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Biodiversity Surveys of Wake Atoll—Featuring Field Guides for Plants, Arthropods, and Herpetofauna

Open-File Report 2023–1066

U.S. Department of the Interior
U.S. Geological Survey

Cover. Aerial view of Wake Atoll (Source: Google Earth image taken 2016), *Gossypium stephensii*, (Photograph by J. Gilardi, Island Conservation, 2019), *Ampulex compressa* and *Olfersia* sp. (Photographs by R. Peck, Hawai'i Cooperative Studies Unit, University of Hawai'i at Hilo, 2019), *Hemidactylus frenatus* and *Cryptoblepharus poecilopleurus* (Photographs by A.R. Backlin, U.S. Geological Survey, 2019), and *Ipomoea pes-caprae* subsp. *brasiliensis* (Photograph by J.D. Jacobi, U.S. Geological Survey, 2019).

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Contents

Figures

Tables

Conversion Factors

International System of Units to U.S. customary units

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch (in.)
millimeter (mm)	0.03937	inch (in.)
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)
kilometer (km)	0.5400	mile, nautical (nmi)
meter (m)	1.094	yard (yd)
	Area	
hectare (ha)	2.471	acre
square kilometer (km^2)	247.1	acre
	Mass	
gram (g)	0.03527	ounce, avoirdupois (oz)
	Volume	
liter (L)	0.264172	Gallon
milliliter (mL)	0.03	fluid ounce (fl oz)
cubic meter (m^3)	1.3	cubic yard (yd^3)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F = (1.8 \times °C) + 32.$$

Abbreviations

HMU	habitat management unit
INRMP	Integrated Natural Resources Management Plan
Pan Am	Pan American Airlines
SVL	snout vent length
USAF	United States Air Force
USGS	United States Geological Survey
YCA	yellow crazy ant
WWII	World War II

Biodiversity Surveys of Wake Atoll—Featuring Field Guides for Plants, Arthropods, and Herpetofauna

By Stacie A. Hathaway,[1] James D. Jacobi,[1] Robert Peck,[2] Adam R. Backlin,[1] Cynthia J. Hitchcock,[1] and Robert N. Fisher[1]

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Chapter A. 2019 Wake Atoll Biodiversity Surveys Overview

By Stacie A. Hathaway and Robert N. Fisher

A. Introduction

Wake Atoll (generally referred to hereafter as "Wake") is part of the Gilbert-Marshall Island chain in the Pacific Ocean, about 3,500 kilometers (km) west of the Hawaiian Islands, 2,600 km east of Guam, 3,200 km southeast of Japan, and 570 km north of Bokak Atoll in the Republic of the Marshall Islands (Bryan, 1959; U.S. Air Force, unpub. data, 2017). Wake is one of the most isolated terrestrial islands in the Pacific (fig. A1; U.S. Air Force, unpub. data, 2017). Wake consists of three islets: (1) Peale, (2) Wake, and (3) Wilkes, arranged in a V-shaped pattern around a central lagoon (fig. A2; Bryan, 1959). Wake is a low atoll with an average elevation of about 4 meters (m), maximum elevation of about 6.4 m above sea level, and a total land area of about 7 square kilometers (km^2; U.S. Air Force, unpub. data, 2008). The climate is tropical maritime with little annual temperature variation (U.S. Air Force, unpub. data, 2008). Mean annual temperatures range from 24.4 to 28.3 degrees Celsius (°C), with an annual maximum of 35 °C and a minimum of 20 °C. Rainfall averages about 890 millimeters (mm) per year (Weatherbase, 2020). Together, high temperatures and low rainfall generally keep Wake in a state of drought (U.S. Air Force, unpub. data, 2008). Frequent tropical storms and typhoons generating high winds and waves can cause considerable damage to vegetation and infrastructure (U.S. Air Force, unpub. data, 2008). Wake consists of porous coral rubble and limestone with organic matter in vegetated areas (U.S. Air Force, unpub. data, 2008). Despite low endemism and biodiversity in general, Wake and other atolls protect various natural resources, including several terrestrial and marine natural resources, such as plants, seabirds, shorebirds, lizards, and sea turtles (Engilis and Naughton, 2004; U.S. Fish and Wildlife Service, 2005; Thaman, 2016).

