

Bahamas Invasive Species Field Guide

Identification of Plant and Animal Invasives

Department of Marine Resources
2013



Introduction

This Field Guide has been produced by the Department of Marine Resources to assist technical officers, protected area managers and the general public to identify critical invasive species in The Bahamas. The species included are taken from the National Invasive Species Strategy (NISS) for The Bahamas.

The scientific name, common name and photos of each species is provided as well as:

- Description – The characteristics that can be used to identify the species. Those provided are usually visible externally without a magnification lens.
- Similar species – Species that are similar in appearance to or may be mistaken for the invasive species.
- Habitat – A general description of the habitat in which the species could be found.
- Native range – The continent or region of the world where the species is native.
- Introduced range – The area which a species occupies that is outside of its native range. It should be noted that the range of invasive species continuously changes as they continue to be introduced and spread.
- Pathway of introduction and spread – The means through which a species can be transferred from one location to another by human-related activities (such as pet trade and transport) and by natural means (such as migration and water currents).
- Impacts – A general description of potential or documented impacts.

This Field Guide is an output of the project, *Mitigating the Threats of Invasive Alien Species in the Insular Caribbean* (MTIASIC).

Bahamas Invasive Species Field Guide: Identification of Plant and Animal Invasives

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Family Casuarinaceae

Australian Pine

Casuarina equisetifolia

Other Common Names: Casuarina, Beefwood

NISS Category: Control

Description

Casuarina is a tree species now occurring throughout The Bahamas on every island. It is considered to be invasive because it can take over natural systems and outcompete native species until there are monotypic stands (i.e. only Casuarinas). Casuarinas can invade natural systems including dunes, wetlands, and rocky shores as well as human disturbed areas.

Adult Casuarina trees range in height from 65 - 150 feet (20 - 46 m). Casuarinas produce cone-like fruits with each woody segment (follicle) producing numerous small windborne seeds. Each year a fully mature tree can produce tens of thousands of seeds. The seeds are resistant to salt water and are transported easily along shorelines by wave action and by the wind from island to island and invades new beaches rapidly.

The trees are fairly stout-trunked, rough-barked, fast-growing trees with nearly erect or semi-spreading main branches, slim branchlets, and tufts of deciduous, gray-green, segmented "needles".

Habitat

Coastal, sandy beaches as well as interior, particularly areas disturbed by activities, such as clear cutting by bulldozers.

Native range - Australia

Introduced range

Populations found in The Bahamas and other countries in the Wider Caribbean, South Pacific, Hawaii, and Florida.

Pathways of introduction and spread

Natural dispersal (non-biotic): *Casuarina equisetifolia* produces large numbers of small winged seeds that are easily dispersed by the wind. They are also salt-tolerant and can move along shorelines and between islands in sea water, being dispersed by ocean currents.

Accidental Introduction: Casuarinas occur along shorelines invading dunes, but they also like disturbed areas. Many Casuarinas have been introduced along roads sides, construction sites, and other disturbed areas from the activity of sand mining. Areas of dunes with Casuarinas are mined along with the Casuarina seeds. The sand is taken to construction sites, it is used for road building and wherever the sand has been placed, Casuarinas will grow.

Intentional introduction: The Casuarina has been deliberately introduced numerous times throughout the Bahamian Islands for the purposes of erosion control, shade trees, and as an ornamental.

Family Casuarinaceae

Australian Pine

Casuarina equisetifolia

Other Common Names: Casuarina, Beefwood

NISS Category: Control

Impacts

The *Casuarina* devastates natural systems. It outcompetes native vegetation and causes erosion of dune systems allowing storm surge to reach further inland. There has been extensive loss of dunes in all national parks where it occurs including the Lucayan National Park, Exuma Cays Land and Sea Park, Clifton Heritage Park, and Andros West Side Park. There has also been extensive loss of dune systems in areas outside of the national parks, including the shorelines of Andros, Eleuthera, Grand Bahama, and New Providence.

The *Casuarina* severely reduces biodiversity wherever it occurs. It outcompetes native vegetation and creates monocultures. This species shades out the native shrubs and grasses, produces allelopathic compounds which retards growth of other species, and produces a thick ground litter which inhibits seedling germination. Allelopathy is the ability to exude chemicals that inhibit growth of other species beneath it. The chemicals called tannins that are leached from the *Casuarina* needles are carcinogenic and can also kill cattle that forage on them. The root system is shallow but hard and woody, reducing the ability of sea turtles to dig nests on shorelines.

Casuarinas have shallow roots and tip over easily in tropical storms and hurricanes. When they tip over, they tear up roads, snap power lines and stop economic activity until they are cleared away. Additionally, Casuarinas cause beach erosion. As areas lose their beaches, they lose their ability to provide recreational space for locals, attract tourists and support the local economy.



Casuarinas along coastline

Photo credit: Ethan Freid.

Casuarina needles

Photo credit: Ethan Freid.



Casuarina fruit

Photo credit: Marisa Wells.

Casuarina seeds

Photo credit: Ethan Freid.



Family Casuarinaceae

Suckering Australian Pine

Casuarina glauca

Other Common Names: Swamp she-oak, Brazilian beefwood

NISS Category: Eradication

Description

C. glauca is an evergreen tree, growing up to 70 feet (20 m) tall, with a dense, pyramidal shape. The bark is gray-brown, finely fissured, and scaly. Its branchlets look like pine needles, are green, occasionally waxy, jointed, 8-10 inches (20-26 cm) long, and minutely ridged. Leaves are reduced to tiny scales, in whorls of 10-17 at joints of branchlets. Flowers are inconspicuous. The fruit is a tiny, 1-seeded, winged brown nutlet formed in woody cone-like clusters. It differs from *C. equisetifolia* in having 10-17 leaf scales per whorl, hairless branchlets, and separate male and female plants. It also differs from *C. equisetifolia* as it can develop deep root systems in certain soil types.

