habitat for disease-causing mosquitoes.

Participants in multi-stakeholder consultations held to develop the NIASSAP and this *Toolkit* believed the following groups of pets to be of the greatest risk of becoming IAS in Jamaica:

- Ornamental fish – a wide variety of species. Growth of the ornamental fish industry in Jamaica and insufficient biosecurity measures in a hurricane-prone region lead to concern that ornamental fish will be introduced into freshwater systems, intentionally and unintentionally, in large numbers. Many of these species are native to tropic and subtropical environments and thus have a high likelihood of being able to establish in Jamaica.
- Parrots – Parrots and related birds¹⁴ are becoming popular as indoor and outdoor (aviary) pets. The rose-ringed parakeet (*Psittacula krameri*) has already become established in Jamaica. Although the consequences are yet to be studied, there is ample concern that they will compete with native species, such as the olive-throated parakeet (*Aratinga nana*), yellow-billed parrot (*Amazona collaria*), and black-billed parrot (*Amazona agilis*). There is also the risk of disease transmission between formerly captive and wild parrots.

¹⁴ Also known as *psittacines*, are birds of the roughly 372 species in 86 genera that make up the order Psittaciformes. This includes birds commonly called parrots, parakeets, macaws, cockatoos, etc.

- Sub/Tropical Reptiles and Amphibians – Small reptiles and amphibians are kept in aquariums, terrariums, and, sometimes, water gardens. They are relatively inexpensive to acquire and maintain, making them popular with people who don't have the finances, space, and time to care for dogs and cats. Many of the species in the trade are native to environments that have climate patterns similar to those found in Jamaica. There is, thus, a high probability that these animals could persist if introduced into Jamaica's natural environment. The red-eared slider (*Trachemys scripta elegans*) turtle is already established in Jamaica's freshwater systems. Of particular additional concern are:
 - Imported amphibians carrying the deadly chytrid fungus, *Batrachochytrium dendrobatidis* (*Bd*) – a microscopic organism that has caused severe declines in amphibian populations, and even species extinctions, in many parts of the world. *Bd* could have devastating impacts on Jamaica's native amphibians, as well as prove costly to those who have amphibians for commercial purposes; entire inventories can be wiped out. Research suggests that at least one species of endemic frog (*Eleutherodactylus orcutti*) has already gone extinct due, at least in part, to *Bd* infection (Holmes et al. 2012).
 - Non-native iguanas that could compete with, spread pathogens and parasites to, or hybridize with the critically endangered Jamaican iguana. Both the green iguana (*Iguana iguana*) and the black spiny-tailed iguana (*Ctenosaura similis*) are in the pet trade and have become invasive in subtropical and tropical locations where they have been released or escaped.
 - An emerging infection disease known as 'snake fungal disease' could pose a threat to the island's endemic snakes. Of particular concern is the Jamaican boa (*Chilabothrus [Epicrates] subflavus*), which is listed as Vulnerable on the IUCN Red List. Further investigation into (a) the potential impacts of snake fungal disease and (b) measures to prevent its introduction and spread are warranted.

Animal Welfare and Human Livelihoods

Animal Welfare

While the *Pet Trade Pathway Toolkit* is being implemented under Jamaica's NIASSAP and the ultimate goal is to minimize the impact of IAS on Jamaica's environment and natural resource-based economy, addressing the pet trade pathway has direct benefits for animal welfare and human livelihoods. This is why the cover page includes the broad statement: "Safeguarding pets. Protecting Biodiversity & Human Livelihoods."

The four primary goals of pet trade pathway prevention are to:

1. Protect the natural environment and economy from the impacts of abandoned or escaped pets (i.e., potentially invasive alien species);

2. Identify ‘high risk’ species in the pet trade and proactively implement measures that effectively minimise this risk;
3. Ensure that pets are carefully selected and well cared for by their owners; and
4. Help pet owners find alternatives to the release of unwanted pets.

The first goal is achieved through the effective implementation of the other three goals.

Measures to minimise the risk of species in the pet trade becoming invasive are discussed in the third section of the *Toolkit* under ‘Well-informed Decision Making.’

Ideally, a prospective pet owner carefully considers how to be a responsible owner and environmental steward before choosing an animal companion. Their intent for a companion, lifestyle, family composition, work schedule, income, health and physical fitness, and even personality will make some pets more suitable than others. In some instance, ‘no pet’ is the most appropriate choice.

When someone brings a pet home, they become its caretaker - it is their responsibility to provide for its every need: proper diet, clean water, adequate housing and shelter, exercise, entertainment, and even emotional well-being. People often fail to consider that:

- While many companion animals are short-lived, others can live for decades and some (turtles and parrots, for example) can live for more than 100 years.
- Although most pets are small and remain small, others will grow to very large sizes and require specialized feeding and housing.
- It is not uncommon for an animal’s temperament to change as it grows older. Playful puppies and kittens may become more aloof. Snakes and other ‘terrarium pets’ that were easily handled, may become more aggressive.
- Whenever multiple pets of different genders are co-housed, there is a likelihood of offspring. The same is true when unspayed dogs and cats are not kept indoors or in adequate enclosures. Producing offspring is a physical challenge for pets and can be a costly expense for pet owners. Unwanted offspring are often abandoned or killed.
- Pets are not a one-time expenditure. Properly caring for a pet requires that money be spent on food, housing/containment, toys and other supplies, and veterinary care over the animal’s lifetime. Money might also need to be spent on property damaged by the pet and fees for licensing, for example.

Activities that promote animal welfare and educate people on how to: a) properly choose and b) care for a pet will reduce the likelihood that a pet owner will abandon it or maintain it in a manner that allows for its escape. It also helps reduce the likelihood that the pet will carry disease or parasites, which makes them less likely to spread invasive ‘hitchhikers’ (e.g., ticks, fleas) to other domestic animals, wildlife, or people.

Human Livelihoods

Although the pet industry is a relatively new commercial enterprise in Jamaica, it is the primary livelihood for a growing number of people. When initially approached about participating in *Toolkit* development, several members of the industry expressed fear and concern that the activity was largely intended to increase regulation and fees, and perhaps put them out of business altogether.

Preventing biological invasion through the pet trade pathway is, however, good for the pet industry. Here are some of the reasons why:

- If imported animals and plants are carrying pathogens and parasites, they can infect the existing inventory of live animals, potentially causing substantial economic loss.
- Some pathogens and parasites can also be transmitted to employees, pet owners, and other pets. Those who sold the infected animals may be liable for damages incurred, garner a poor business reputation, or even have their establishments closed.
- People who acquire a pet and later discover that it was a ‘bad match’ as a companion animal will often blame the retailer for not having better informed them in advance. This will make the pet owner less likely to become a repeat customer and may also undermine the retailer’s reputation in the community.
- Once former pets do become IAS, those persons negatively impacted often become strong activists for a broad ‘anti-pet trade agenda’ that calls for more limited and costly operating permits, tighter regulation, stronger regulatory enforcement, and high penalties and fines when regulations are violated. This can make it impossible for many small retailers and individual breeders to continuing doing business.

GENERAL PRINCIPLES

A Toolkit Comprised of Best Practices

There is no single approach to addressing the pet trade pathway. The most effective efforts employ a combination of complementary activities in the regulatory and non-regulatory contexts. They are also stakeholder inclusive and ‘fit to purpose’ – in other words they are scientifically well-informed and motivated, tailored to reach specific audiences, carefully consider budgets and other logistical realities, monitored and revised as necessary to ensure success, and institutionalized in a manner that reflects a long-term commitment to achieving outcomes.