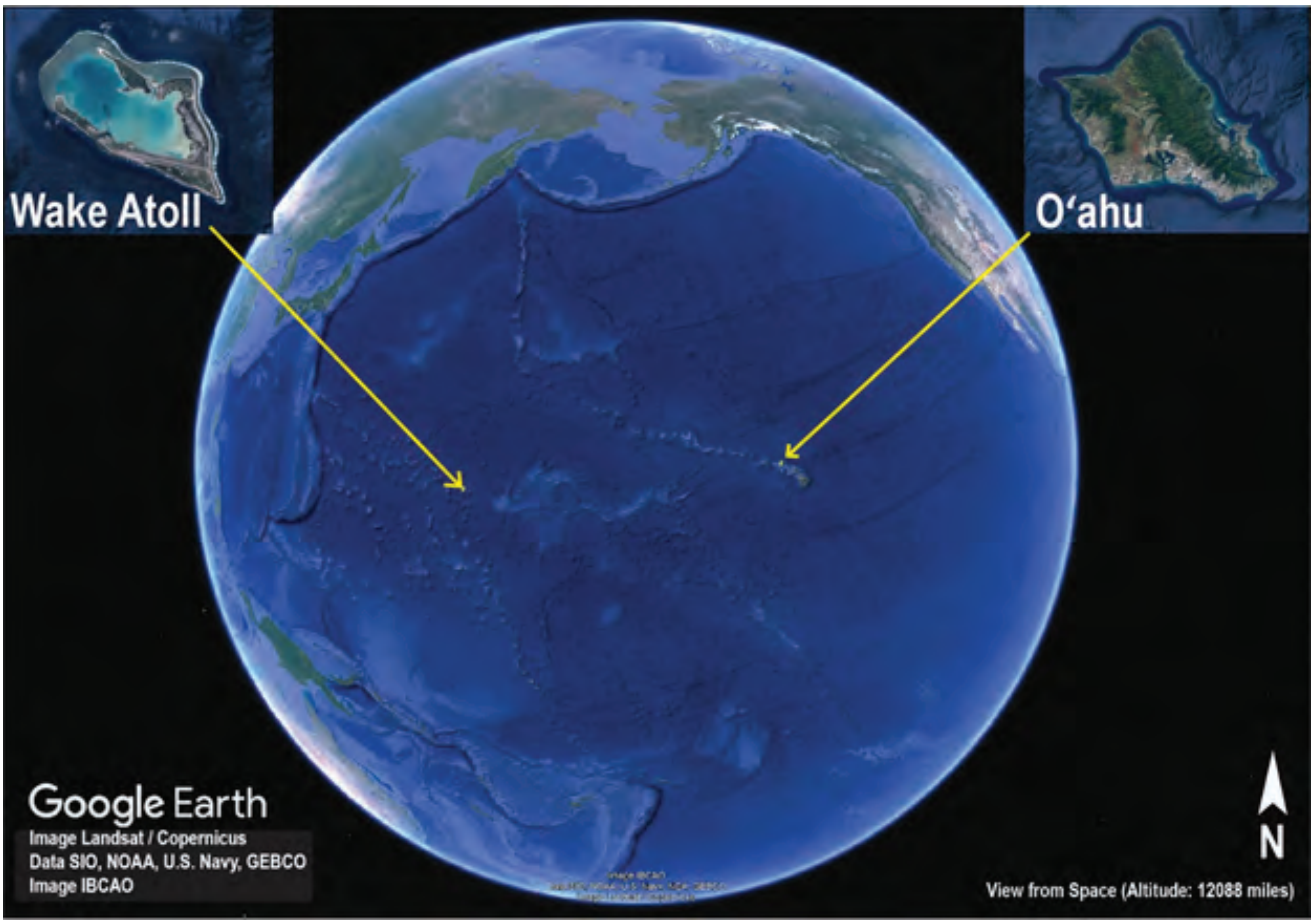

Figure A1. Location of Wake Atoll (Google Earth image, 2016).

Figure A2. Wake Atoll with habitat mapping units and selected sites referred to in the report (U.S. Air Force, WorldView 3 image, taken October 2015).