The tree suckers aggressively form widely spreading roots, especially when pruned, creating "local jungles" of dense *Casuarina* branches, excluding other vegetation. It is extremely destructive to native plant communities, tending to completely take over areas it invades, especially along beaches.

Similar species - *Casuarina cunninghamiana* (*C. glauca* will hybridize with this species in the wild).

Habitat

Swampy locations, near salt water estuaries, and along slow-moving creeks.

Native range - Australia

Introduced range

Populations found in The Bahamas and other countries in the Wider Caribbean, Southeast United States, Hawaii, and New Zealand.

Family Casuarinaceae

Suckering Australian Pine

Casuarina glauca

Other Common Names: Swamp she-oak, Brazilian beefwood

NISS Category: Eradication

Pathways of introduction and spread

Natural dispersal (non-biotic): *Casuarina glauca* produces large numbers of small winged seeds. They are easily dispersed by the wind. They are also salt-tolerant and can move along shorelines and between islands in sea water.

Accidental Introduction: Casuarinas occur along shorelines invading dunes, but they also like disturbed areas. Many Casuarinas have been introduced along roads sides, construction sites, and other disturbed areas from the activity of sand mining.

Intentional introduction: *Casuarina spp.* have been deliberately introduced throughout the Bahamian Islands for the purposes of erosion control, shade trees, and as an ornamental.

Impacts

C. glauca alters native plant communities by displacing native species, changing community structures or ecological functions as well as by hybridizing with native species. This Casuarina also possesses allelopathic properties.



C. glauca tree

Photo credit: Forest & Kim Starr.

C. glauca needles

Photo credit: Forest & Kim Starr



C. glauca fruit

Photo credit: Forest & Kim Starr.

C. glauca seeds

Photo credit: Steve Hurst.



Family Pontederiaceae

Water Hyacinth

Eichhornia crassipes

Other Common Names: Water orchid, Jacinthe d'eau

NISS Category: Control

Description

The Water hyacinth is a free-floating perennial aquatic plant. Its leaves are floating, forming a rosette. The blade is thick, glossy, egg-shaped to round and up to 4.3 x 3.7 inches (11 x 9.5 cm) in size. The petiole is 1.4 – 13 inches (3.5 – 33 cm) and usually swollen or inflated. Its flowers are emergent, showy, and violet-blue in colour with one tepal having a darkened middle area and yellow spot within. There are 6 tepals in total, ranging from 0.2 – 1.5 inches (6 – 37 mm). There are 6 stamens, up to 1.4 inches (35 mm) in length. There are 4 – 15 flowers per inflorescence. It flowers between early spring and late fall. Stolons extend outward from the plant to produce new plants which readily break apart from one another. The roots are submersed, numerous and hanging beneath the rosette.

Habitat

Ponds, rivers, canals and wet ditches, particularly where there is nutrient-rich water. It survives large fluctuations in water levels. Distribution is limited to warmer climates between 40° latitude North and South, considered tropical and pan-tropical.

Native range - South America

Introduced range

Populations found in The Bahamas and other countries in the Wider Caribbean, South United States, Asia, Africa, India and Australia.

Pathways of introduction and spread

Intentional and accidental introduction: The Water hyacinth is used as an ornamental plant in ponds and outdoor water features where it may be intentionally planted near or along shorelines where it can escape into new areas as plant material is discarded into a waterway or carried off by flooding during rain events. It can spread between water bodies via plant material such as rosettes or seeds that are transported by boats, boat trailers and equipment, such as fishing and scuba gear.

Impacts

Water hyacinth grows and spreads rapidly over very large areas in a short period of time, forming dense, continuous floating mats up to 6 feet thick. The oxygen level of the water under these mats is reduced, resulting in displacement of native species. The dense mats also result in impeded water flow and boat traffic. Water treatment plants can be hindered as well as recreational activities, such as fishing.



Water hyacinth inflorescence

Photo credit: Marisa Wells.



**Water hyacinth
leaves and roots**

Photo credit: Forest & Kim Starr.

Water hyacinth leaves

Photo credit: Marisa Wells.



Family Myrtaceae

Paper Bark Tree

Melaleuca quinquenervia

Other Common Names: Punk tree, Bottle brush tree

NISS Category: Eradication

Description

Melaleuca is a tree species native to Australia, New Guinea and West Caledonia. It was brought to the United States as an ornamental some time before 1906 and quickly spread into natural areas especially in South Florida where it has invaded the Everglades and other wetland areas.

Melaleuca can reach heights of up to 100 ft. The tree prefers seasonally wet sites, but also occurs in standing water and well-drained uplands. Leaves are alternate, simple, grayish green and smell of camphor when crushed. Leaves are also narrow and lance-shaped, up to 4 inches long and ¾ inches wide. Flowers are off-white “bottle brush” type with spikes up to 6 inches long. The trunk and branches are covered with thick layers of whitish, papery bark, peeling off in sheets. The fruit is contained in small, round, woody capsules occurring in clusters.

The species does well in wetland areas and a single tree can produce millions of seeds per year. It is estimated that a single individual can create a monotypic stand of 1 square mile in 25 years. Once established, the species forms monotypic stands and outcompetes all native vegetation. The fruits produce small wind borne seeds that provide no nourishment for wildlife. The species also transpires vast amounts of water and had been introduced into areas as a “swamp drier”. Over time, Melaleuca completely transforms ecosystems, altering the water table, soil structure, and biodiversity.

Habitat

Agricultural areas, natural forests, planted forests, riparian zones, scrublands, freshwater wetlands and landscaped areas being used as an ornamental (e.g. Palmdale Shopping Center, New Providence).

Native range - Australia, Indonesia and New Caledonia

Introduced range

In The Bahamas, Melaleuca populations are found on Andros, Abaco, Grand Bahama, and New Providence. It is also known to occur in South Florida (USA), other countries in the Wider Caribbean, Brazil, China, Italy and parts of Africa.