Appendix II contains a broad ‘toolkit of options’ that have been effectively used around the world to prevent the release or escape of pets, as well as their associated organisms (e.g., parasites, live food, aquarium plants). The fourth section of this document provides a ‘strategy and action plan’ in which a subset of the available approaches (tools) have been selected as priorities for addressing the pet trade pathway in Jamaica. Below we introduce general principles that can be used to help guide development and implementation of Jamaica’s pet trade pathway programme.

1. *Become and stay well-informed.* In order to be credible and effective, approaches to addressing the pet trade pathway need to be based on the best available information. Ideally, this information is science-based and has been through an adequate peer-review process. Assembling the baseline information necessary to address the pet trade pathway includes creating lists of: non-native species already in the country and their documented impacts; non-native species in the pet trade that are regarded as IAS elsewhere; stakeholders and their current attitudes about pets, as well as knowledge of IAS; and relevant regulatory and voluntary measures that are already in place (Appendix I). Risk analyses are typically used to inform and set priorities for decision makers. The second half of this section provides more detailed information on risk analysis as a prevention tool.
2. *Work together.* The pet trade pathway is complex and includes a wide variety of stakeholders. Only by working together can impacts of the pathway be minimised. Ideally, governments work hand-in-hand with non-governmental stakeholders by cooperatively engaging in strategic planning processes, inviting joint review of draft documents, and creating multi-stakeholder implementation teams for specific projects.
3. *Raise awareness of the risks posed by the pet trade pathway.* Simply as a result of being better informed about the potential impacts of IAS, a large number of pet owners and business persons will choose to take the necessary actions to protect animal welfare, the environment, and human livelihoods. Schools, churches, and local community events provide venues for directly reaching groups of people simultaneously, which is both cost-effective and can result in collective, team-oriented engagement in particular activities. The entertainment industry can provide a highly effective means of garnering the

attention and enthusiastic support of thousands of people who decide that it is ‘cool’ to ‘do the right thing.’

4. *Promote and empower responsible choices.* Many people will choose to have pets in their lives. It is important to help them make the best choices *before* they purchase or adopt an animal. Since ‘getting a pet for the child’ is one of the most common motivations for pet purchase and adoption, it is wise to target ‘responsible choice programmes’ to children and their families. Making relevant information available to would-be pet owners at the point of sale/adoption is one of the most effective means of ensuring that thoughtful consideration has gone into pet acquisition. The information provided needs to address not only the implications of choosing certain types of pets (e.g., care/housing requirements, behaviour, costs, longevity), but also provide guidance on ethical and environmentally-friendly alternatives to release of the animal if the owner decides not to keep it.
5. *Implement regulatory and voluntary measures in a complementary manner.* As previously mentioned, there is no ‘one-size-fits-all’ model for addressing the pet trade pathway. Every country differs in terms of its natural environment, trade patterns, development status, evolution of the pet trade as an industry, legal and policy systems, and culture. Regulatory measures require substantial time and money to develop and implement. They can also foster division among stakeholders and a lack of trust in all levels of government. Regulations are, therefore, best used to target highly significant risks and situations in which large-scale voluntary compliance is unlikely. Voluntary measures developed and adopted by pet owners and the pet industry can serve as a form of ‘self-regulation.’ Voluntary measures can stand alone indefinitely when effective; serve as ‘testing grounds’ for the development of more formal regulations; and sometimes exist in parallel to regulations, enabling practices and programmes the flexibility to evolve as new information, methodologies, and financial resources become available.

Well-informed Decision Making

The concept of ‘invasive alien species’ is context specific. An organism may be harmful in one location, but regarded as benign or even beneficial in another. There are even instances in which a species that has become established in large numbers in a new location is rare and endangered in its native habitat. The Burmese python (*Python bivittatus*) is one example. The snake’s native range comprises much of Southeast Asia, but has been undergoing extensive and widespread population declines. The IUCN Red List categorizes it as ‘Vulnerable’ overall, although some populations are considered ‘Critically Endangered.’ Where it has been introduced into the Everglades of south Florida, however, the population is reportedly growing rapidly. It is believed to be a highly invasive predator of native wildlife and a threat to human safety.

Not all species in the pet trade are, therefore, likely to become invasive in every country they are imported, nor every ecosystem in which they are introduced. The risks are not equal.

Risk analysis is a scientific approach to determining the level of risk a specific species poses in a particular context. It is a valuable tool for setting priorities for prevention measures. A risk analysis can, for example, help determine which species are too risky to import, which necessitate more stringent containment regulations, and which pose such little risk of surviving in the wild that they warrant relatively little concern or action.

The World Trade Organisation (WTO) provides the international governance framework for national measures designed to minimise pest and disease risks to importing countries through application of the Sanitary and Phytosanitary Agreement (aka the SPS Agreement). As a WTO member, Jamaica is obligated to comply with the rules and disciplines of WTO agreements when deciding on measures that may restrict international trade.

Whenever Jamaica bases its national measures on standards recognized by fora operating under the WTO umbrella, namely the International Plant Protection Convention (IPPC) and World Organisation for Animal Health (OIE)¹⁵, no separate risk analysis is required. However, a science-based risk assessment is needed to justify a potentially trade-restrictive measure:

- in the absence of an available international standard; or
- if the national measure seeks a higher level of protection than under existing standards.

Because many species of wildlife are not adequately covered by existing international standards, governments need to be able to conduct viable risk analyses for the pet trade pathway.

There are three aspects of a risk analysis: risk assessment, risk management, and risk communication. The outcomes of each component help inform the appropriate response measures and messaging required to effectively address the pet trade pathway.

1. *Risk assessment*¹⁶ is a technical process of evaluating ecological and socio-economic data to determine the level of risk associated with importation of a non-native species and its associated parasites and pathogens. It draws on reliable, technical information collected for a specific species, group of species (taxonomic group) and, sometimes, a specific pathway (e.g., ornamental aquatic plants for use in aquaria). It is tailored to an appropriate biogeographic context (e.g., country, island, ecosystem). The outcome of the risk assessment is expected to be scientifically credible. Unfortunately, a lack of basic biological information on many species frequently result in the answer ‘unknown’ to key questions and obligate decision makers to cope with high levels of uncertainty.

Ideally, risk assessments are:

- based on the best available, reliable information;
- transparent and accountable;

¹⁵ *Guidelines for Assessing the Risk for Non-native Animals Becoming Invasive* are available at: http://www.oie.int/fileadmin/Home/eng/Our_scientific_expertise/docs/pdf/OIEGuidelines_NonNativeAnimals_2012.pdf

¹⁶ The SPS Agreement defines this as ‘the evaluation of the likelihood of entry, establishment or spread of a pest or disease within the territory of an importing Member according to the sanitary or phytosanitary measures which might be applied, and of the associated potential biological and economic consequences’

- fit for the specific purpose (comparable and repeatable);
- explicitly designed to consider uncertainties;
- based on documented risks and not perceived ones (e.g., some people may have a bias against snakes regardless of their likely or real impacts);
- aligned with existing policy processes and capacity where possible (e.g., through cooperation between national agencies that implement risk assessment under international agreements¹⁷).

