



# 15. INVASIVE SPECIES

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## 15.1 HAZARD PROFILE

### 15.1.1 HAZARD DESCRIPTION

#### Overview

Invasive species refer to non-native plants, animals, and other organisms that establish themselves in regions where they do not naturally occur. These species can cause, or are likely to cause, significant economic or environmental harm, as well as adverse effects on human, animal, or plant health. Invasive species can alter, degrade, or displace native habitats, compete with indigenous wildlife, and pose substantial threats to biodiversity (FWS 2022).

In Hawai'i, the term "invasive species" typically refers to species that are both harmful to the environment, economy, and/or human health, and not native to Hawai'i. These species were introduced by human assistance rather than by their own means of introduction (DLNR 2024). It's important to note that not all non-native species are considered invasive. Only those that cause environmental or economic harm, or harm to human health, are classified as invasive. The Department of Land and Natural Resources (DLNR) has compiled a list of injurious wildlife that can be reviewed here: [Injurious Wildlife](#) and the Hawai'i Department of Agriculture (HDOA) has compiled a list of noxious weeds here: [Noxious Weed List](#). While there is currently no official designation of invasive species in Hawai'i, the Hawai'i Invasive Species Council (HISC) is working on an effective way to define and classify these species for the state (DLNR 2024).

#### Types of Invasive Species

Invasive species include both terrestrial invasive species and aquatic (water-dwelling) invasive species (USDA n.d.):

- Invasive terrestrial species include plants, animals and other organisms. Terrestrial invasive plants include trees, shrubs, vines, grasses and herbaceous plants. Terrestrial invasive animals include insects, mammals, reptiles, arachnids, birds and nematodes. Other terrestrial invasive organisms include pathogens (disease causing organisms) such as molds, fungus, bacteria and viruses.
- Aquatic invasive plants include algae, floating plants, submersed plants, and emergent plants. Aquatic invasive animals include insects, fish, reptiles, mollusks, crustaceans, and amphibians. Other aquatic invasive organisms include pathogens (disease-causing organisms), such as molds, fungi, bacteria, and viruses.



## Causes of Invasive Species Introductions

The following are some of the ways invasive species introductions can occur.

- **Human Activity**—Globalized trade and travel have facilitated the unintentional introduction of non-native species, often hitchhiking on ships, aircraft, or other forms of transportation.
- **Intentional Introductions**—Some species were intentionally brought to Hawaii for agricultural, ornamental, or other purposes, but later became invasive.
- **Natural Disasters**—Extreme weather events or other natural occurrences can also introduce non-native species.
- **Lack of Natural Predators**—Invasive species often thrive in new environments because they lack natural predators or competitors that could control their populations.

## Regulatory Oversight and Coordination Bodies

In Hawaii, the regulation of invasive species is a multi-faceted approach involving the Hawaii Invasive Species Council (HISC), the Department of Land and Natural Resources (DLNR), the Department of Agriculture (DOA), and the federal government.

- **Hawaii Invasive Species Council (HISC)**—The HISC was established for cabinet-level coordination and policy direction amongst the various agencies that deal with a portion of the invasive species problem.
- **DLNR** regulates the transport and release of wildlife.
- **The DOA** is responsible for agricultural quarantine and inspection to prevent the introduction of invasive species

## O‘AHU INVASIVE SPECIES COMMITTEE

The O‘ahu Invasive Species Committee (OISC) is a project under the University of Hawai‘i-Pacific Cooperative Studies Unit, representing a collaborative partnership among state, federal, and private agencies dedicated to safeguarding O‘ahu from the most harmful invasive plants and animals that threaten the environment, economy, and human health. OISC’s primary objectives include preventing the establishment of new alien pests, managing and eradicating early-stage invasive species on both public and private lands, and raising community awareness about the threats posed by invasive species and how the public can contribute to mitigation efforts (OISC 2024).

## Potential Impacts

Invasive species have the potential to cause ecological, economic, public health and cultural impacts.

- **Ecological Disruption**—Invasive species pose a significant environmental threat, often triggering a cascade of effects that exacerbate other hazards. When these species invade new habitats, they outcompete native species for resources, leading to declines or extinctions that disrupt ecosystem balance (NWF n.d.). Invasive plants can change fire regimes, making wildfires more frequent and severe, which further disrupts native ecosystems. This disruption reduces biodiversity and weakens ecosystem



resilience. Invasive plants, particularly flammable grasses and shrubs, increase wildfire frequency and intensity by providing abundant fuel. These fires destroy native vegetation, alter landscapes, and create conditions that favor further spread of invasive species, creating a vicious cycle.

- **Water Resource Impacts**—Invasive species in Hawaii can significantly impact water resources by altering the way water moves through ecosystems, potentially reducing streamflow and groundwater recharge, and increasing water loss through transpiration. Invasive plants, in particular, often use more water than the native species they replace, leading to a decrease in water availability.
- **Economic Damage**—Invasive species can harm agriculture by damaging crops, impacting tourism by reducing the appeal of natural landscapes, and causing infrastructure damage.
- **Public Health Risks**—Some invasive species can carry diseases that affect both wildlife and humans, such as mosquitoes spreading malaria, dengue fever, and Zika virus (DLNR 2024). These diseases can devastate human health and wildlife populations.
- **Cultural Impacts**—Healthy native ecosystems are essential for Hawaiian culture, and the destruction of forests and other natural habitats by invasive species can threaten cultural practices and traditions.

### 15.1.2 LOCATION

Hawai‘i’s unique geographic isolation and volcanic origin have given rise to a distinct array of native plant and animal species. These species arrived without human assistance, through natural means such as floating on waves, blown by the wind, or transported by birds. Over 70 million years, these original introductions evolved into species found nowhere else in the world, such as the ‘ōhi‘a and koa forests, and native animals like the hoary bats, ‘i‘iwi, and ‘apapane.