Family Myrtaceae

Paper Bark Tree

Melaleuca quinquenervia

Other Common Names: Punk tree, Bottle brush tree

NISS Category: Eradication

Pathways of introduction and spread

Natural dispersal (non-biotic): A single individual tree can produce thousands of capsules each filled with hundreds of small windborne seeds. Seeds move directly to areas or are moved with soil and heavy equipment to new locations.

Accidental introduction: There is a high likelihood of accidental introduction. Once individuals are established on an island, any movement of soil or rock from those areas infected will bring seeds with it. This is the most likely cause of dispersal to the Family Islands.

Intentional introduction: There is a high chance that *Melaleuca* is being grown and cultivated on New Providence and Grand Bahama and being sold to local contractors for landscaping. Throughout New Providence and Grand Bahama, large trees have been planted along the roads. On Andros, it may have been planted as an ornamental at the Andros Town airport.

Impacts

Entire ecosystems are altered and destroyed when *Melaleuca* invades. *Melaleuca* transpires large amounts of water and will alter the water table by removing more water than is typically recharged. If wetlands are invaded, the areas will dry up and be filled in with biomass. Lucayan National Park has experienced an explosion of individuals along the Queen's Highway in the ephemeral freshwater wetland created from trenching to support drainage off the road. Individuals are starting to appear in areas of natural vegetation further away from the road. Alteration of the water tables could dramatically change the entire island's systems, especially the pine forests which are dependent on the extensive freshwater lens.

The impacts to biodiversity are tremendous. *Melaleuca* forms dense monotypic stands outcompeting the native vegetation and displacing animal species. *Melaleuca* provides limited food and habitat value for native wildlife. Additionally, it invades wetlands and dries them out reducing their ability to provide habitat for migrating birds and waterfowl. As systems are invaded, there will be a reduction in food source for non-wetland birds as well as insects, snakes, and other reptiles.

While there is no quantitative data on the economic effects, the results from systems altering in South Florida and the Everglades due to *Melaleuca* has cost the state hundreds of millions in lost tourism revenue as well as US\$3 -10 million a year for invasive management. As areas become invaded and lose their diversity, there will likely be a reduction in usage of these areas by tourists.



Melaleuca trees

Photo credit: Marisa Wells.



Melaleuca leaves, fruits and flower

Photo credit: Ethan Freid



Melaleuca bark

Photo credit: Ethan Freid.

Family Fabaceae

Monkey Tamarind

Mucuna pruriens

Other Common Names: Cow itch, Cowhage, Velvet bean, Itchy bean, Nescafe

NISS Category: Eradication

Description

Monkey Tamarind is an annual climbing vine that grows 9 - 54 feet (3-18 m) in height. It has long, slender branches, and alternate, lanceolate leaves on hairy petioles, 6 to 12 inches long. Flowers are large, white to dark purple and grow in clusters of two or three. The approximately 4 inch long seed pods are hairy, thick, and leathery. They are shaped like violin sound-holes, and contain 4 - 6 seeds. Seeds are a rich dark brown color, thickly covered with stiff hairs, about 1/10 inch long. While Monkey tamarind is considered native to part of the Caribbean, it is listed as an invasive because of its negative impacts on humans, causing intense irritation to the skin.

Habitat

Disturbed areas, including cleared lots, undeveloped overgrown properties, fields, roadside and secondary forests.

Native range - Africa, India and parts of the Caribbean

Impacts

Monkey tamarind causes extreme itching on contact with young foliage and seed pods.

It is used in some parts of the world as traditional medicine. For example, formulations of the seed powder are being studied for the treatment of Parkinson's disease.



Monkey tamarind flowers

Photo credit: Caribbean Regional Environment Project (CREP) Bahamas.



Monkey tamarind seed pods

Photo credit: CREP Bahamas.

Family Acanthaceae

Purple Showers

Ruellia brittoniana

Other Common Names: Mexican petunia, Wild petunia, Mexican bluebell

NISS Category: Control

Description

Purple showers is a vigorous, upright petunia that typically grows in a clump of 3 – 4 feet tall. Tubular, petunia-like flowers bloom from the leaf axils on greenish-purple stems covered with linear, willowy, sword-shaped green leaves. Flowers last only one day, but plants often produce a non-stop succession of blooms.

Habitat

Marshy or wet areas, disturbed sites, shorelines of ponds and lakes, moist to wet wooded areas. It has considerable drought tolerance and will survive in drier sites with full sun.

Native range - Mexico

Introduced range

Populations found in The Bahamas and the Southeast United States (across Florida).

Pathways of introduction and spread

Intentional introduction: Purple showers was imported to The Bahamas for use as an ornamental and is sold in local nurseries. It is easy to grow, seldom bothered by disease or pests, inexpensive and fast-growing. It has also been used to landscape hotel properties and adjacent public areas. It propagates from cuttings, division and seeds. Over time, the plant multiplies and the original stem becomes a colony.

Impacts

Purple showers alters native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives.



Purple showers along fence
Photo credit: Marisa Wells.



Purple showers flower
Photo credit: Marisa Wells



Purple showers
Photo credit: Marisa Wells.

Family Goodeniaceae

Hawaiian Seagrape

Scaevola taccada

Other Common Names: Hawaiian half-flower, Beach napuka

Synonyms: *Scaevola sericea*, *Scaevola sericea* var. *taccada*

NISS Category: Eradication

Description

The Hawaiian Seagrape is a large bushy shrub with dense mounded habit, growing up to 16 feet high. Leaves are simple, closely alternate, and crowded at the stem tips. Blades are thick, shiny and bright green, up to 8.5 inches long, and wider at tips. The small, five-lobed white to pale purple flowers appear on only one side of the corolla tube, leading to another popular name, "half flower". Fruits range in colour from white to pale green and are fleshy, with a hard inner layer enclosing the seed. Fruits are eaten by pigeons, seabirds, raccoons and crabs.