There is no single risk assessment procedure that has been adopted worldwide, and some countries have decided to develop slightly different risk assessments for different taxonomic groups (i.e. birds, reptiles, amphibians, small mammals, birds, etc.). In general, risk assessments are undertaken following a step-wise approach that mirrors the process of a biological invasion from importation to release/escape into the environment, through to establishment, spread and adverse impact. Ideally, a measure of ‘likelihood’ (probability) is assigned at each step:

- *Importation and likelihood of release/escape.* Ideally, the risk assessment looks at each act of importation as a particular event/context. Depending on the origin and intended use of the organism, the risks are likely to vary.
- *Likelihood of establishment.* The three factors most consistently related to establishment success are: (a) climate suitability (current and future); (b) history of invasiveness (harm) elsewhere; and (c) propagule pressure (i.e. the volume and frequency of live animal imports, and thus possible number of escapes/releases; see Reaser et al. 2008). Other factors related to risk may include, but are not limited to, reproductive rates, predatory and competitive behaviour, and breadth of environmental tolerance (e.g., temperature, moisture, water quality).
- *Likelihood of spread.* Many successful models for spread exist, although these may be difficult to apply in certain cases (e.g., hybrids between wild and domestic animals do not have a natural geographic range to reference). Natural and human-mediated dispersal need to be considered in projections of spread.
- *Likelihood of invasiveness (harmful impact/hazard).* The likelihood of impact and the consequence of the impact (type/scale/degree) need to be evaluated. Ideally, this assessment includes data on the economic impacts of IAS in a manner which informs cost-benefit analyses (benefits of import minus the costs of invasion and the costs of assessment). Realistically, however, this requires a considerable amount of quality data – data which are often not available, even for species in their native ranges. Furthermore, the costs of impacts on biological diversity are largely incalculable.

Risk assessments do need to quantify/categorize the degree of uncertainty associated with each step of the evaluation process. Even in instances of substantial uncertainty, governments need to move forward with an appropriate management response (see

¹⁷ Especially those associated with the International Plant Protection Organisation (IPPC) and World Organisation for Animal Health (OIE)

below¹⁸). Once additional data becomes available, a more complete assessment can be performed and new management options enacted, as necessary.

2. *Risk management* is the analytical process of evaluating and choosing appropriate actions to minimise the identified risks to an acceptable level. What is defined as ‘acceptable’ will vary with context – one government might be willing to take greater risks than another government based on trade value, for example. The competent authority decides whether to authorise a proposed import, the conditions of its importation (if applicable) and any management actions required to minimise risks (e.g., permitting only sterilized animals, or animals of a single gender).

Decisions based on risk assessment outcomes could be part of a country’s regulatory framework and/or part of a self-regulating process (e.g., through an industry code of conduct).

Regulatory decision-making systems need to be independent of proponents of the import, although they might invite all stakeholders to submit relevant information. Typically, risk management options will permit import of the species in question either with no or few conditions, or with stringent permit conditions. In ‘high risk’ circumstances, import may be prohibited and the species also banned from trade within the country.

3. *Risk communication* is the process by which the results of the risk assessment and the identified management options are conveyed to the relevant industry and other stakeholders. Ideally, this process is to foster stakeholder engagement and support for the preventative measures to be taken.

¹⁸ We recommend reviewing information on the ‘precautionary approach’ and ‘precautionary principle’ as addressed by the Convention on Biological Diversity (<https://www.cbd.int>) and in peer-reviewed literature

STRATEGY AND ACTION PLAN

The Strategies contained herein are intended to complement Jamaica’s 2014-2020 National Invasive Alien Species Strategy and Action Plan (NIASSAP). Activities that are included in both documents are marked with *. The Activities were identified during NIASSAP and/or Pet Trade Forum consultations, and guided by the approaches (‘tools’) listed in Appendix II. Participants selected ‘tools’ that they believed to be necessary and feasible for Jamaica to implement in the next six years.

In the tables below, timeline references are as follows: ‘short-term’ means two years for implementation, ‘medium-term’ means four years for implementation, and ‘long-term’ means six years for implementation. ‘Ongoing’ indicates that the activity is an ongoing process that is intended to continue indefinitely. The ‘Coordinating Mechanism’ is to be designated under the NIASSAP for the purposes of ensuring timely and effective implementation of Activities. Acronyms are listed on page 4. A two-page summary, organized by implementation timeframe, can be found in Appendix VII.

Strategy 1: Facilitate NIASSAP Implementation.

| Activity | Lead | Timeline |
|--|------|------------|
| Include pet industry representatives and veterinarians in the IAS Working Group Output: Expansion of IAS Working Group to include additional stakeholders | NEPA | Short-term |

Strategy 2: Prevent, eradicate and control IAS

Strengthen existing and establish new “on-the-ground” programmes¹⁹ to prevent the introduction of IAS, as well as to minimize their spread and impact.

| Activity | Lead | Timeline |
|---|--|------------|
| <i>Cross-cutting</i> | | |
| Implement a comprehensive programme to reduce the risk of biological invasion by non-native parrots ²⁰ , including risk analysis (see Strategy 5)*; establishing and enforcing relevant legal measures on importation, identification, breeding, housing and escape/release (see Strategy 3); public education about making wise pet choices, clipping | NEPA and MoAF with support from expert consultant(s) | Short-term |

¹⁹ Including associated technical approaches and tools, as needed

²⁰Also known as *psittacines*, are birds of the roughly 372 species in 86 genera that make up the order Psittaciformes; this includes birds commonly called parrots, parakeets, macaws, cockatoos, etc.

| Activity | Lead | Timeline |
|--|---|--|
| <p>flight feathers, and proper containment (See Strategy 6); pre-established protocols for eradication</p> <p>Output: Products listed above; eradication and control of non-native parrots and related birds</p> | | |
| <p>Implement a comprehensive programme to reduce the risk of biological invasion via ornamental fish, risk analysis (see Strategy 5)*; establishing and enforcing relevant legal measures on importation, containment, sanitation and escape /release (see Strategy 3); public education about making wise pet choices, sanitation and re-homing (See Strategy 6); pre-established protocols for eradication</p> <p>Output: Products listed above; eradication and control of non-native ornamental fish</p> | <p>NEPA and MoAF with support from expert consultant(s)</p> | <p>Short-term</p> |
| <p><i>Eradication</i></p> | | |
| <p>Develop early detection/rapid response (ED/RR) programme for reporting and eradication non-native species associated with the pet trade</p> <p>Note: Link to any comprehensive national or regional ED/RR programmes that are developed.* A ‘first responder’ team needs to be identified, trained, listed and ranked by capacity in a publicly accessible directory, and provided species identification tools and pre-established protocols. Expand the ‘hotline’ to include a website that enables detailed information to be documented and photos uploaded. The ‘people on the ground’ need to be able to directly report into and receive information from an alert system. Adapt the Wildlife Incident Database to support this programme. Ensure that there is adequate logistical and financial support for responders to work ‘off hours’ by paying overtime or contracting the service out</p> <p>Output: Priority component of national and/or regional ED/RR programme</p> | <p>Coordinating Mechanism</p> | <p>Medium-term</p> |
| <p>Develop and implement a plan for eradicating white-tailed deer (<i>Odocoileus virginianus</i>) from Jamaica*</p> | <p>NEPA and MoFA</p> | <p>Short-term initiation, with potential for long-term</p> |

| Activity | Lead | Timeline |
|--|--|----------------|
| Outputs: White-tailed deer eradicated from Jamaica | | implementation |
| <i>Control</i> | | |
| Assess and improve/expand the lionfish (<i>Pterois spp.</i>) harvesting programme* Output: Lionfish population controlled in coastal waters of Jamaica, coral reef ecosystem and fisherpersons protected | MoFA | Ongoing |
| Continue/expand the programme to control non-native predators of the Jamaican iguana (<i>Cyclura collei</i>)* Output: Jamaican iguana protected | NEPA and UWI | Ongoing |
| Establish national spay/neuter programmes for dogs and cats Note: Will need to include capacity to visit rural communities and provide funding to vets to conduct surgeries and post-surgery care. Link to education/outreach and ‘pride in ownership’ campaigns Output: Improved animal welfare, reduced population of unwanted animals | NEPA supporting relevant animal welfare organizations and veterinarians to provide leadership ²¹ Note: Partner with tourism industry | Long-term |