There is no prehistoric evidence that Wake was populated by pre-European Pacific peoples. Heinl (1947) provides an account of the pre-war history of Wake from 1568 to 1941, and additional historical context is contained in the Wake Integrated Cultural Resources Management Plan (Verhaaren and Kullen, unpub. data, 2014) and the Wake Integrated Natural Resources Management Plan (INRMP; U.S. Air Force, unpub. data, 2017). The brief history that follows is summarized from these documents. Wake was discovered in 1568 by Spanish explorers, although credit is given to British Captain William Wake, who rediscovered the island more than 200 years later in 1796. Wake was explored by U.S. Navy Commander Charles Wilkes and naturalist Titian Peale in 1841. The United States formally took possession in 1899. There are reports of several shipwrecks and otherwise limited visitations until the Japanese began landing to harvest bird feathers and fish for shark fins. A group of Japanese castaways were marooned on the atoll at one point. Remaining Japanese camps were abandoned by 1922. Most early zoological and botanical observations are from the Smithsonian's Tanager Expedition, which carried out a biological reconnaissance at Wake in 1923. The U.S. Navy was given jurisdiction over Wake in 1934 and gave permission for Pan American Airlines (Pan Am) to begin constructing facilities to support weekly trans-Pacific flights. In 1938, the Navy began plans for an outlying military base; however, construction did not begin until January 1941. Construction was not yet completed when the Japanese invaded and overran the island in December 1941 and occupied Wake for the rest of World War II. During the war, the Japanese continued to build many structures underground and behind embankments for protection against repeated bombing. After Japanese surrender in 1945, the atoll returned to U.S. possession and was placed under the jurisdiction of the U.S. Navy. Later, the civil administration was given to what is now known as the Federal Aviation Administration (FAA). Military Air Transport Services and,

later, Military Airlift Command provided service to transient U.S. Air Force (USAF) aircraft while at Wake, and Pan Am and other airlines reestablished commercial airline services. During that period, population rose to roughly 2,000 people at the atoll, and an elementary school was constructed. Additional botanical and bird surveys were carried out during this period. In 1972, when long-range jet aircraft reduced the need for Wake as a refueling stop, the FAA transferred jurisdiction to the USAF until 1994. After this time, Wake was administered by the U.S. Army for missile defense and then transferred back to the USAF in 2002. On January 6, 2009, by Presidential Proclamation 8336, Wake Atoll was included in the establishment of the Pacific Remote Islands Marine National Monument. The Secretary of the Interior, in consultation with the Secretary of Commerce, is responsible for the management of the monument. On January 16, 2009, through Secretary Order 3284, the Secretary of the Interior delegated management of the monument to the U.S. Fish and Wildlife Service (USFWS). In accordance with Proclamation 8336, this order (3284) states that Wake is under management by the USAF under the 1972 agreement with the Secretary of the Interior (Code of Federal Regulations 32 Part 935) until the agreement is terminated. The USFWS manages the areas surrounding Wake Atoll from the mean low water line out to 50 nautical miles as part of the National Wildlife Refuge System. Emergent lands are managed by the USAF and used for contingency deployments, an emergency landing facility, and fuel storage. With these activities, construction and maintenance at Wake have continued. In addition, there are currently (2019) regular flights to and from the atoll that carry passengers and supplies. Oceangoing barges bring the bulk of materials and supplies to the atoll and transport used equipment and materials off island.

This history is important for understanding how Wake and its natural resources have been affected over time and illustrates an array of past and current (2019) pathways for invasive species. Non-native species have the potential to be invasive, defined by Executive Order numbers 13112 and 13751, as "species whose presence has caused harm or may cause harm to environmental or human, animal, or plant health" (National Invasive Species Council, 2008). Invasive species are well known to be important factors in the decline of unique natural communities, species, and ecological processes (Vitousek, 1990; numerous papers in Veitch and Clout, 2002; Engilis and Naughton, 2004). Per the Sikes Act, the USAF currently (2019) uses INRMPs to manage and protect natural resources on installations. The INRMP that addresses Wake includes components that cover biosecurity and pest management. These are long-term planning documents to guide Department of Defense (DOD) natural resource managers in the management of natural resources to support installation missions while protecting and enhancing resources for multiple uses and biological integrity (U.S. Department of Defense, 2018; U.S. Air Force, 2020). The initial plan introduced the goal to "bring together and integrate all management activities in a way that sustains, promotes, and restores the health and integrity of ecosystems and that enhances the human environment on Wake Atoll" (Foothill Engineering Consultants, Inc., written commun., 2000). The 2008 INRMP identified the need for an invasive species risk assessment (U.S. Air Force, written commun., 2008).