It tolerates very dry conditions and strong, salty winds. Hawaiian seagrape likes full sun and sandy soil, but tolerates many other conditions. Seeds can float for months in the ocean and still germinate after having been in salt water for up to a year.

Similar species - Native inkberry (*Scaevola plumieri*). The native inkberry has smaller leaves and dark fruit.

Habitat

Sand dunes, marine, estuarine, tidal marshes, saline shores, mangroves, coastal strand and coastal uplands. Also found on regularly disturbed and developed land, roadsides and dump sites.

Native range - Coastlines along the Indian and Western Pacific Oceans, Southeast Asia, East Africa, Australia and the Pacific Islands (including Hawaii).

Introduced range

Populations found in The Bahamas and other countries in the Wider Caribbean, and Southeast United States.

Family Goodeniaceae

Hawaiian Seagrape

Scaevola taccada

Other Common Names: Hawaiian half-flower, Beach napuka

Synonyms: *Scaevola sericea*, *Scaevola sericea* var. *taccada*

NISS Category: Eradication

Pathways of introduction and spread

Natural dispersal (biotic): The seeds are dispersed by birds. Fruits are eaten by pigeons, sea birds and moved by ghost crabs and raccoons.

Natural dispersal (non-biotic): The fruits float and are carried by ocean currents to invade shorelines far away. Fruits may float for up to one year and will still germinate. Fruits are buoyant with a corky outer layer adapted to dispersal by ocean currents.

Intentional introduction: Hawaiian seagrape can become established as a result of land clearance in association with development and through landscaping with exotic species. It was introduced as a salt-tolerant ornamental on many Caribbean islands. Through the nursery trade, Hawaiian seagrape has become distributed across the tropics, readily spreading from landscape plants into coastal habitats.

Accidental introduction: It escapes from gardens or cuttings are thrown out with garden waste. It is easy to grow from cuttings or seeds.

Impacts

Hawaiian seagrape colonizes sand dunes and competes with native coastal vegetation. It can quickly form extensive colonies, which provide a seed source for more rapid dispersal to other shorelines.

The shallow root systems of Hawaiian seagrape, combined with its ability to outcompete native species, encourages dune destabilization.



Hawaiian seagrape shrub

Photo credit: Marisa Wells.

**Hawaiian seagrape
'half-flower'**

Photo credit: Marisa Wells



Hawaiian seagrape fruit

Photo credit: Marisa Wells.

**Hawaiian seagrape
leaf base with hairs**

Photo credit: Ethan Freid.





Hawaiian Seagrape (upper left) vs. Native inkberry (lower right)

Photo credit: Ethan Freid

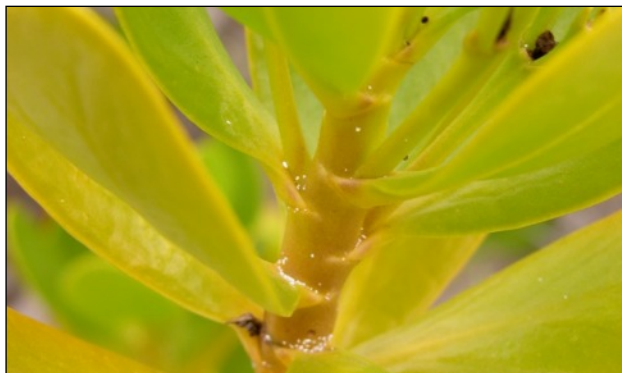


Native inkberry shrub

Photo credit: Ethan Freid.

**Native inkberry leaf base
without hairs**

Photo credit: Ethan Freid.



Family Anacardiaceae

Brazilian Pepper

Schinus terebinthifolius

Other Common Names: Christmas berry tree, Bahamian holly, Pepper tree

NISS Category: Eradication

Description

Brazilian pepper is an evergreen shrub or small tree, 6 – 21 feet (3-7 m) tall or more. Its trunk is often multiple-stemmed, and when growing in open areas, the crowns of these trees are broad and rounded and compose numerous long, arching, leafy branches, which reach the ground. Each compound leaf is composed of usually 4 or 6 lateral leaflets, arranged in pairs with a single, terminal leaflet. The oblong, distinctively veined leaves can have rounded or toothed edges with red-tinged stems. Brazilian pepper leaves have a distinctive peppery smell and have been known to cause allergic rashes in some people like its more potent cousins, poisonwood and poison ivy.

Characteristic of many non-native invasive species is the presence of numerous small fruits dispersed by birds and small mammals, and the production of allelopathic chemicals emitted by roots and decaying vegetation. Additionally, this species will form dense canopies shading out native species.

Habitat

Disturbed coppice and pinelands, urban areas, wetlands, and agricultural areas.

Native range - Brazil, Paraguay and Argentina.

Introduced range

Populations found in The Bahamas and other countries in the Wider Caribbean, South and Southwest United States, Hawaii, and Australia.

Pathways of introduction and spread

Natural dispersal (biotic): Fruits are dispersed by birds and small mammals.

Accidental introduction: usually amongst yard debris and waste dump along roads.

Intentional introduction: Brazilian pepper is used in the ornamental trade.

Family Anacardiaceae

Brazilian Pepper

Schinus terebinthifolius

Other Common Names: Christmas berry tree, Bahamian holly, Pepper tree

NISS Category: Eradication

Impacts

Brazilian pepper will invade natural systems and out-compete the native vegetation eventually producing a monotypic grove of a single species. It is an aggressive colonizer, growing up to 2 feet in a month under good conditions. It is resistant to fire, flood and drought.

It disrupts systems entirely. It reduces productivity, and alters nutrient cycling. It reduces ecosystem services, such as mangroves systems when it invades estuaries. Brazilian pepper is present in Clifton Heritage Park and throughout New Providence. It is also found at Lucayan National Park in Grand Bahama.

The impact on native vegetation is complete and devastating. Over time, all native species in the area will be outcompeted altering the animal composition as well. Entire systems such as coppice, wetlands, and pinelands can be altered or destroyed. The soil, flora and fauna will all be altered as well as the water table.