Island species evolved without the presence of many of the world’s more competitive species, such as sharp-hooved ungulates, carnivorous predators, or thorny plants. As a result, they lack the defensive mechanisms found in their mainland relatives, creating a relatively benign environment. For example, the koa tree is thornless, unlike its prickly acacia relatives, and pre-contact Hawaiian birds could nest on the ground without fear of predators (DLNR 2024).

The introduction of nonnative, competitive species from other parts of the world poses a significant threat to Hawai‘i’s ecosystems. In today’s globalized society, species such as deer, goats, ants, coqui frogs, rats, snails, and miconia have been introduced to Hawaii. These invasive species outcompete native species, which have not evolved to coexist with them.

The O‘ahu Invasive Species Committee focuses on species that pose the highest threat to O‘ahu’s ecosystem and quality of life, and those with the greatest potential for eradication. By addressing these priorities, OISC aims to protect O‘ahu’s unique biodiversity and ensure the well-being of its residents and natural habitats. Table 15-1 lists the priority that OISC actively controls or provides outreach and information on.



**Table 15-1. O’ahu Invasive Species Committee Priority Invasive Species**

	Description/Location	Extent
Fireweed	Daisy-like herb that grows upright and branched, up to 50 cm (20 in) high. Invades pastures, disturbed areas and roadsides	Historically, there have been several populations of fireweed ranging from Kunia to Mānoa. These populations have since been removed and are monitored by HDOA, OISC, and the O’ahu Army Natural Resources Program. However, in February 2014, a new infestation of fireweed was detected in the Keamanea watershed on the north shore. OISC treated the infestation, and no new plants have been seen since December 2014 (OISC 2024).
Cape Ivy	Cape ivy is an aggressive and hearty grower that can thrive in both dry and wet conditions and to elevations of over 7,000 feet.	Cape ivy is present in the Pālehua area of the Wai’anae Mountains and on Tantalus in the Makiki/Mānoa area. OISC’s management goal for cape ivy is island-wide detection and eradication.
Naio Thrips	Naio thrips attack the native Hawaiian naio tree ( <i>Myoporum sandwicense</i> ). These thrips are small sucking insects with feathery wings. They harm the naio by sucking the tissue out of the new leaves, causing severe damage, defoliation, and eventual death of the plants.	Naio thrips were detected on O’ahu on November 23, 2018. Since then, over 900 plants have been removed, with thousands of man-hours dedicated to fieldwork. The current strategy is management the invasive population given how wildly they were used in landscaping and the ease with which thrips are dispersed.
Himalayan Blackberry	Found in disturbed areas, open fields and around fresh water habitats Forms dense, impenetrable thickets that exclude other native plant species. Eradication	Two known areas on O’ahu: Mau’umae Trail and Pālolo Valley in the southeastern corner of the island.
Glory Bush	Glory bush is an aggressive colonizer of disturbed areas that can create monotypic thickets that displace native emergent species.	Glory bush has been detected in the Tantalus area within the Honolulu Watershed. OISC is partnering with landowners to conduct management efforts and eradicate glory bush from this priority watershed. There have been two known areas of Himalayan blackberry on O’ahu: Mau’umae Trail and Pālolo Valley in the southeastern corner of the island.
Pampas Grass	Pampas grass is native to South America and while it’s a popular ornamental grass, it is considered very invasive. In native forests they out-compete native plants and create a fire hazard.	OISC is working to educate property owners where the few ornamental plantings of <i>C. selloana</i> exist, and requests that pampas grass be removed and replaced with non-invasive alternate plants.



	Description/Location	Extent
Cane Tibouchina (Cane Ti)	Cane ti poses a major threat to the Ko’olau forests, especially the near-pristine summit regions. Not only does the plant thrive in wet forest conditions, it also produces hundreds of tiny seeds and can spread vegetatively. Broken pieces—even small ones—can root and form new plants. The seeds are easily transported via wind, birds, and pigs; hikers unwittingly carry them on shoes, clothes, and backpacks.	Cane ti was first detected in 2005 at Poamoho in the Ko’olau Mountains, representing the only known population on the island. The OISC is collaborating with the Ko’olau Mountains Watershed Partnership and the Department of Native Ecosystem Protection Services to conduct management operations aimed at containing this population (OISC 2024).
Rapid ‘Ōhi’a Death	Rapid ‘ōhi’a Death (ROD) is a fungal pathogen new to science and not seen before 2014, when it was identified on Hawaii Island. The fungus attacks and can quickly kill ohia trees ( <i>Metrosideros polymorpha</i> ). Ohia is endemic to Hawaii and comprises approximately 80% of Hawaii’s native forests.	There are two species ROD: <i>Ceratocystis lukuohia</i> – VERY aggressive and rapid death as occurs in as little as two weeks. <i>Ceratocystis huliohia</i> – Less aggressive and death can take many months. Only the less aggressive strain ( <i>C. huliohia</i> ) has been detected on O’ahu. Refer to Figure 15-1.
Coconut Rhinoceros Beetle	Native to Southeast Asia, adult CRB feed on emerging palm fronds, causing damage that can often be severe enough to kill the plants.	The coconut rhinoceros beetle (CRB) was first detected on O’ahu in December 2013 and has since spread island wide, threatening the island’s palm trees. The management strategy has shifted from eradication to containment to reduce detections on neighboring islands. Figure 15-2 shows CRB distribution across O’ahu.
Coqui Frog	Coqui frogs have become a major ecological threat in Hawai’i due to their loud calls that disrupt native bird and insect populations and their rapid reproduction, which increases competition for food with native species.	The only known wild population of coqui frogs was located in Wahiawā, with over 100 calling frogs. Due to the efforts of the Hawaii Department of Agriculture (HDOA), OISC, the O’ahu Army Natural Resources Program, and DLNR, this population was eradicated in 2006 (OISC 2024). As of January 2025, there are three known established coqui populations; Waimanalo detected in 2021 Pālolo Valley detected in 2019, and Kuli’ou’ou summit detected in 2024. All three populations are undergoing control efforts with collaboration between OISC, Division of Forestry and Wildlife and the Hawaii Dept. of Agriculture (OISC, 2025).