Strategy 3: Improve Legal and Institutional Capacity

Strengthen and establish legal and institutional frameworks to enable the effective prevention, eradication, and control of IAS at regional, national, and local (site-specific) levels.

| Activity | Lead | Timeline |
|---|------------------------|------------|
| <i>Cross-cutting</i> | | |
| Conduct a thorough review of relevant legal and institutional frameworks in order to assess the capacity of existing instruments, gaps, inconsistencies, needs, and potential barriers to improvement (See Appendix X) ^{22*} Note: (a) Be careful to proceed in a manner that | Coordinating Mechanism | Short-term |

²¹ As a priority, interface with the International Spay/Neuter Network (ISNN; <http://www.spay-neuterjamaica.org/>)

²² To include the Charter of Fundamental Rights and Freedoms (Constitutional Amendment) Act, 2011

| Activity | Lead | Timeline |
|--|--|--|
| <p>ultimately decreases the likelihood of animal smuggling, rather than fostering ‘black market’ activity; (b) consider law and policy in environmental, animal welfare, and human health and safety contexts</p> <p>Output: Report of findings, including recommendations for building legal and institutional capacity</p> | | |
| <p>Based on the aforementioned report, develop and implement a strategy to strengthen and fill the gaps in relevant national, regional, and global frameworks*</p> <p>Output: Publicly available strategy document</p> | Multi-stakeholder team lead by the Coordinating Mechanism | Short-term initiation, implementation ongoing |
| <i>Prevention</i> | | |
| <p>Institutionalize risk analysis as a standardized approach to pre-import decision making*; in the context of the pet trade pathway, prioritize risk analyses for ornamental fish, birds, and reptiles/amphibians</p> | MoAF and NEPA | Short-term |
| <p>Develop a comprehensive ‘pet trade pathway permitting’ approach that allows for relevant activities (e.g., importation, distribution, breeding, sale, ownership, handling) when appropriate biosecurity measures are in place</p> <p>Note: The system needs to be cost-effective for legal imports</p> <p>Output: Effective permit system</p> | <p>NEPA and MoAF</p> <p>Note: Include in review /revision of NRCA Act and Animal (Disease and Importation) Act</p> | Long-term |
| <p>Develop and promote a voluntary IAS codes of conduct (VCoCs) for (a) zoos and aquaria; (b) farms (agriculture and aquaculture); (c) pet stores, breeders, and dealers; (d) pet owners, (e) veterinarians, and (f) eco-tourism industry</p> <p>Note: Take into consideration materials in the Pet Trade Toolkit and VCoCs completed by Anguilla and the Bahamas</p> <p>Output: Publicly available VCoCs and associated</p> | NEPA and MoAF | Short-term initiation to mid-term implementation |

| Activity | Lead | Timeline |
|--|---|-------------|
| promotional campaign(s) | | |
| Allow for breed-specific importation of genetic material Output: Reduced risk of disease transmission associated with movement of live animals | [MoAF] Note: Review/Revise in association with relevant agricultural laws/policies | Medium-term |
| Establish and enforce more rigorous penalties for violations of animal welfare, including animal abandonment ²³ Output: Improved animal welfare | [NEPA and MoAF] | Medium-term |
| <i>Eradication/Control</i> | | |
| Proactively establish the legal framework, authorities, and procedures for the eradication and control of non-native vertebrates and communicate these in a publicly available guidebook (see Strategy 6) ²⁴ Output: Improved legal framework, guidebook | [NEPA and MoAF] | Medium-term |

Strategy 4: Build IAS Information Capacity.

Enable access to and the exchange of reliable information in order to facilitate the prevention, eradication, and control of IAS in a timely and cost-effective manner.²⁵

| Activity | Lead | Timeline |
|--|---------------|-------------------------------------|
| <i>Generating Information</i> | | |
| Conduct baseline surveys of non-native species in Jamaica’s terrestrial, freshwater, and marine ecosystems, placing an emphasis on protected areas and landscapes managed for commercial purposes* Output: Data contributed to the Jamaica IAS database that, as a minimum, includes information on species, species verification (method, expert name), date documented, | NEPA and MoAF | Short-term initiation, then ongoing |

²³ Examine in the context of proposed revisions to the Wild Life Protection Act

²⁴ Will need to include a rapid response fund.

²⁵ Note: To the extent feasible, information will be verified by relevant experts prior to being made publically accessible

| Activity | Lead | Timeline |
|--|------------------------|-------------------------------------|
| specific locality, population size, and reproductive status | | |
| In an ongoing manner, support a ‘citizen science’ initiative that promotes the reporting and verification of non-native ‘pet’ species documented by naturalists (e.g., members of BirdLife Jamaica, Jamaica Naturalist Society, ecotourists) | Coordinating Mechanism | Medium-term |
| See also Strategy 5 | | |
| <i>Mobilizing Information</i> | | |
| Mine relevant literature, specimen collections, and datasets for relevant information* Output: Data contributed to the Jamaica IAS database | IoJ and Ja CHM | Short-term initiation, then ongoing |
| <i>Making Information Accessible, Useful, and Secure</i> | | |
| Expand and adapt Wildlife Incident Database to become part of an ED/RR system and enable information sharing with the Jamaica IAS database Output: Data available for improved decision making and enabling eradication measures | [NEPA] | Short-term |

Strategy 5: Conduct Research and Monitoring.

Facilitate an evidence-based approach²⁶ to the prevention, eradication, and control of IAS through information synthesis, scientific research, and ecological monitoring.

| Activity | Lead | Timeline |
|---|------------------------|-------------------------------------|
| <i>Cross-cutting Catalytic Information</i> | | |
| Create and maintain a ‘watch list’ of non-native species documented in Jamaica* Output: A publically-accessible list of non-native species documented in Jamaica that can be used as a point of reference for informing policy and | Coordinating Mechanism | Short-term initiation, then ongoing |

²⁶Integration of: (a) technical expertise/expert opinion, (b) scientific research findings, and (c) stakeholder values to provide high-quality information for NIASSAP implementation

| Activity | Lead | Timeline |
|---|--|-------------------------------------|
| management decisions, as well as developing research and monitoring programs | | |
| Create and maintain a ‘watch list’ of non-native species not yet documented in Jamaica, but known to be harmful in the Caribbean region and countries of major trading partners* Output: A publically-accessible list of species of high risk of introduction into Jamaica that can be used as a point of reference for prioritizing risk analyses, informing policy, and the focusing early detection/rapid response programs | Coordinating Mechanism | Short-term initiation, then ongoing |
| <i>Specific Priority Projects</i> | | |
| As a priority, conduct risk analyses of: <ul style="list-style-type: none"> Pet trade pathway: birds, ornamental fish, and reptiles/amphibians* Output: Scientifically-credible, publicly accessible risk analyses that can be used to inform regulatory decisions and voluntary codes of conduct | NEPA, MoAF, and relevant technical consultant(s) | Short-term |
| Explore the feasibility of promoting/captive breeding native species for the pet trade in lieu of the importation of non-native species ²⁷ | NEPA and MoAF with support of expert consultants | Long-term |

Strategy 6: Ensure effective communication, education, and outreach (CEO)

Strengthen and expand projects that raise awareness of the IAS issue and their potential impacts, as well as inspire and empower stakeholders to take the appropriate action to prevent, eradicate, and control IAS.

| Activity | Lead | Timeline |
|--|---|-------------------------------------|
| <i>Species- and Site-Specific</i> | | |
| Strengthen and expand the lionfish social marketing project* Output: Control of lionfish populations to the extent logistically feasible; Strategic plan, annual progress monitoring reports, and associated CEO products | NEPA and MoAF | Ongoing |
| Develop and implement separate but complementary ‘Do not release’ and associated | NEPA with support with social marketing | Short-term initiation, then ongoing |