Invasive/pest species are recognized as one of the greatest threats to ecosystems and economies (Vitousek and others, 1997; Warziniack and others, 2021). Biosecurity is thus a concern at several scales from global to local, and to address this issue, prevention and control policies have been and continue to be improved at several levels of government (Ricciardi and others, 2020; Rawluk and others, 2021). A biosecurity plan is an effective tool for identifying and addressing non-native, potentially invasive species problems and concerns (Matos and others, 2018). In 2012, the USAF, with support from private consultants, authored the "Wake Island Biosecurity Management Plan" (U.S. Air Force, unpub. data, 2012). The plan re-defined the container requirements and other elements of USAF shipping to the atoll. The biosecurity plan was updated in 2015 (U.S. Air Force, unpub. data, 2015) and incorporated into the 2017 INRMP as a component plan. The current (2015) biosecurity plan retains a rodent focus. However, some components of the intervention measures within it have potential for inhibiting or intercepting invasive species other than rodents. The INRMP calls for this plan to be updated periodically. In 2017, the U.S. Air Force issued funds to the U.S. Geological Survey (USGS) to update the biosecurity plan, create a current (2019) flora and fauna species identification index, and do container evaluations for the presence of potential invasives. The current (2019) biosecurity protocols used for prevention were evaluated (S.A. Hathaway, C.S. Brehme, and R.N. Fisher, U.S. Geological Survey; J.C. Molden, U.S. Fish and Wildlife Service; R. Peck, Hawai`i Cooperative Studies Unit, University of Hawai`i at Hilo; and K.R. Rex, National Oceanic and Atmospheric Administration, unpub. data, 2022), and new biodiversity surveys were completed for terrestrial vegetation and arthropods and included the first formal reptile surveys. Results from field efforts add to existing knowledge and may identify new species arrivals to Wake.

One goal of this project was to update and compile established species information for the atoll and create species identification guides for the three taxonomic groups surveyed. We made these flora and fauna species identification guides by compiling results of the recent (2019) and historical surveys. The guides can be used as resident desktop references, as a baseline for assessing future natural resource surveys, and to assist with guiding management actions. We refer herein to biosecurity and integrated pest management plan materials, which we created simultaneously to inform current (2019) biosecurity and to identify some of the top invasive species at Wake (Hathaway and others, 2022). This study was done in cooperation with the USAF, and surveys were performed for the 611th Civil Engineer Squadron Natural Resources Program, ACES PROJECT #YGFZ170002 under agreement number F2MUAA7116GW02 between the USAF and the USGS-Western Ecological Research Center.

A. Methods

Species Identification Guides

We compiled data specific to Wake from museums, herbariums, and published and unpublished literature; we also interviewed people with local knowledge to understand the status and distribution of flora and fauna known historically to exist on the atoll.

Wake, Wilkes, and Peale Islets have been separated into habitat management units (HMUs), which were delineated to assist in the creation of natural resources management actions and approaches (U.S. Air Force, unpub. data, 2017. We performed flora and fauna surveys broadly across HMUs on all three islets as well as in focused areas most likely to be vulnerable to invasive species incursions (for example, the marina and associated area within HMU-11; areas with concentrated populated buildings, such as in HMU-58; and cargo container unloading and storage areas within HMU-65; fig. A2). Field surveys were carried out at Wake between May 24 and June 7, 2019. For the specific methods employed and details about plants, arthropods, and reptiles, see chapters B, C, and D, respectively.

A. Results

We identified more than 450 species of terrestrial plants, arthropods, and reptiles that have been recorded at Wake (table A1, see chapters B, C, and D for plants, arthropods, and reptiles, respectively). There have been 229 vascular plant species documented during past and current (2019) surveys; 20 are considered native, and 1 is endemic to Wake, whereas 209 are nonnative (table A1). In 2019, a total of 153 plant species were recorded: 19 native and 134 nonnative; 15 were newly reported nonnative species. One native and 75 nonnative plant species previously reported at Wake were not observed in 2019.