	Description/Location	Extent
Little Fire Ant	Little Fire Ants infest beach parks, homes, and habitats for native species, causing painful stings, crop losses, and injuries to pets.	Little Fire Ants were first detected on O‘ahu in December 2013 in a shipment of hāpu‘u logs from Hawaii Island. Table 2 shows recent events where areas of O‘ahu active sites. Naio thrips were detected on O‘ahu on November 23, 2018. Since then, over 900 plants have been removed, with thousands of man-hours dedicated to fieldwork. Refer to Figure 15-3
Devil Weed	Devil weed is an aggressive plant that disrupts native ecosystems by forming dense thickets that outcompete native vegetation and alter fire regimes.	The first detection of devil weed on O‘ahu occurred in 2011 at the Kahuku Training Area/Kahuku Motocross Track. Since then, it has spread to Kahana Valley, Pūpūkea, and ‘Aiea. OISC is actively working to reduce these populations, although new detections continue to emerge across the island. Refer to Figure 15-4 for areas on O‘ahu that are affected by devil weed.
Miconia	Miconia, an invasive plant from South America, spreads rapidly through forests, preventing the growth of other plants and increasing erosion risk with its shallow roots.	Miconia, originally introduced to O‘ahu and traded among botanical gardens in the early 1960s, has since spread to several locations in the Ko‘olau range. The potential population boundary now extends to 9,500 acres, including areas considered "seed banks." Long-term eradication of miconia is difficult due to seed-bank longevity, which is estimated to be approximately 18 years. OISC efforts have reduced detected mature trees by over 85% annually since 2002 (OISC, 2025).

Source: (OISC 2024)



Figure 15-1. Rapid 'Ōhi'a Death Detections on O'ahu, September 2019 – December 2023

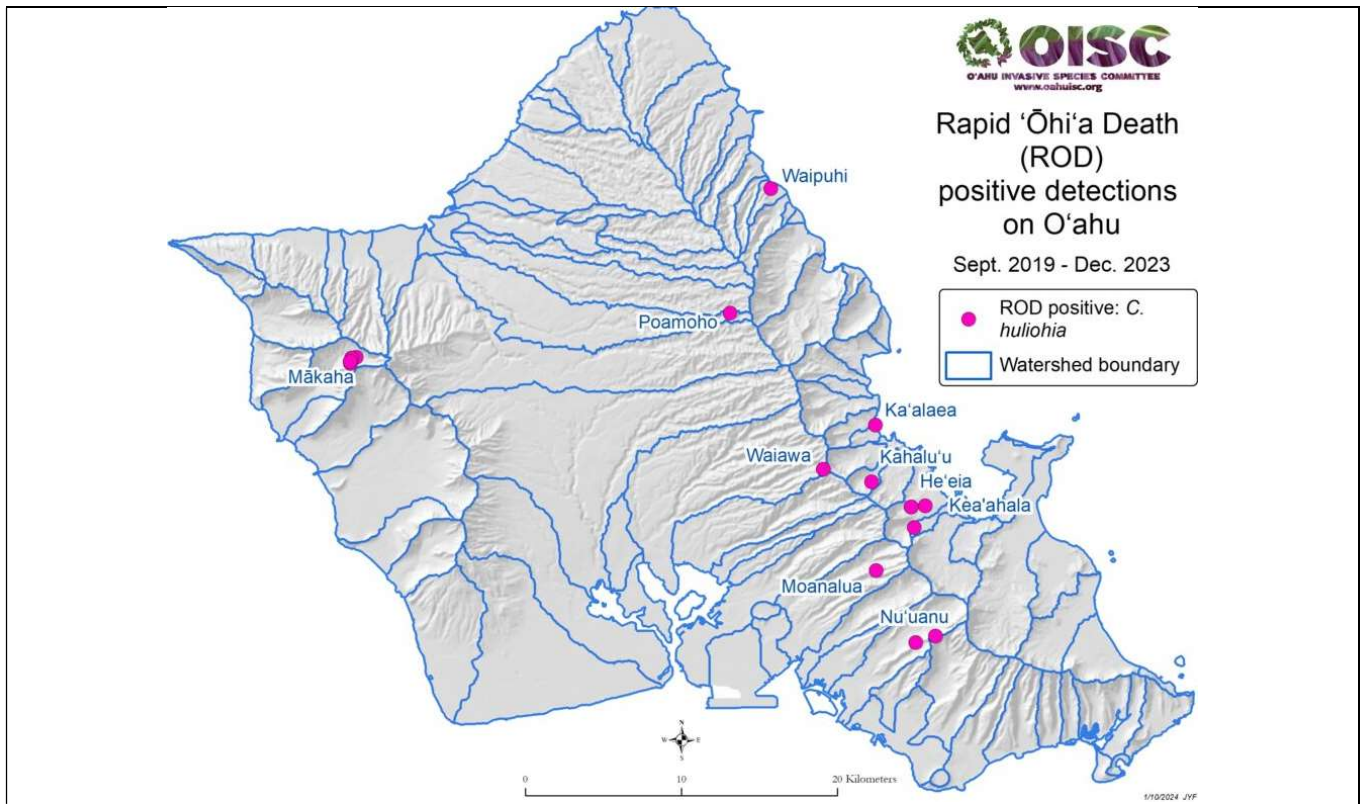
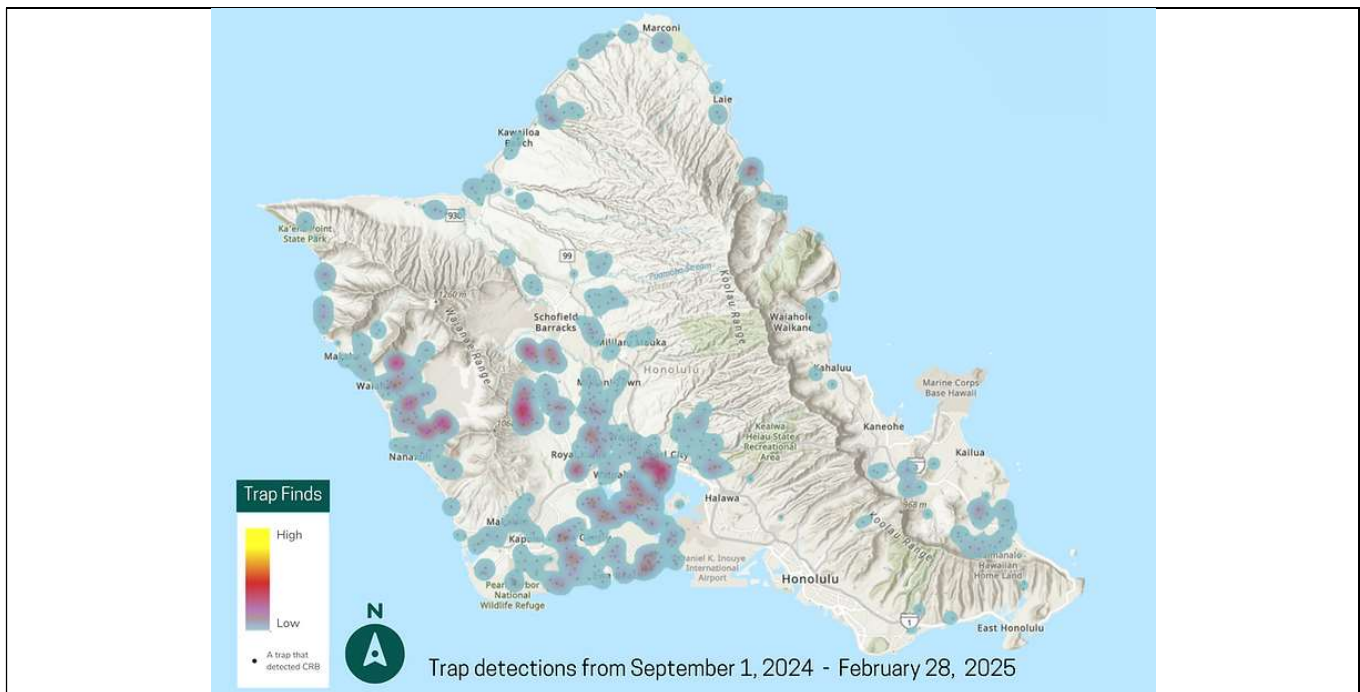