²⁷ Include review of issues related to regulatory framework needs and enforcement capacities (e.g., in the context of the Wild Life Protection Act), population viability analysis, habitat degradation/destruction, zoonotic disease

| Activity | Lead | Timeline |
|---|---|-----------------------|
| <p>animal welfare campaigns for ornamental fish, birds, and reptiles/amphibians</p> <p>Output: Campaign plans and products, and annual progress monitoring reports</p> | <p>consultant(s)</p> <p>As a minimum:</p> <ul style="list-style-type: none"> • ‘Treat Me Like a Dog’ • ‘1, 2, 3s of Pet Ownership’ • ‘It’s Jus Not Cool’ <p>See Appendix III</p> | <p>implementation</p> |
| <p>Produce and/or make available fact sheets on particular species/breeds</p> <p>Output: Fact sheets for distribution through the pet trade</p> | <p>Coordinating Mechanism</p> | <p>Short-term</p> |
| <p>Produce on-line and hard copy identification tools for species of IAS concern to Jamaica</p> <p>Output: Tools for use by government officials and the private sector</p> | <p>Coordinating Mechanism</p> | <p>Medium-term</p> |
| <p>Following risk analysis, produce ‘unwanted posters’ that have picture of animals that Jamaica does not want people to have as pets due to IAS risks</p> | <p>Coordinating Mechanism</p> | <p>Medium-term</p> |
| <p>Produce a guidebook on for vertebrate species eradication and control in Jamaica</p> <p>Output: Tool for use by the official ‘first responders’ to be incorporated into an ED/RR programme</p> | <p>NEPA and MoAF with support for expert consultants</p> | <p>Medium-term</p> |
| <p>Produce a ‘public-friendly’ guidebook for treating parasites of dogs and cats</p> <p>Output: Reduced disease risk, improved animal welfare</p> | <p>NEPA in collaboration with Veterinary Services supporting relevant technical experts</p> | <p>Short-term</p> |

Strategy 7: Build Capacity

Strengthen the capacity of individuals and institutions to prevent, eradicate, and control IAS.

| Activity | Lead | Timeline |
|---|-------------|--|
| <p><i>Training Courses</i></p> | | |
| <p>Engage in the Green Customs Initiative (CGI) in order to improve the capacity of customs officer</p> | <p>MoAF</p> | <p>Short-term initiation, then ongoing</p> |

| Activity | Lead | Timeline |
|--|-----------------|-------------|
| to prevent IAS from entering Jamaica* | | |
| <p>Train inspectors to use all available profiling information and technologies to look for smuggled vertebrates entering via the pet trade pathway</p> <p>Note: Integrate guidance into the standard training manual; give particular attention to inspecting private vessels for smuggling animals</p> | [NEPA and MoAF] | Medium-term |

Strategy 8: Fundraising plan

Develop and implement a comprehensive fundraising plan that will secure adequate financing for NIASSAP activities.

| Activity | Lead | Timeline |
|---|------------------------|---------------------------------|
| <p>Conduct a cross-cutting analysis of: a) funding needs and associated timelines for implementation of the NIASSAP and b) potential fundraising opportunities to meet monetary needs*</p> <p>Note: Explore fundraising opportunities through a variety of means, including grants²⁸; crowd funding; revenue from fees, fines, and secondary industry products; and public-private partnerships</p> <p>Output: Report on funding needs and opportunities to meet those needs</p> | Coordinating Mechanism | Short-term with annual updating |
| <p>Explore application of the Tourism Enhancement Fund</p> <p>Output: Summary of findings incorporated into the aforementioned report</p> | Coordinating Mechanism | Short-term |

²⁸ In addition to private funding foundations, explore opportunities for funding from development assistance agencies and the private sector

APPENDIX

Appendix I: Relevant Laws, Agreements, and International Organisations

National Laws and Regulations²⁹

| Regulation/Year of issue | Legal Area | Summary of scope relevant to IAS in Jamaica; URL |
|---|-------------------------|--|
| Animal (Disease and Importation) Act, 1948 | Agriculture | Control of animal diseases (e.g., procedures relevant to segregation, ports of entry procedures, slaughter, disposal, compensation) and animal importation issues (e.g., prohibition of birds, regulations, licensing, quarantine). |
| Customs Act, 1941 | Tax | Inspection duties, regulations, and procedures to be followed by Customs officers at ports of entry. |
| Endangered Species (Protection, Conservation and Regulation of Trade) Act, 2000 | Environment | Broad endangered species regulations relevant to trade, possession, breeding/propagation, identification/marketing, and transportation. Includes four 'Schedules' listing regulated species. |
| Fishing Industry Act, 1976 | Agriculture | Provides for regulation of the fishing industry, including licensing and fisheries protection. |
| Maritime Areas Act, 1996 | International Relations | Declares Jamaica to be an archipelagic State and makes provision with respect to certain Maritime Areas of Jamaica and their related issues (e.g., vessel routes, activities, pollution). |
| Natural Resources Conservation Authority (NRCA) Act, 1991 | Environment | Addresses a broad range of conservation-related issues including parks and protected area designation, environmental impact statements, effluent discharge licensing, and water pollution. See Permit and License Regulation (1996): Permits are required for the introduction of new species (flora and fauna) into the country. The use of IAS and other non-native species in landscaping requires special permits which must be obtained in writing from the Authority. |
| Plants (Quarantine) Act, 1994 | Agriculture | Makes provision for the effective control of the importation of plants, plant products and articles which pose a threat of injurious plant pests (including IAS). Explicitly addresses inspection, quarantine, treatment, and disposal. |
| Public Health Act – Nuisance Regulation 1985 | Health and Safety | Enables the promotion of public health issues and preventing the spread of communicable and epidemic diseases (including those which are IAS or are vectored by IAS). |
| Wild Life Protection | Environment | Makes broad provision for the protection of certain |

²⁹ For additional information, see: <http://moj.gov.jm/laws?title>

| Regulation/Year of issue | Legal Area | Summary of scope relevant to IAS in Jamaica; URL |
|--------------------------|------------|--|
| Act, 1945 | | <p>wild animals, birds and fish and for other matters related to their survival and welfare. Issues addressed include hunting, gaming, poaching, collecting, protecting waters from effluent discharge.</p> <p>Note: New suggestions for the amendment of this act have been proposed which would make provisions for the management of IAS.</p> |

Regional Agreements and Organisations

| Name of Agreement/ Organization | Legal Area | Summary of scope relevant to IAS in Jamaica; URL |
|--|-------------|---|
| <i>Agreement</i> | | |
| <p>Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, Cartagena de Indias (Cartagena Convention) 1987 [Date of Entry into Force]</p> | Environment | <p>The ‘Cartagena Convention’ is a comprehensive, umbrella agreement for the protection and development of the marine environment. It provides the legal framework for cooperative regional and national actions in the Wider Caribbean Region.</p> <p>It is supported by three protocols. Two of them address marine pollution. The third, Protocol Concerning Specially Protected Areas and Wildlife (SPA) in the Wider Caribbean Region, has direct relevance to IAS prevention and management.</p> <p>http://www.cep.unep.org/cartagena-convention</p> |
| <i>Organisation</i> | | |
| Caribbean Plant Protection Commission | Agriculture | <p>Originally designated to assist region-level coordination and implementation of decisions and activities associated with the International Plant Protection Convention (IPPC). It is currently in transition to a new organization and does not have a work programme.</p> <p>https://www.ippc.int/ar/partners/regional-plant-protection-organizations/caribbean-plant-protection-commission</p> |