Between 221 and 237 total arthropod species have been recorded at Wake. Varying levels of identification impeded comparisons across surveys; therefore, an exact assessment of how many species in total have actually been recorded could not be made. Also, given that reasonable assessment of species provenance has not been possible (see chapter C, "Wake Atoll 2019 Arthropod Species Survey Report and Field Guide"), we could not clearly distinguish which species should be considered native or nonnative to Wake. Between 140 and 156 species had not previously been reported for Wake, and between 48 and 64 species previously recorded were not observed in 2019.

Nine reptile species have been reported at Wake over time; four of these we consider to be native. Of these reptile species, we observed three native and one nonnative lizard species in 2019. We also obtained photographic evidence of one nonnative snake species in 2017. We did not directly detect this species ourselves in the field in 2019.

A. Discussion

As summarized herein, there are 20 terrestrial plant and 4 terrestrial reptile species considered native to Wake. Although there are undoubtedly terrestrial arthropods that are native to Wake, determining with confidence which species are native is beyond the scope of this study. We deduce there have been up to 451 nonnative terrestrial plant (209), arthropod (up to 237), and reptile (5) species recorded on Wake (table A1). About 7 percent (15) of all nonnative plants and up to about 70 percent (156) of arthropod species detected in 2019 had not been previously recorded. This finding may indicate that introductions of new species, particularly arthropods, are ongoing. However, given that many of these species are likely uncommon and patchily distributed, and given the brevity of these surveys, some or even many of these species may have been present previously but not observed. Conversely, it also is possible that some species detected during our surveys were newly introduced and had not yet established or been able to establish. Likewise, approximately 39 percent of nonnative plant species and up to 29 percent of arthropod species were previously recorded but not observed in 2019. Previously unrecorded species of reptiles were not detected in 2019. However, the previously recorded common house gecko (*Hemidactylus frenatus*), along with various plant seeds and arthropods detected in shipping containers sent to Wake in 2018 (S.A. Hathaway, U.S. Geological Survey; J.C. Molden, U.S. Fish and Wildlife Service; and K.R. Rex, National Oceanic and Atmospheric Administration, unpub. data, 2022), indicates that continued introductions of some established species does happen.

Because of time constraints, some HMUs were less thoroughly assessed than others, and not all HMUs were examined. However, surveys were as representative as time and access permitted; surveying broadly across the atoll, including multiple HMUs on each of the three islets, and focusing on areas we considered most likely to harbor new arrivals. The compilations of historical and 2019 survey data presented here provide a current (2019) baseline for making decisions regarding research, monitoring, planning, and management. These results include examples of recent (since last documented according to sources we report in the chapters herein) changes in biodiversity that point to the importance of robust biosecurity practices.

Table A1. Summary of species recorded during surveys by U.S. Geological Survey on Wake Atoll in 2019 (from chapters B, C, and D for plants, arthropods, and reptiles, respectively).

[No., number; sp., species; unk, unknown; —, not determined]

Taxa	Species recorded from Wake			Species recorded pre-2019			Species recorded 2019					Species not recorded 2019		
	Total no.	No. native	No. nonnative	Total no. sp.	No. native	No. nonnative	Total no. sp.	No. native	No. nonnative	Newly recorded native	Newly recorded nonnative	Total no.	No. native	No. nonnative
Plants	229	20	209	212	19	193	153	19	134	0	15	76	1	75
Arthropods	[1](221–237)	unk[2]	unk[2]	81	unk[2]	unk[2]	173	unk[2]	unk[2]	[1,2](140–156)		[1](48–64)	unk[2]	unk[2]
Reptiles	9	4	5	9	4	5	4	3	1	0	0	5	1	4
Total	**[1](459–475)**	—	—	**302**	—	—	**330**	—	—	—	—	**[1]127–143**	—	—

[1]Incomplete levels of identification sometimes precluded species-level comparisons among surveys (see chapter C).