Figure 15-2. Trap Detections of Coconut Rhinoceros Beetle on O'ahu, September 2025 – February 2025



Source: (OISC 2025)



Figure 15-3. Little Fire Ant Distribution Across O’ahu, February 2025

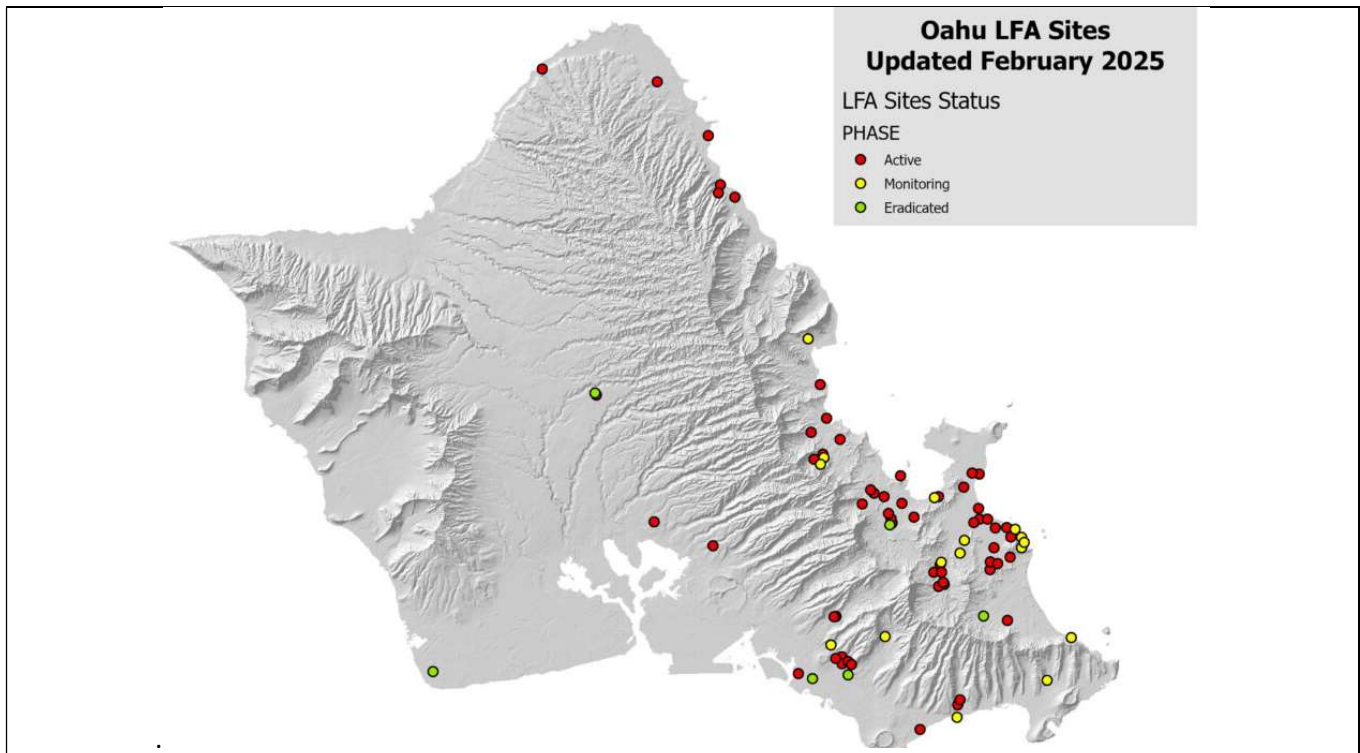
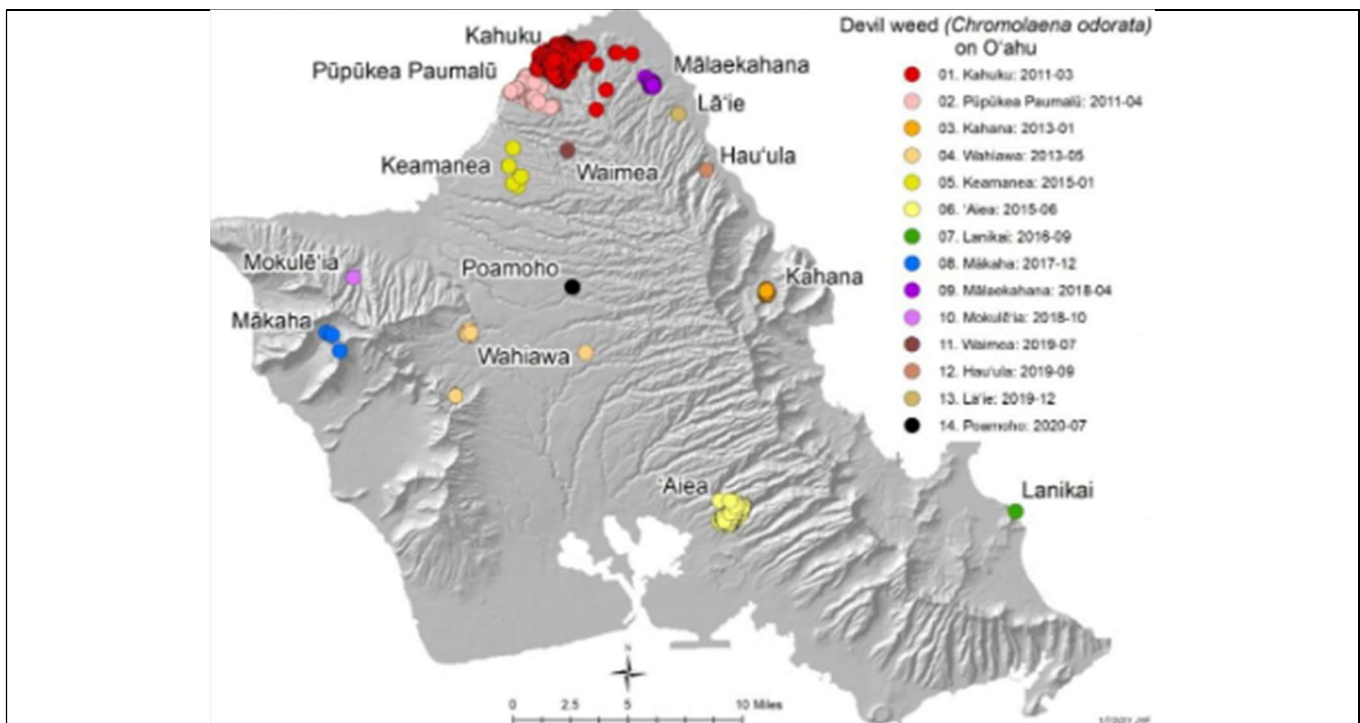


Figure 15-4. Devil Weed in O’ahu



Source: (OISC 2025)



In addition to the priority species listed in Table 15-1, OISC focuses on priority pests at the ports and at the Foreign Trade Zone, including: Spongy Moth, Spotted Lanternfly, Japanese Beetle, Asian Long-Horned Beetle, Queensland Longhorn Beetle, Brown Marmorated Stink Bug, and Africanized Honeybee. These are all early detection species and there are no populations to actively manage. OISC hopes that if one of these species arrives and is not caught by other agencies working at the ports that their efforts will catch these species before they have a chance to establish. OISC also assists with Coconut Rhinoceros Beetle (CRB) trap checks and palm surveys to help supplement the CRB Response Team efforts.

A number of other plant, animal, and aquatic species are considered invasive on O'ahu in addition to those identified as priorities by OISC. Though not an inclusive list, other concerns include:

- Feral pigs, feral cats, rabbits, mongoose, chicken, and barn owls. These species can cause significant harm to the native ecosystem by overgrazing, predation, and competition for resources.
- Rats, Rosy Wolf Snails, Jackson's Chameleons, and invasive weeds have all contributed to the decimation of the native Hawaiian snail population, an estimated 90% of the 750 species have gone extinct in the last 40 years.
- Invasive algae (seaweed) poses a significant threat to Hawaiian coral reefs. Invasive seaweed smothers coral and degrades the environment needed by native fish, invertebrates, and limu.
- Albizia is a highly invasive tree species in Hawai'i, including O'ahu. Albizia trees are known for their rapid growth and brittle wood and pose a significant risk to O'ahu's environment and infrastructure, including posing a threat to power lines, homes, and roadways, and displacing native flora. While it's impossible to give an exact number of Albizia trees on O'ahu, over 20,000 acres are infested with Albizia trees, indicating a widespread presence (Ko'olau Mountains Watershed Partnership).
- Invasive, non-native grasses are a significant factor in the increased risk of wildfires in Hawaii. These grasses, like fountain grass, Guinea grass, buffel grass, and molasses grass, dry out quickly and create a lot of fuel for fires, and after fires, they quickly regrow and spread, displacing native plants. Currently, an estimate of over 25% of the islands are now covered by non-native grasses (DLNR).