International Agreements and Organisations

| Name of Agreement or Organisation | Lead Area | Summary of scope relevant to IAS in Jamaica |
|--|--------------------|--|
| <i>Agreements</i> | | |
| Convention on Biological Diversity (CBD) 1993 [Date of Entry into Force] | Environment | United Nations convention with a broad focus on biodiversity conservation. Includes an Article (8h) and Aichi Biodiversity Target (#9) focused on IAS prevention, eradication, and control, as well as numerous relevant decisions. http://www.cbd.int |
| Convention on International Trade in Endangered Species of Fauna and Flora (CITES) 1975 [Date of Entry into Force] | Environment | Although explicitly focused on endangered species conservation in the trade context, includes multiple Resolutions (e.g., COP 14 Resolutions 10.17, 12.10 and 13.10) and Decisions (e.g. 15.57 and 15.58) relevant to preventing the movement of IAS through trade. http://www.cites.org |
| Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters (London Convention) 1972 [Date of Entry into Force] | Environment | The "London Convention" is one of the first global conventions to protect the marine environment from human activities and has been in force. Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter. http://www.imo.org/OurWork/Environment/SpecialProgrammesAndInitiatives/Pages/London-Convention-and-Protocol.aspx |
| Convention on Wetlands of International Importance (Ramsar Convention) 1975 [Date of Entry into Force] | Environment | The 'Ramsar Convention' is an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of their Wetlands of International Importance and to plan for the "wise use", or sustainable use, of all of the wetlands in their territories. Resolutions VII.14 and VIII.18 focus on the prevention, control, and eradication of IAS in wetland ecosystems. http://www.ramsar.org |
| International Plant Protection Convention (IPPC) 1952 [Date of Entry into Force] | Agriculture, Trade | The IPPC aims to protect cultivated and wild plants by preventing the introduction and spread of pests, including IAS. IPPC activities include standard setting, communications, capacity building, and dispute resolution. http://www.ippc.int |
| United Nations Convention on Law of | Environment | UNCLOS lays down a comprehensive regime of law and order in the world's oceans and seas establishing |

| Name of Agreement or Organisation | Lead Area | Summary of scope relevant to IAS in Jamaica |
|--|--------------------------|---|
| the Sea (UNCLOS) 1994 [Date of Entry into Force] | | <p>rules governing all uses of the oceans and their resources. It enshrines the notion that all problems of ocean space are closely interrelated and need to be addressed as a whole. Article 196 requires nations to "take all measures necessary" to prevent the intentional or accidental introduction of non-native species to a new part of the marine environment.</p> <p>http://www.un.org/depts/los/convention_agreements/convention_overview_convention.htm</p> |
| <i>Organisations</i> | | |
| <p>Food and Agriculture Organisation of the United Nations (FAO)</p> <p>Multiple agreements have been established, each with different dates of entry into force</p> | Agriculture | <p>Multiple divisions are relevant, especially the Fisheries and Aquaculture Department. Several codes of practice, guidelines, reports, and datasets contain information relevant to IAS prevention and management.</p> <p>http://www.fao.org</p> |
| <p>International Maritime Organisation (IMO)</p> <p>Multiple Conventions have been established, each with different dates of entry into force</p> | Environment, Trade | <p>Member countries negotiate, develop, agree, adopt, ratify, enter into force and administer international Conventions as well as other legal instruments on maritime safety, maritime security and marine pollution. The IMO has been focused of prevention of IAS movement through ballast water, but may also be expanding its scope of engagement to include hull fouling.</p> <p>http://www.imo.org</p> |
| <p>World Organisation for Animal Health (OIE)</p> | Agriculture, Environment | <p>The OIE plays a role of international leadership in controlling pathogens and disease vectors, as relevant to the diseases listed by the OIE, for terrestrial and aquatic animals. The OIE international standards help to prevent the entry and spread of listed animal diseases via international trade, and also provide a basis for early detection and effective action to control and eliminate listed diseases.</p> <p>http://www.oie.int</p> |
| <p>World Trade Organisation (WTO)</p> <p>Multiple agreements have been established, each with different dates of entry into force</p> | Trade | <p>One of the WTO trade agreements named the Agreement on the Application of Sanitary and Phytosanitary Measures (the "SPS Agreement"), addresses measures that governments may take to minimise the risks to human, plant and animal life and health that may be associated with the movement of goods through trade, in particular risks of unsafe food, or the introduction or spread of animal diseases or plant</p> |

| Name of Agreement or Organisation | Lead Area | Summary of scope relevant to IAS in Jamaica |
|-----------------------------------|-----------|--|
| | | <p>pests. The SPS Agreement also permits governments to impose measures to protect their territory from other potential damages from the entry, establishment or spread of pests. These provisions were intended to address measures that governments may take to minimise the spread, through trade, of IAS.</p> <p>http://www.wto.org</p> |

Appendix II: The Toolkit: Full Range of Options

Here we provide a wide-range of best management practices (‘tools’) that can help minimise the risk of alien (non-native) species being released or escaping into the natural environment through the pet trade pathway. The list is in alphabetical order and does not reflect priorities or procedural steps.

Many of these tools are ‘scalable’ to different socio-economic and cultural contexts. They can be implemented through regulatory and/or non-regulatory measures. Some tools will be more effective than others in specific contexts, depending on cultural norms, budgets, and the ‘maturity’ of the pet trade as an industry.

1. Animal Inspection, Acclimation, and Quarantine Protocols/Plans

At various stages (e.g., import, distribution, retail) along the pet trade pathway animals are:

- Thoroughly inspected for external parasites, signs of disease, and ‘hitchhikers’ (e.g., other animals or plants, soil) in order to minimise the risk of biological invasion. [Note: housing and shipping containers are inspected as well]
- Acclimated to specific husbandry conditions in order to reduce stress factors which could make them more susceptible to pathogens and parasites.
- Quarantined or otherwise isolated to enable: a) further inspection overtime, b) containment of potentially infectious agents, and c) treatment of issues of concern.

2. Biosecurity Measures: Housing, Packaging, and Handling

- Promote/require secure containment measures that will effectively prevent pets (as well as associated pathogens, parasites, or other hitchhikers) from escaping from commercial facilities, as well as during transport and handling.
- Institute regulatory and/or voluntary inspections of facilities and transport/handling procedures in order to ensure best practices for biosecurity are being implemented.
- If feasible, provide technical and financial support for the implementation of biosecurity measures through small business and development programmes.

3. Codes of Conduct/Practice

- Provide a list and description of actions that can be taken by the industry and/or consumers to minimise the risk of pets being abandoned or escaping. In some cases (e.g., ornamental water gardens), the codes may also address aquatic plants and hitchhikers.
- Encourage industry and hobbyist groups to customize and adopt these codes of conduct as voluntary, self-regulated policies and guidance documents.

- At the point of sale, encourage customers to adopt a personal code of conduct in which they agree to keep the pet secured and never release it into the natural environment (see Customer Record Keeping).

4. Consumer Education/Outreach Campaigns

Use a comprehensive, social-marketing approach to:

- Raise public awareness of the potential environmental, economic, and/or human health implications of pet escape and abandonment (i.e. the invasive alien species issue).
- In order to reduce the likelihood that there will be a need/desire to give up a pet, educate consumers on actions they can take to ensure a mutually beneficial relationship with their pets (i.e. making a good choice when selecting a pet and knowing how to care for it properly; See Pet Care Fact Sheets).
- Educate consumers on actions they can take as alternatives to pet abandonment if they do need/desire to give up their pet.

5. Customer Record Keeping

- Document customer purchase and contact information so as to increase the likelihood that you contact the customer if there is a need to inform him/her of relevant information (e.g., disease risk).
- At the time of purchase, obtain written customer acknowledgement (signature) indicating that they: a) understand the specific care needs, risks, etc. relating to the pet purchased and b) will keep the pet well secured and never release the pet into the natural environment.