The likely major economic effects will be reducing tourism, altering the water table, and impacting mangrove and estuary systems and the organisms they support. This species has the potential to reduce the amount of native species used for wood carving, basket weaving and bush medicine.

It can cause contact dermatitis and inflammation in sensitive individuals. Persons sitting beneath Brazilian pepper trees have been known to exhibit flu-like symptoms with sneezing, sinus congestion, chest pains and acute headaches. The ingested fruits can result in irritation of the throat, diarrhea and vomiting in humans as well as a paralyzing effect on birds and grazing animals.



Brazilian pepper tree
Photo credit: Marisa Wells.

Brazilian pepper flowers
Photo credit: Marisa Wells



Brazilian pepper berries
Photo credit: Ethan Freid.

Brazilian pepper leaves
Photo credit: Ethan Freid.



Family Typhaceae

Common Cattail

Typha latifolia

Other Common Names: Broadleaf cattail, Cattail, Great cattail

NISS Category: Control

Description

Cattail 'cigars' are very densely packed with tiny flowers – male flowers in the top cluster and female flowers in the bottom cluster. Stems can be more than a foot long. Leaves are strap-like, stiff, thick and pale grayish-green in colour. It flowers during May and June.

The fruit is a tiny and tufted nutlet. Seeds are minute and numerous.

Habitat

Coastal areas, estuarine habitats, lakes, water courses and wetlands.

Native range - Alaska, Continental United States, Hawaii, Africa, Asia and Europe.

Introduced range

Populations found in The Bahamas and other countries in the Wider Caribbean, Australia, New Zealand and South America.

Pathways of introduction and spread

Natural dispersal (biotic): Seeds may be transported by mud of the feet of birds and livestock. Vegetative reproduction is very effective.

Natural dispersal (non-biotic): Seeds may be transported by wind and water.

Accidental introduction: Seeds may be transported on machinery or equipment.

Impacts

Cattails form dense monocultures. They have the ability to spread rapidly by vegetative reproduction, forming dense rhizome mats and litter. Dense cattail growth and litter may reduce the opportunity for other plants to establish or survive, thus impacting species diversity by alteration of habitat.



**Cattails at Harrold &
Wilson Pond National Park**
Photo credit: Marisa Wells.



Cattails in golf course pond
Photo credit: Stacey Moultrie



**Cattail flowers
(male at top; female at bottom)**
Photo credit: Max Licher.

Family Asteraceae

Wedelia

Wedelia trilobata

Other Common Names: Carpet daisy

NISS Category: Control

Description

Wedelia is a spreading perennial herb which grows up to 10 inches in height. It has round stems, rooting at the nodes with the flowering stems ascending. Leaves are fleshy, hairy, serrate or irregularly toothed, dark green above and lighter green below. The flowers are bright yellow ray florets of about 8 – 13 per head. Propagation is mostly vegetative as seeds are usually not fertile.

Habitat

Wide ecological tolerance, but grows best in sunny areas with well-drained, moist soil at low elevations. It is found in agricultural areas, along roadsides, dump sites and other disturbed sites, along canals and borders of mangroves and coastal vegetation.

Native range - Mexico, Central America and parts of the Caribbean.

Introduced range

Populations found in The Bahamas, Pacific Islands, South Africa, Australia and Indonesia.

Pathways of introduction and spread

Intentional and accidental introduction: Wedelia is spread as an ornamental or ground cover when it is planted in gardens. From gardens, it spreads into surrounding areas when garden waste is dumped.

Impacts

Wedelia rapidly forms a dense ground cover, crowding out other plant species from regenerating.

Farm animals have aborted fetuses after grazing on Wedelia.



Wedelia

Photo credit: Marisa Wells



Wedelia along roadside

Photo credit: Marisa Wells.

Wedelia flower

Photo credit: Marisa Wells



Family Canidae

Dog

Canis lupus

Other Common Names: Domestic dog, Feral dog

NISS Category: Control

Description

Domestic dogs are believed to be descendants of wolves. They have been selectively bred for various behaviours, sensory capabilities and physical attributes, including herding, hunting, guarding and as companions. Domestic dogs are extremely variable, but their basic morphology is that of the grey wolf.

Habitat

Potentially found in all habitats including urban areas, agricultural areas, coastal areas, deserts, forests and scrublands.

Native range - Australia.

Introduced range

Populations found virtually worldwide in association with humans, though feral dogs can be found far from human habitation.

Pathways of introduction and spread

Intentional introduction: Dogs are brought in as pets by humans and sometimes escape from confinement or are abandoned to fend for themselves.

Impacts

Feral dogs as well as uncontrolled domestic dogs prey on birds, mammals and seabirds, negatively impacting native populations of these animals.



Adult dog

Photo credit: Marisa Wells.



Juvenile dog (Puppy)

Photo credit: Jerry Frausto.

Family Felidae

Cat

Felis catus

Other Common Names: Domestic cat, House cat, Feral cat

NISS Category: Control

Description

A cat is a small animal in the wild (up to 11 pounds), but may be considerably heavier when domesticated. Colour is extremely variable in domesticated varieties and feral cats commonly revert to black, tabby or tortoiseshell with varying extents of white starting from the belly and breast.

Habitat

Feral cats have adapted to a variety of habitat types and circumstances, including urban areas, agricultural areas, forests, disturbed lands and wetlands.

Native range - Domestic cats are thought to be descended from African wild cats.

Introduced range

Populations found virtually worldwide in association with humans.

Pathways of introduction and spread

Intentional introduction: Cats are brought in as pets by humans and sometimes abandoned to fend for themselves. Many ships in the 18th and 19th centuries were infested with rats and so carried cats to control them. Some cats or their offspring were left in ports of call.

Impacts

The greatest impact of feral cats is predation on native prey populations, particularly birds. This is of grave concern in the Abaco National Park where they can prey on the Bahama Parrot.