### 15.1.3 EXTENT

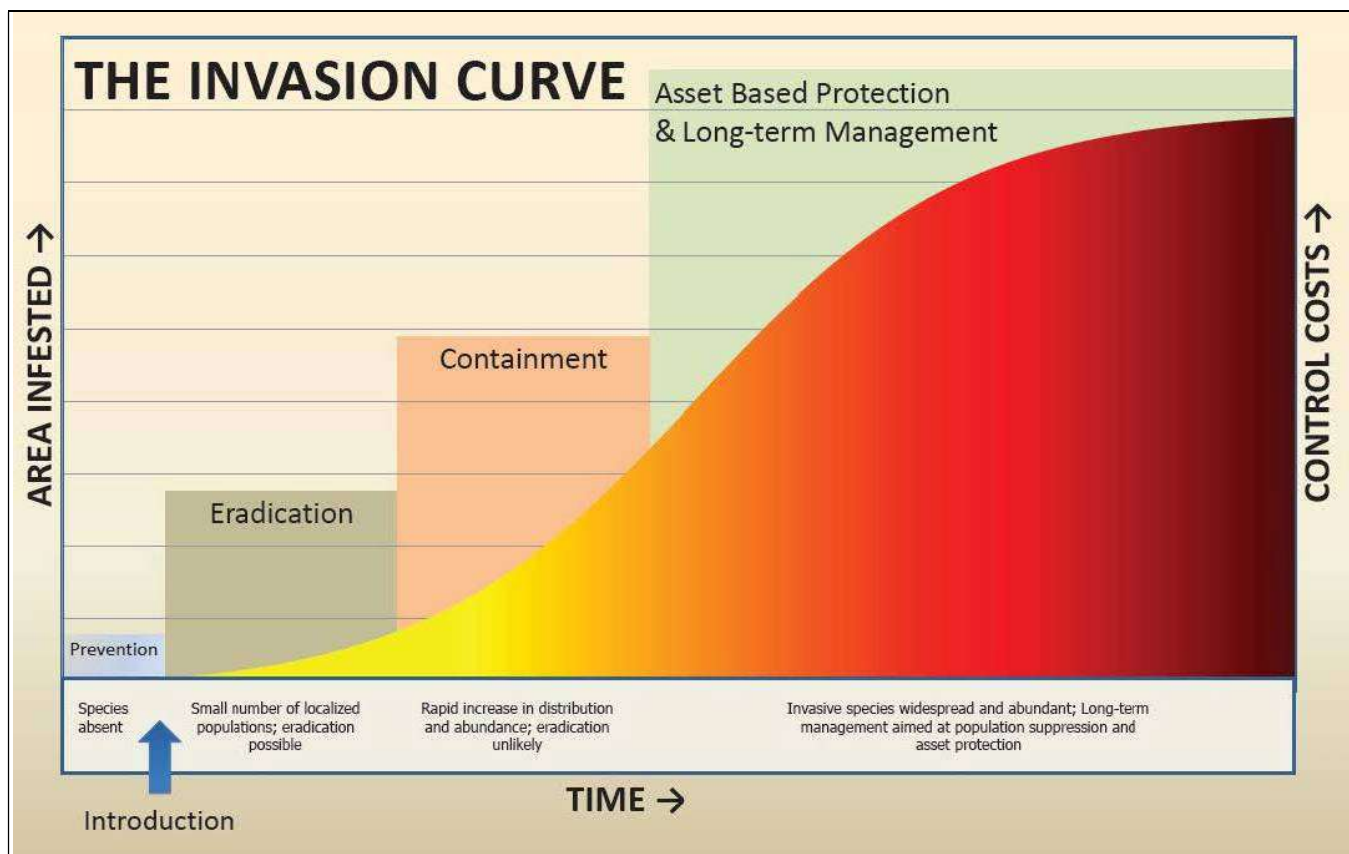
Hazard extent refers to the potential severity or magnitude of hazard events in a given area. This section describes categories used to indicate the extent of this hazard and the systems in place for monitoring severity.

The extent of invasive species on O'ahu is significant and varied, impacting multiple ecosystems across the island. Invasive species such as miconia, coconut rhinoceros beetles, and little fire ants have established themselves in various regions, posing threats to native flora and fauna, agricultural productivity, and human health. The extent of priority invasive species and the status of efforts to address them is provided in the last column of Table 15-1.

Research and monitoring can help managers anticipate which species will cause harm before it is too late to remove them. Identifying where a species is on the invasion curve is the first step to taking management action.

Figure 15-5 shows that eradication of an invasive species becomes less likely and control costs increase as an invasive species spreads over time. Prevention is the most cost-effective solution, followed by eradication. If a species is not detected and removed early, intense and long-term control efforts will be unavoidable (Harvey and Mazzotti 2021). The following sections describe appropriate responses to invasive species based on the phase of the invasion.

Figure 15-5. Phases of the Invasion Curve



Source: (Harvey and Mazzotti 2021)

### Early Detection and Rapid Response

While it is best to prevent invasive species from ever entering an area, early detection of new species is imperative for minimizing impacts on the ecosystem, reducing costs of management, and eradication of the species. In invasive species management, this is known as early detection and rapid response. Early detection and rapid response on O’ahu refers to a coordinated effort to prevent the establishment and spread of invasive species by rapidly detecting new incursions and responding quickly with eradication or containment measures. This approach aims to protect native ecosystems and resources before significant damage occurs.



## Eradication

The second line of defense is eradication, where the approach is to eliminate founding populations of invasive species while doing so is feasible. Early detection and rapid response actions are generally necessary to achieve eradication.