6. Industry Education/Outreach Campaigns

- Raise awareness within the pet industry (e.g., importers, distributors, retailers) of invasive alien species issues.
- Educate members of the pet industry on actions they can take to minimise the risk of biological invasion.
- Empower members of the industry to educate consumers on invasive alien species issues and responsible behaviors (e.g., pet choice, care, and placement).

7. Labeling

- At the point of sale, provide adequate information on the care requirements of each type of pet so that potential owners can make well-informed decisions about the suitability of this animal for their lifestyle and budget. As a minimum, indicate whether animals are: a) easy care/low cost or if b) they require specialised care and substantial financial and/or time investment.

8. Listing

Based on scientific assessments (see Risk Analysis), create a list of species in the pet trade:

- Known or likely to become invasive (i.e. black list, red list, or prohibited list). These species are typically regulated or otherwise discouraged in the trade;
- Unlikely to become invasive or already so widespread in the environment that control is not feasible (i.e., white list, green list, or approved list). These species are generally traded without regulation, and their sale/ownership may be encouraged as an alternative to species on black lists or grey lists; and/or
- For which there is not enough information to determine risk of invasiveness (i.e. grey list). These species require more in-depth scientific analysis in order to determine appropriate risk management strategies.

9. Permits/Registration

- Require permits for the trade, breeding, and/or possession of certain species of pets that have the potential to become invasive if released into the natural environment. Permits may pertain to the industry and/or pet owners at national and/or subnational levels.
- Use fees and fines from pet permits to support education/outreach campaigns.
- Require that certain types of pets (e.g., dogs, parrots, large snakes) be marked (e.g., tagged or banded) with a unique identification number and registered with a local authority so that the ownership and location of the animal can be referenced if the animal escapes or is released into the natural environment.

10. Pet Care Fact Sheets.

- Prior to purchase, provide pet owners with information on the proper care of specific types of pets so that they can: a) determine if that species is the best choice of a pet and b) keep the pet healthy and adequately housed.
- When feasible, ensure that the fact sheets are available in hard copy (at time of purchase) and electronically (for later reference, or for review prior to selecting a pet).

11. Pride in Ownership Campaigns.

- As a complement to or part of customer education/outreach campaigns, develop ‘pride campaigns’ that encourage individuals and communities to take responsibility for domestic animals, especially free-ranging dogs, cats, and livestock.
- In low income communities, work with animal welfare groups to provide free or low-cost care (esp. Spay/Neuter Programmes) to people who can demonstrate pet ownership/responsibility (e.g., collars and tags for dogs, ear tags for livestock, bands on bird legs, and/or based on the animal’s behavior and health).

12. Re-homing Programmes.

- Facilitate the ability for owners to find responsible homes for unwanted pets. Incorporate this information into education/outreach campaigns.
- Establish and/or support rescue and adoption programmes for abandoned pets, and encourage people to adopt unwanted animals rather than support breeding of surplus animals.

13. Risk Analyses and Screening.

- In order to determine if a thorough risk analysis is warranted and/or when financial and time resources are extremely limited, conduct a basic risk ‘screening’ that addresses questions such as: Has the species been documented as being harmful in similar ecological contexts? Is there evidence that the species is already harmful in the country/ecosystem of concern? Use the outcome of the screening to determine next steps for research, policy, and/or code of practice.
- Use science-based approaches to conduct a credible risk analysis of all potential invasive alien species in the pet trade, i.e. to determine how likely a species is to become invasive if it is introduced into the natural environment and what can be done to minimise this risk. A risk analysis involves three components: risk assessment, risk management and the overarching task of risk communication.
- Promote ‘low risk pets’ and discourage (through law/policy, education/outreach) ‘moderate to high risk pets.’

See page 4 of this document for more information screening and risk analysis.

14. Same Gender Programmes.

- For species that pose a moderate risk of becoming invasive (see Risk Analysis and Screening), limit importers (individuals, commercial/private business, and public institutions) to the importation of a single gender.
- Require/encourage retailers to provide only same gender (male or female) animals to pet owners (consumers) in order to eliminate unwanted matings which could lead to pet overpopulation. This tool is particularly useful for the management of small mammals and some birds.

15. Sanitation Policy and Education.

- Strongly discourage/prohibit the practice of cleaning pet cages, supplies, and other equipment in a manner that enables waste (and associated pathogens, parasites, seeds, eggs, etc.) to enter the natural environment.
- Establish policies and education/outreach programmes to prevent beaches, parks, and other outdoor public recreation areas from becoming contaminated with dog and cat feces.
- Establish, maintain, and promote guidelines and facilities for the disposal of deceased pets.

- Incorporate best practices for sanitation into relevant biosecurity, codes of conduct, education/outreach, and permit initiatives.

16. Spay/Neuter Programmes.

- For species that pose a substantial risk of becoming invasive (see Risk Analysis and Screening), limit importers (individuals, commercial/private business, and public institutions) to the importation of animals that have been spayed/neutered prior to importation.
- Require/encourage the establishment of spay/neuter animals at points of sale and/or offer low-cost public programs in order to: a) eliminate unwanted matings which could lead to pet overpopulation and b) enable owners to house animals of opposite gender together, which can reduce risk of pet-pet aggression and thus the need for rehoming.

17. Feral Animal Removal³⁰

- Provide guidelines and programmes for the removal of feral animals from natural environments, placing a priority on sites hosting threatened/endangered species. This approach requires careful consideration of animal welfare and human health/safety issues. Success is likely best achieved through partnerships involving national and local governments with non-profit animal welfare organizations (local to international).
- Ideally, combine the feral animal removal programme with pet rehoming programmes that includes education/outreach on responsible pet care (see 19).

18. Amnesty Events/Programmes

- Establish events and/or ongoing programmes that encourage people to turn illegal and unwanted pets over to the proper authorities without penalty. Ideally, these event/programmes are coupled with education/outreach and rehoming initiatives.

19. Rehoming Events/Programmes

- Support qualified organizations in their efforts to provide facilities and networking for the rehoming of unwanted pets. Depending on the type of pet, these activities may be coordinated through professional animal welfare organizations (esp. for dogs, cats, parrots) or amateur hobbyist groups (e.g., an ornamental fish or reptile club).

³⁰ Success is likely best achieved through partnerships involving national and local governments with non-profit animal welfare organizations (local to international).

Appendix III: New Social Marketing Campaigns

A. *Treat Me Like A Dog*

Issue: Dogs and other pets are often treated poorly in Jamaica; lack of veterinary care, physical abuse, and abandonment have been common practices for decades. Animal welfare is, however, a growing social concern. Fostering animal welfare is one of the most important approaches Jamaicans can take to preventing the introduction of IAS. Pets that are well cared for are less likely to transmit disease or parasites and tend to be kept under conditions that prevent their escape. Furthermore, people who are responsible for their pets, find them good homes when they are no longer able to keep them.

Response: The ‘*Treat Me Like A Dog*’ campaign will promote animal welfare by spreading the message that “dogs and other pets deserve to be treated so well that people are envious.” Professionals in dog-related industries (e.g., breeders, distributors, boarding kennels, groomers, trainers) and hobbyist groups (e.g., breed-specific clubs) will be invited to take on leadership roles in campaign design and implementation.

B. *1,2,3s of Pet Ownership*

Issue: One of the most effective ways to prevent the introduction of harmful, non-native animals is to promote responsible pet ownership.