Adult cat

Photo credit: Olivier H.



Juvenile cat (Kitten)

Photo credit: Sylar Major.

Family Icteridae

Shiny Cowbird

Molothrus bonariensis

NISS Category: Eradication

Description

The Shiny cowbird has a slender conical bill with a uniform, dull, blue-black plumage and squared-off tail. It has a solid dark eye colour. Males have a purplish shine on their head, neck, breast and upper back and a blue shine on their wings. Females are grey-brown with whitish eyebrows and throats. Nestlings have flesh-coloured skin with scattered tufts of blackish down. Their oral flanges range from white to yellow and the mouth lining is reddish.

Habitat

Agricultural areas, grasslands, disturbed areas and urban areas.

Native range - Saint Vincent and the Grenadines, Trinidad and Tobago, and South America.

Introduced range

Populations found in The Bahamas and other countries in the Wider Caribbean and the South United States.

Pathways of introduction and spread

Natural dispersal (biotic): The Shiny cowbird has naturally migrated from its native range to other countries.

Intentional introduction: In the early 1900s, the Shiny cowbird was a popular cage bird and large-scale importations took place from Argentina to markets in other parts of South America. Some of these pet birds escaped.

Impacts

The Shiny cowbird is a brood parasite, relying on a host to incubate its eggs and rear its chicks. It destroys or eats the eggs of the target host bird, replacing them with its own eggs. It is negatively affecting some threatened bird species that are already at risk due to habitat loss.



Male Shiny cowbird

Photo credit: Lip Kee.



Female Shiny cowbird

Photo credit: Lip Kee.

Family Colubridae

Corn Snake

Pantherophis guttatus

Synonyms: *Elpahe guttata*, *Coluber guttatus*

Other Common Names: Red corn snake

NISS Category: Eradication

Description

The Corn snake is a small to medium-sized slender snake up to 70 inches (180 cm) long. Various colour morphs have been created through breeding and there are over a hundred of them. The most common form observed in The Bahamas is white or beige with large black-edged red blotches down the middle of its back. It typically has alternate black marks on its underside, giving a checkerboard appearance.

This snake is non-venomous and kills its prey via constriction.

Habitat

Commercial ports, construction sites, pinelands, coppice, and agricultural areas.

Native range - South United States and Mexico.

Introduced range

Populations found in The Bahamas (Abaco, Grand Bahama, New Providence) and other countries in the Wider Caribbean, continental islands off the northern coast of South America. Large numbers are kept as pets, both legally and illegally around the world.

Pathways of introduction and spread

Intentional and accidental introduction: Introductions have been attributed to the pet trade or through import of landscaping plants and building materials in which the snakes stowaway. Those kept as pet sometimes escape from enclosures.

Impacts

Ecological impacts on native fauna (particularly ground nesting birds, lizards and snakes) through predation and competition. It has the potential to cause significant decline in a variety of native species.

It is also a potential host for alien pests and disease, such as the reptile bacterium, *Cowdria ruminantium*, which can result in the death of grazing animals. The snake serves as a host for the bacterium which is then spread by ticks.



Corn snake (beige morph)

Photo credit: STV News



Corn snake (orange morph)

Photo credit: Piatkowskk

Family Passeridae

House Sparrow

Passer domesticus

Other Common Names: English sparrow, Town sparrow

NISS Category: Control

Description

The male House sparrow has a brown back with black streaks. The top of the crown is grey, but the sides of the crown and nape are chestnut red. The chin, throat and upper breast are black and the cheeks are white. Females and juveniles are less colourful. They have a grey-brown crown and a light brown or buff eye stripe. The throat, breast and belly are greyish-brown and unstreaked.

Similar Species - *Passer hispaniolensis*, *Passer montanus* and *Spiza americana*.

Habitat

Urban areas (where garbage is a significant part of their diet), agricultural areas, disturbed areas and wetlands.

Native range - Eurasia and North Africa.

Introduced range

Populations are found in The Bahamas, South America, North America, southern parts of Africa, Australia and New Zealand.

Pathways of introduction and spread

Intentional introduction: In the late 1800s, House sparrows were deliberately imported from Europe and released in the United States to establish wildlife that was familiar to European immigrants.

Impacts

House sparrows are quite aggressive and are known for displacing native species by outcompeting them for resources. They may even evict native birds from their nests.

Early in its invasion in North America, it was considered a serious agricultural pest, feedings on grains (wheat, oats, corn) as well as numerous vegetables and fruits, including peas, cabbage, apples, grapes and strawberries.



House sparrow

Photo credit: Sergey Yeliseev.



House sparrow

Photo credit: Marisa Wells.

Family Procyonidae

Raccoon

Procyon lotor

NISS Category: Eradication

Description

The raccoon is an omnivorous mammal with a blackish facial mask outlined with white. It has whitish rings on its bushy tails with the tip being black. Its body is grayish, sprinkled with black. It has 5 toes on each foot with non-retractile claws. Their molar teeth are flat and adapted for crushing, not for cutting. They range in weight from 8 – 29 pounds (4 – 13 kg).

Habitat

Urban areas (where they feed on garbage), agricultural areas and forests (coppice and pinelands).

Native range - North America.

Introduced range

Populations found in The Bahamas on Abaco, Chub Cay, Grand Bahama and New Providence. Also in other countries in the Wider Caribbean, parts of Asia and Europe.

Pathways of introduction and spread

Intentional introduction: Raccoons were imported as pets in some countries; some escaped confinement while others were abandoned to the wild when they displayed aggression.

Impacts

The raccoon is a major consumer of agricultural crops, including fruits, sugar cane and sweet potatoes. It also is suspected to prey on native reptiles, amphibians and birds. Raccoons can also be hosts for various infectious and parasitic diseases, including rabies, West Nile virus and Larva migrans (a nematode worm).



Raccoon

Photo credit: Marisa Wells



Raccoon

Photo credit: Marisa Wells.