When eradication is infeasible with existing technologies, then containment or long-term control of an invasive species population is the remaining management option. These programs often require substantial, if not indefinite, financial investments. In some cases, eradication (such as in island ecosystems) or suppression of widespread established invasive species (such as by using integrated pest management) are possible and can be successful late in the invasion stages.

## Containment

Invasive species containment focuses on restricting an invasive species to a limited area, preventing its spread to new locations, and managing its population within the core area. It's a strategy that often follows initial attempts at eradication, but where complete removal is not feasible.

## Long-Term Management

Long-term control of an invasive species population involves strategies beyond initial eradication attempts, focusing on managing the species so it causes minimal harm. This includes suppressing population growth, protecting valuable resources, and mitigating the invasive species' impact.

### 15.1.4 PREVIOUS OCCURRENCES

This section provides an overview of hazard occurrences since the publication of the previous LHMP, which covers the period between January 2020 and February 2025. It identifies significant events that resulted in federal disaster declarations and/or state or local emergency proclamations. For events prior to 2020, refer to the 2020 LHMP.

## Recent Events

Table 15-2 shows recent events for O'ahu. Invasive species pose a significant threat to the ecological balance and biodiversity of O'ahu. These non-native organisms can cause extensive damage to the environment, economy, and even human health. In addition, HISC maintains a dashboard for reporting invasive species that provides information on the total number of reports by island, by organism type, and by species. The dashboard may be accessed at the following link: <https://www.643pest.org/Dashboard.aspx>. The HISC reporting dashboard indicates that since 2014, there have been 5,006 reports of invasive species for O'ahu (HISC 2025).



**Table 15-2. Reported Invasive Species Events in the City (2020 to 2024)**

Event Date	Disaster Declaration/ Proclamation			Description
	Federal	State	Mayoral	
2020	—	—	—	Little Fire Ants Active Sites: Makiki Lower, Kahala, Mililani Mauka
2021	—	—	—	Little Fire Ants Active Sites: Waimānalo, Kāneʻohe, Waimānalo, Maunawili, Kahuku
2022	—	—	—	Little Fire Ants Active Sites: Hauʻula, Lanikai, Papakōlea, Lanikai, Kāneʻohe, Kāneʻohe, Kāneʻohe, Hauʻula, Kāneʻohe, Lanikai
2022				Hawaii Department of Agriculture approved Interim Rule 22-1 restricting movement of Coconut Rhinoceros Beetle host material on, to, and from Oʻahu
2023	—	—	—	Little Fire Ants Active Sites: Kāneʻohe, ʻĀhuimanu, Kāneʻohe, Kaʻelepulu, Waiheʻe, Waiāhole, Lanikai, Waimānalo (south), Kailua, Kāneʻohe, Round Top Drive, Lanikai, Kāneʻohe, Kailua
2023				Response to Coconut Rhinoceros Beetle on Oʻahu shifts from eradication to containment.
2024	—	—	—	Little Fire Ants Active Sites: Kahaluʻu Beach, Maunawili, Pearl City, Kaʻelepulu, Kaneohe, Nuʻuanu, Roundtop, Kailua, Kaʻelepulu, Kailua, Nuʻuanu 2, ʻĀina Haina, Aiea, Kailua

Source: (HDOA, et al. 2024, StopTheAnt.org 2025)

### Federal Disaster Declarations

Under the Stafford Act, the President of the United States may issue an Emergency Declaration (EM) or Major Disaster Declaration (DR) for health related events and activate certain federal assistance programs based on factors related to the magnitude of the hazard threat or impacts. Invasive species are not an eligible hazard under the Stafford Act.

### State and Local Emergency Proclamations

State law authorizes the Governor to issue emergency proclamations if an emergency or disaster has occurred, or there is imminent danger or threat of an emergency or disaster in any portion of the state. County Mayors have the authority to issue local emergency proclamations when such conditions exist within any part of their respective jurisdictions. No state or local emergency proclamations related to this hazard were issued for the City during this period.



### 15.1.5 PROBABILITY OF FUTURE OCCURRENCES

The probability of future occurrences of invasive species on O’ahu remains high due to several factors, including the island’s climate, geographic location, and human activities. O’ahu’s warm, tropical climate provides an ideal environment for many invasive species to thrive. Additionally, the island’s status as a major transportation hub increases the risk of new species being introduced through cargo shipments, tourism, and trade.

Historical data and recent trends indicate that invasive species such as miconia, little fire ants, and coconut rhinoceros beetles are likely to continue spreading if not effectively managed. For example, the potential introduction of brown tree snakes could lead to the extinction of native bird species and result in an estimated \$2.14 billion annually in damages to electrical infrastructure and medical costs from snake bites (DLNR 2024). The presence of established populations and the potential for new introductions underscore the need for ongoing vigilance and proactive management strategies to actively monitor, control, and mitigate invasive species threats by organizations such as OSIC, HDOA, and other partners.

The future occurrence of invasive species is considered *highly likely*, as defined by the Risk Factor Methodology probability criteria (discussed in Section 4.4).

Information on previous invasive species occurrences in the City was used to calculate the probability of future occurrence of such events. Table 15-3 lists the number of events from various sources over the 4-year period from 2020 to 2024, which is the most complete period of record for all sources reviewed. Based on these records, the probability of occurrence for invasive species in the City is considered “frequent”.

**Table 15-3. Probability of Future Invasive Species Events in the City**

Hazard Type	Number of Occurrences Between 2014 and 2024	Percent Chance of Occurring in Any Given Year
Invasive Species	5,006	100%

Source: (HISC 2025)

Note: The time period presented in this table is the most complete period of record for the various data sources reviewed. 100% probability indicates that it is statistically likely for an event to occur every year. It does not indicate that the occurrence of an event is a certainty in any given year.