Response: The ‘*1, 2, 3s of Pet Ownership*’ campaign will spread a three-part message: 1) *Be smart* (Think carefully before getting a pet. Choose a pet that fits your lifestyle and budget), 2) *Take care* (Give your pet the care it requires to be happy and healthy), and 3) *Rehome, never release* (If you can no longer keep your pet, find it a good home). The slogan “*Be good to your pet. Be good to our environment*” will be used to succinctly link pet welfare to environmental conservation. The campaign will target children, church congregations and civic groups, as well as those attending public social events (e.g., festivals, sports). The entertainment industry will be invited to provide a key role in campaign implementation. **The first campaign poster was release in March 2014 (URL?).**

C. *It Jus Ain’t Cool*

Issue: Smuggling has been identified as one of the primary ways in which non-native animals are entering Jamaica, at both airports and seaports. Animals are being illegally brought into the country for resale (as a commercial enterprise) and personal possession (to become pets). Not only is import of these animals a crime, it can pose substantial risks to human and health. Many illegally transported animals are abused and do not receive proper veterinary care - they may be carrying pathogens or parasites to which humans and other animals (pets and livestock) are susceptible.

Response: The ‘*It Jus Ain’t Cool*’ campaign will spread the message that: 1) it is not socially acceptable to smuggle animals into Jamaica, 2) animal smuggling can cause substantial harm to

people and animals, and 3) it is illegal. The campaign will be implemented at ports of entry and engage the tourist industry.

Appendix IV: Strategy and Action Plan Summary

Activity leads are listed in brackets. Acronyms can be found on page 4.

Short-term (Two years to implement)

| |
|--|
| Include pet industry representatives and veterinarians in the IAS Working Group [NEPA] |
| Implement a comprehensive programme to reduce the risk of biological invasion by non-native parrots ³¹ , including risk analysis (see Strategy 5)*; establishing and enforcing relevant legal measures on importation, identification, breeding, housing and escape/release (see Strategy 3); public education about making wise pet choices, clipping flight feathers, and proper containment (See Strategy 6); pre-established protocols for eradication [NEPA and MoAF with support from expert consultant(s)] |
| Implement a comprehensive programme to reduce the risk of biological invasion via ornamental fish, risk analysis (see Strategy 5)*; establishing and enforcing relevant legal measures on importation, containment, sanitation and escape/release (see Strategy 3); public education about making wise pet choices, sanitation and rehoming (See Strategy 6); pre-established protocols for eradication [NEPA and MoAF with support from expert consultant(s)] |
| Develop and implement a plan for eradicating white-tailed deer (<i>Odocoileus virginianus</i>) from Jamaica [NEPA and MoAF; May require long-term implementation] |
| Conduct a thorough review of relevant legal and institutional frameworks in order to assess the capacity of existing instruments, gaps, inconsistencies, needs, and potential barriers to improvement [Multi-stakeholder team led by the Coordinating Mechanism] |
| Based on the aforementioned report, develop and implement a strategy to strengthen and fill the gaps in relevant national, regional, and global frameworks [Multi-stakeholder team lead by the Coordinating Mechanism; Implementation of report ongoing] |
| Institutionalize risk analysis as a standardized approach to pre-import decision making*; in the context of the pet trade pathway, prioritize risk analyses for ornamental fish, birds, and reptiles/amphibians [MoAF and NEPA] |
| Develop and promote a voluntary IAS codes of conduct (VCoCs) for (a) zoos and aquaria; (b) farms (agriculture and aquaculture); (c) pet stores, breeders, and dealers; (d) pet owners, (e) veterinarians, and (f) eco-tourism industry [NEPA and MoFA; May require mid-term implementation] |
| Conduct baseline surveys of non-native species in Jamaica’s terrestrial, freshwater, and marine ecosystems, placing an emphasis on protected areas and landscapes managed for commercial purposes [NEPA and MoAF; Ongoing after initiation] |
| Mine relevant literature, specimen collections, and datasets for relevant information [IOJ and Ja CHM; Ongoing after initiation] |
| Expand and adapt Wildlife Incident Database to become part of an ED/RR system and enable |

³¹Also known as *psittacines*, are birds of the roughly 372 species in 86 genera that make up the order Psittaciformes; this includes birds commonly called parrots, parakeets, macaws, cockatoos, etc.

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| information sharing with the Jamaica IAS database [NEPA] |
| Create and maintain a ‘watch list’ of non-native species documented in Jamaica [Coordinating Mechanism; Ongoing after initiation] |
| Create and maintain a ‘watch list’ of non-native species not yet documented in Jamaica, but known to be harmful in the Caribbean region and countries of major trading partners [Coordinating Mechanism; Ongoing after initiation] |
| As a priority, conduct risk analyses of pet trade pathway (birds, ornamental fish, and reptiles/amphibians) and horticulture pathway (bamboo) [NEPA, MoAF, and relevant technical consultant(s)] |
| Develop and implement separate but complementary ‘Do not release’ campaigns for ornamental fish, birds, and reptiles/amphibians [NEPA with support with social marketing consultant(s); ongoing after implementation] |
| Produce and/or make available fact sheets on particular species/breeds [Coordinating Mechanism] |
| Produce a ‘public-friendly’ guidebook for treating parasites of dogs and cats [NEPA in collaboration with Veterinary Services supporting relevant technical experts] |
| Engage in the Green Customs Initiative (CGI) in order to improve the capacity of customs officer to prevent IAS from entering Jamaica [Coordinating Mechanism] |
| Conduct a cross-cutting analysis of: a) funding needs and associated timelines for implementation of the NIASSAP and b) potential fundraising opportunities to meet monetary needs [Coordinating Mechanism; Annual updating] |
| Explore application of the Tourism Enhancement Fund and Forest Conservation Fund [Coordinating Mechanism] |

Medium-term (Four years to implement)

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| Develop early detection/rapid response (ED/RR) programme for reporting and eradication non-native species associated with the pet trade [Coordinating Mechanism] |
| Allow for breed-specific importation of genetic material [MoAF] |
| Establish and enforce more rigorous penalties for violations of animal welfare, including animal abandonment [NEPA and MoAF] |
| Proactively establish the legal framework, authorities, and procedures for the eradication and control of non-native vertebrates and communicate these in a publicly available guidebook [NEPA and MoAF] |
| In an ongoing manner, support a ‘citizen science’ initiative that promotes the reporting and verification of non-native ‘pet’ species documented by naturalists (e.g., members of BirdLife Jamaica, Jamaica Naturalist Society, ecotourists) [Coordinating Mechanism] |
| Produce on-line and hard copy identification tools for species of IAS concern to Jamaica [Coordinating Mechanism] |

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| Following risk analysis, produce ‘unwanted posters’ that have picture of animals that Jamaica does not want people to have as pets due to IAS risks [Coordinating Mechanism] |
| Produce a guidebook on for vertebrate species eradication and control in Jamaica [NEPA and MoAF with support for expert consultants] |
| Train inspectors to use all available profiling information and technologies to look for smuggled vertebrates entering via the pet trade pathway [NEPA and MoAF] |

Long-term (Six years to implement)

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| Develop a comprehensive ‘pet trade pathway permitting’ approach that allows for relevant activities (e.g., importation, distribution, breeding, sale, ownership, handling) when appropriate biosecurity measures are in place |
| Explore the feasibility of promoting/captive breeding native species for the pet trade in lieu of the importation of non-native species [NEPA and MoAF with support of expert consultants] |

Ongoing

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| Assess and improve/expand the lionfish (<i>Pterois spp.</i>) harvesting programme [MoAF] |
| Continue/expand the programme to control non-native predators of the Jamaican iguana (<i>Cyclura collei</i>) [NEPA and UWI] |
| Strengthen and expand the lionfish social marketing project [NEPA] |

Appendix V: Recommended Reading

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