Family Scorpaenidae

Lionfish

Pterois volitans

Other Common Names: Red lionfish, Indo-Pacific lionfish

NISS Category: Control

Description

Lionfish are a subfamily of the scorpionfishes (Scorpaenidae). All *Pterois* species of lionfish contain venomous dorsal, anal and pelvic spines. It has 13 dorsal spines, 10 - 11 dorsal soft rays, 3 anal spines and 6 - 7 anal soft rays. The membranes of the fins are often spotted. The body is white or cream-coloured with red to reddish-brown vertical stripes. The vertical stripes alternate from wide to very thin and sometimes merge along the flank to form a V. Maximum length observed in their native ranges is about 15 inches (38 cm) and maximum weight is 2.6 pounds (1.2 kg). They tend to be larger in their introduced range.

Lionfish are carnivorous mid-level predators on coral, rocky and sandy substrates.

Similar species - *Pterois miles* which has a similar morphological resemblance and is considered to be an allopatric sibling species.

Habitat

Marine habitats including coral reefs, man-made structures, mangrove creeks, blue holes, tidal pools, marinas, rock substrates, sand substrates.

Native range - Western Australia, and Western and Central Pacific Ocean.

Introduced range

Populations found in The Bahamas and other countries in the Wider Caribbean, and on southeast continental shelf of the United States.

Pathways of introduction and spread

Numerous lines of evidence suggest that lionfish were most likely introduced to the Western Atlantic Ocean via aquarium releases, but possible introduction via ballast water cannot be fully ruled out.

The pathway and rates of dispersal of lionfish in the Western Atlantic Ocean are currently unknown. *P. volitans* is considered to be invasive along the southeast continental shelf of the United States, in Bermuda and in several Caribbean countries (e.g. Bahamas, Turks and Caicos, and Cuba) due to the establishment of viable, self-sustaining populations, its abundance, and the apparently rapid rate of spread of the species throughout the region, most likely made possible by the ease with which pelagic eggs and larvae are dispersed over great distances via ocean currents.

Family Scorpaenidae

Lionfish

Pterois volitans

Other Common Names: Red lionfish, Indo-Pacific lionfish

NISS Category: Control

Impacts

The overall impact of the now widely distributed and abundant lionfish in the Atlantic remains largely unknown. Many scientists have suggested that *P. volitans* will negatively affect coral reef ecosystems by decreasing the abundance of a wide range of native reef fish via direct predation and competitive interactions in which lionfish monopolize food resources. Lionfish have a somewhat novel predatory strategy in the Atlantic in which they herd and corner prey using ornate, oversized pectoral fins and then attack with a rapid strike. Naivety of Atlantic prey to this strategy could result in increased predator efficiency of lionfish.

The venomous nature of lionfish means that it has few, if any, natural predators.

Lionfish have venomous dorsal, anal and pelvic spines, and are known to envenomate humans when threatened or harassed. Envenomation may also occur due to reckless handling of recently dead specimens. Lionfish have envenomated a number of persons in The Bahamas, including fishermen, avid beach-goers and researchers. The frequency of incidents of envenomation in The Bahamas is likely to increase as the fish becomes more widespread and abundant, particularly in shallow, nearshore areas frequently used by people.

The predominant symptom of lionfish envenomation is severe pain at the wound site, which is usually responsive to hot water immersion therapy. Rare but more serious symptoms related to the amount of venom injected include: chills, headache, nausea, vomiting, abdominal pain or cramping, delirium, seizures, limb paralysis, hyper- or hypotension, respiratory distress, congestive heart failure and pulmonary edema. Victims may also develop a hypersensitivity to lionfish venom and experience anaphylactic reactions upon subsequent envenomation.

Lionfish (adult)

Photo credit: Jared Dillet



Lionfish (adult)

Photo credit: Nick Hobgood

Lionfish (juvenile)

Photo credit: Peter Leahy



Family Muridae

Common Rat

Rattus norvegicus

Other common names: Brown rat, Norway rat

NISS Category: Control

Description

The Common rat has brown fur on the back with pale grey fur on its belly. The adults may weigh up to (500 g) and be up to (390 mm) long. They have small ears. The tail is shorter than the head-body length.

Similar species - *Rattus exulans* and *Rattus rattus*.

Habitat

Globally widespread occurring in agricultural areas, coastal areas, forests, grasslands, disturbed areas, scrublands, urban areas and wetlands.

Native range - Northeast China.

Introduced range

Populations are found globally including The Bahamas, other countries in the Wider Caribbean, the United States, Canada, Mexico, Pacific Islands and Western Europe.

Pathways of introduction and spread

Natural dispersal (biotic): These rats swim readily.

Accidental introduction: These rats can be transported in bulk or loose equipment or simply by stowing away on a vessel.

Impacts

The Common rat is known to restrict the regeneration of many plant species by eating seeds and seedlings. They prey on animal species smaller than them, including reptiles, small birds and birds eggs. They eat food crops and spoil stored food by urinating and defecating in them. Additional economic damage has been caused by rats chewing through power cables and electrical wires.

This rat species along with *Rattus rattus* transmits the plague bacterium, *Yersinia pestis*, via fleas in certain parts of the world.



Common rat

Photo credit: Anemone Projectors.



Common rat

Photo credit: Olbertz.

Family Bufonidae

Cane Toad

Rhinella marina (also known as *Bufo marinus*)

Other common names: Marine toad, Giant toad

NISS Category: Eradication

Description

Cane toads are heavily built with short legs. They can sometimes grow up to 30 cm long. Males are slightly smaller than females. Their fingers lack webbing, but the toes are heavily webbed. Adults have a rough, warty skin, coloured tan, brown, dark brown, dull green or black. Venom glands are aggregated together to form large, distinctive parotoid glands, found above each shoulder. These glands are able to ooze venom.

Habitat

Agricultural areas, lakes, forests, urban areas (including homes), water courses and wetlands. They vary from native frogs in the areas they frequent. Cane toads will not be found on walls and windows. They do not climb trees.