## 15.2 VULNERABILITY AND IMPACT ASSESSMENT

### 15.2.1 LIFE, HEALTH, AND SAFETY

The entire population in the City is vulnerable to invasive species to some extent, but direct impacts to life, health, and safety are minor. Invasive species can negatively impact human health by serving as vectors for existing diseases, or causing wounds through bites, allergens, or other toxins (USDA n.d.).



Invasive species can impact socially vulnerable populations in several ways. Economically, invasive species can damage crops, reduce agricultural productivity, and increase control costs, disproportionately affecting low-income communities that rely on agriculture for their livelihoods. The health risks that can be associated with invasive species are a particular concern for medically vulnerable populations, including the elderly population and individuals with suppressed immune systems.

Socially vulnerable populations often have fewer resources to manage and mitigate the impacts of invasive species, leading to greater exposure to negative effects and slower recovery times. Overall, the presence of invasive species can aggravate existing social and economic inequalities, making it crucial to address these issues through targeted management and support efforts.

### 15.2.2 ECONOMY AND GENERAL BUILDING STOCK

No structures are anticipated to be directly affected by infestation or invasive species; however, some invasive species could lead to the death of vegetation and trees, which could result in stream bank instability, erosion, and increased sedimentation, impacting ground stabilization and possibly causing foundation issues for nearby structures. Additionally, with an increased number of dead trees, there is an increased risk of trees falling on roadways, power lines, and buildings.

Some invasive plants have been shown to destabilize soil due to high densities and shallow root systems, negatively impacting nearby buildings and septic systems. Other invasive plant species have been known to clog culverts and streams, increasing flood risk.

The economic and social impacts of invasive species encompass both direct effects on property values, agricultural productivity, public utility operations, native fisheries, tourism, and outdoor recreation, as well as the costs associated with control efforts. For example, invasive insects that attack crops reduce yields and increase costs for farmers, while invasive species that damage forests impact the timber industry and recreational activities.

In Hawaii, it has been estimated that little fire ant infestation alone resulted in \$33 million in damage and management costs statewide over the period from 2011 to 2015 (UHERO 2016).

### 15.2.3 NATURAL, HISTORIC, AND CULTURAL RESOURCES

Invasive species have significant environmental impacts within the City. They threaten native plants and animals, disrupt ecosystems, and degrade natural resources. For example, invasive species like the little fire ant and coconut rhinoceros beetle damage crops, harm native wildlife, and alter habitats (DLNR 2015). Invasive plants, such as miconia, outcompete native vegetation, leading to the loss of biodiversity. Additionally, invasive species can affect freshwater resources by altering water quality and availability. The presence of invasive species also increases the risk of wildfires, as some invasive grasses are highly flammable (DLNR 2025). Overall, invasive species pose a significant threat to the environment, impacting both the natural ecosystem and the resources that local communities depend on.



Invasive species can alter landscapes and ecosystems that are integral to cultural heritage and traditional practices. For example, invasive plants can overrun native vegetation, disrupting the natural environment that many cultural practices depend on (AU SOE 2021). This can lead to the loss of plants used in traditional medicine, crafts, and ceremonies. Additionally, the introduction of invasive species can lead to changes in land use and management practices, which may conflict with traditional land stewardship and cultural values. The presence of invasive species threatens the preservation of cultural heritage and the continuation of traditional practices.

Invasive species can also damage historic sites and structures. For instance, invasive tree roots can undermine the foundations of historical buildings and archaeological sites, while invasive animals can cause physical damage to these structures. These impacts can compromise the integrity and preservation of historic resources, making it challenging to maintain and protect these important sites.

## 15.2.4 Future Changes That May Affect Risk

Understanding future changes that affect vulnerability can assist in planning for future development and ensure establishment of appropriate mitigation, planning, and preparedness measures. The following sections examine potential conditions that may affect hazard vulnerability.

### Potential or Planned Development

Chapter 3 identifies areas targeted for future growth and development across the City. Any areas of growth in the City could be impacted by invasive species.

### Projected Changes in Population

Projected population growth in the City, estimated at an annual rate of 0.2 percent from 2020 to 2040, could increase the risk of invasive species in several ways (DBEDT 2024). Increased human activity, such as construction, transportation, and tourism, can introduce and spread invasive species. For example, construction materials and equipment can harbor invasive plant seeds or insects, while increased tourism can lead to the accidental introduction of non-native species.

As the population grows, natural habitats may be disturbed or destroyed to make way for housing, infrastructure, and other developments, creating opportunities for invasive species to establish themselves in disturbed areas where native species may be less competitive. Invasive species often outcompete native species for resources such as water, nutrients, and space. With a growing population, the demand for these resources increases, potentially intensifying the impact of invasive species on native ecosystems. Chapter 3 includes a discussion on population trends for the City.



## Climate Change

Future climate change impacts could significantly alter the risk of invasive species in Hawai'i. As temperatures rise, the ranges of pests, diseases, and invasive species expand, impacting both high and low elevations in Hawai'i.

Increasing temperatures and, in some areas, reduced rainfall will stress native plants and animals, especially in high-elevation ecosystems. Established invasive species may expand their ranges to higher elevations. These vertical range shifts, along with increased disturbances from extreme weather events could create new opportunities for these species to establish themselves in previously unaffected areas (DLNR 2010).

This increased exposure to invasive species heightens the risk of extinctions and wildfires (HI-EMA 2023). The frequency of wildfires in the Hawaiian Islands has increased by 400% over the last century. The combination of less rainfall and severe drought from climate change, along with the introduction and unmanaged growth of non-native grasses, have contributed to the increased frequency and intensity of wildfires across the state (DLNR).

Climate change is also altering the ocean's physical, chemical, and biological characteristics around Hawai'i. Warmer and more acidic waters could disrupt marine species' feeding and spawning cycles, reduce primary productivity, and threaten calcifying organisms like plankton and corals. These changes may also create more favorable conditions for pathogens and invasive species, endangering native marine life.