Native range - northern South America, Central America and Mexico northward to extreme south Texas.

Introduced range

Globally widespread, populations are found in The Bahamas, other countries in the Wider Caribbean, Hawaii, Australia, Japan, the Philippines and other Pacific Islands as well as Egypt.

Pathways of introduction and spread

Natural dispersal (biotic): Cane toads have spread over large areas of Australia under their own power, hopping long distances.

Natural dispersal (non-biotic): Free-swimming tadpoles are likely to be swept away during flash floods.

Intentional introduction: Cane toads have been introduced to many locations as a biological control agent for crop pests.

Accidental introduction: Cane toads have been transported by large freight trucks and as sea freight in containers.

Impacts

Cane toads have been found to play an important role in structuring native frog and toad communities. They impact populations of animals that try to prey on them as animals die once they mouth or eat the toad. The parotoid glands produce venom when the toad is provoked or localized pressure is applied to it (such as when a predator grasps it in its mouth). The toxic secretions can cause illness or death in domestic (cats and dogs) and wild animals (snakes and lizards) that come in contact with this toad. The toxin will cause extreme pain if rubbed into the eyes.

Cane toad

Photo credit: Marisa Wells



Cane toad

Photo credit: Opencage

Cane toad

Photo credit: Bill Waller



Family Formicidae

Red Imported Fire Ant

Solenopsis invicta

NISS Category: Control

Description

Workers in the *Solenopsis* genus are polymorphic, meaning they are physically differentiated into more than two different body-forms. Fire ants are quite small, varying from 2 - 6 mm in length, and are predominantly reddish-brown in colour. Their nests vary in shape and size, but all have a honeycomb-like internal structure and are usually found in open areas including lawns, pastures, along roadsides and abandoned cropland. They may be 15-inch (40 cm) high dome-shaped mounds without any obvious entrance/exit. Mounds may not be evident at all. The red imported fire ant should not be confused with native species (such as Tropical fire ant, *Solenopsis geminata*) which are commonly called fire ants. *S. geminata* mounds can be distinguished by the presence of workers with disproportionately large square heads that are lacking in *S. invicta* worker ants.

Habitat

Agricultural areas, coastal areas, forests, grasslands, disturbed areas, scrublands, urban areas and water courses.

Native range - South America.

Introduced range

Populations are found in The Bahamas, other countries in the Wider Caribbean, Australia, Pacific Islands and North America.

Pathways of introduction and spread

Natural dispersal (biotic): Colonies grow outward and eventually bud off into separate colonies. In the United States, colonies have been reported to spread in this way up to 40 m a year. These ants may also produce winged reproductive females, spreading colonies across greater distances and faster. Fertile females and males go on mating flights during the warmer months. Mating takes place in the air and the fertilized females can then start new colonies. New nests may not be visible for several months.

Natural dispersal (non-biotic): These ants will float in response to flooding, which allows it to live in watered urban areas. Flooding may stimulate local ant dispersal.

Accidental introduction: These ants can be spread by the movement of equipment associated with agriculture, aquaculture, the nursery trade, landscaping, and construction. In the nursery trade, for example, the ants establish themselves in potted plants in contact with the ground, in stores of topsoil, mulch and potting mixes and under landscaping materials.

Family Formicidae

Red Imported Fire Ant

Solenopsis invicta

NISS Category: Control

Impacts

S. invicta reduces biodiversity among invertebrates and reptiles and may also kill or injure frogs, lizards and small mammals. It has the potential to devastate native ant populations and is competitively dominant to more other invasive ant species.

In 2004, the economic impact of *S. invicta* on humans, agriculture and wildlife in the United States was estimated to be at least half a billion dollars per year. These ants can also sting humans which may cause an allergic reaction. Public areas, such as parks and playgrounds, may become unsafe for children. Agricultural impacts may include damage to crops, interference with equipment and stinging of workers in the field.

Red imported fire ant
Photo credit: fieldbio



Fire ant nest
Photo credit: Marisa Wells

Fire ant nest
Photo credit: Phil Myers.



Family Columbidae

Eurasian Collared Dove

Streptopelia decaocto

Other common names: Collared dove, Indian ring dove

NISS Category: Control

Description

The Eurasian collared dove has a plump body, small head and long tail. The wings are broad and slightly rounded. The broad tail is squared off at the tip. These doves are chalky light brown to gray-buff with broad white patches in the tail. The bird's collar is a narrow black crescent around the nape of the neck. In flight and when perched, the wingtips are darker than the rest of the wing. Its bill is slender and black. Its eyes have a deep red iris, and its legs and feet are a dark red.

Similar species - Mourning dove (*Zenaida macroura*).

Habitat

Urban areas with access to bird feeders and other seed sources, and agricultural areas where they seek open sites where grain is available.

Native range - Turkey, Syria, Iraq, Afghanistan, Northern Greece, Western Europe, British Isles and Scandinavia.

Introduced range

Populations found in The Bahamas, other countries in the Wider Caribbean, Canada, Japan, Mexico and the United States.

Pathways of introduction and spread

Natural dispersal (biotic): Eurasian collared dove typically disperse under 186 miles (300 km) away from its hatching site, but has been known to disperse over 600 miles (1,000 km) in some instances.

Intentional introduction: The introduction of this dove to The Bahamas and other parts of the Caribbean and North America likely resulted from an escape of birds from a pet breeder in Nassau in 1974. Additional introductions have been documented in Guadeloupe and North America.

Impacts

The Eurasian collared dove competes with other bird species, including the Mourning dove and Turtle dove. They may threaten agriculture as they are known to eat and foul grain products. This dove is also a carrier and amplifying species for West Nile virus. It is also a carrier of the Pigeon circovirus which causes illness and mortality in the Columbiformes family (i.e. doves and pigeons).



Eurasian collared dove
Photo credit: Marisa Wells.



Eurasian collared doves
Photo credit: Marisa Wells.

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