[2]Unknown; no assessment could reasonably be made as to the provenance of the species (see chapter C).

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Chapter B. Wake Atoll 2019 Plant Species Survey Report and Field Guide

By James D. Jacobi

B. Introduction

The native flora and plant communities reported on Wake Atoll are relatively simple (Fosberg, 1959; Mueller-Dombois and Fosberg, 1998). The extreme isolation of this location has limited the number of plant species able to colonize the very small land surface naturally. The 21 species of vascular plants considered native to Wake are just a small subset of the flora detected across the pan-tropical Pacific islands (Mueller-Dombois and Fosberg, 1998), and one of these, *Gossypium stephensii*, is endemic to this atoll (Gallagher and others, 2017). Plant diversity on Wake is limited by the relatively uniform dry-arid habitat due to a combination of the porosity of the coral-based substrate (Bryan, 1959) and low annual precipitation, which is approximately 1,015 millimeters (mm) per year (Fosberg, 1959).

In addition to the native flora, many plants have been either purposely or accidentally introduced to the atoll by humans. Although most of these nonnative plants are detected only in cultivation as household or yard ornamentals or in gardens, many introduced species have become naturalized, and a few are considered to be invasive, posing actual or potential threats to maintaining the natural flora and vegetation (D.R. Herbst, B.P. Bishop Museum, unpub. data, 1998; Mueller-Dombois and Fosberg, 1998; U.S. Air Force, unpub. data, 2017).

During summer 2019, a 2-week field survey was done on Wake to assess the status of the plant species and plant communities reported there. This survey was part of a larger project to document the current (2019) status of plant communities, terrestrial reptiles, and arthropods on the atoll and to provide input into the creation of an expanded integrated pest management and biosecurity plan for the Department of Defense.

Specific objectives of the vegetation survey included the following:

1. compile lists of plant species that have been collected or recorded on Wake during previous surveys;

2. complete a new field survey to determine the current (2019) status of plant species detected on the atoll; and

3. produce a list and photograph key describing the plant species previously and currently (2019) recorded from Wake, including information on taxonomy, status, distribution, and potential threats from nonnative species.

B. Methods

Before initiating field work, lists of vascular plant species that had been recorded during previous surveys on Wake were compiled into a relational database. Information in the database includes data source reference and survey dates, current (2019) taxonomic nomenclature, status in the flora (native or introduced), status of the nonnative plants (cultivated or naturalized), and location information on each species on the three islets. Where needed, taxon names were updated to their currently (2019) accepted nomenclature following Roskov and others (2019).

The field survey was done on Wake from May 24 to June 7, 2019. During this time, all areas and habitat types on the three islets were selectivity visited, and plant species were recorded by site and habitat type (fig. B1). Generally, this process involved walking to an arbitrarily chosen representative point within a plant community and documenting all plant species detected in that local vicinity. The Global Positioning System (GPS) coordinates for the site were recorded, as well as information on habitat conditions and other plant communities in that location. Photographs were taken of representative individuals for the recorded species. Each photograph included a date and time stamp, as well as GPS coordinates recorded in decimal degrees so species locations could be accurately mapped.

Information on plants previously recorded on Wake, as well as during the 2019 survey, is presented in tables B1–B3 and appendix B1 and B2. The status of species in these tables is identified as follows: “cultivated”—species that were only detected in cultivation and were not reproducing in the wild; “alien invasive”—introduced species that were reported to be established in the wild and considered to be invasive elsewhere (U.S. Forest Service, 2018; Florida Invasive Species Council, 2019; Hawai‘i-Pacific Weed Risk Assessment, 2019; International Union for Conservation of Nature, 2019; U.S. Department of Agriculture, 2019); “alien naturalized”—species that were reported to be established in the wild but not considered to be invasive; “native”—species that were identified as naturally detected on Wake during previous surveys (Christophersen, 1931; Bryan, 1959; Fosberg, 1959; Fosberg and Sachet, 1969; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998); and “endemic”—species unique only to Wake. In table B2, an introduced species is identified as a threat to biodiversity on Wake if it was reported to be established in the wild and shown to be invasive elsewhere. Also, in table B2, the risk an introduced species poses to biodiversity on Wake ranges from high to medium to low based on the previously mentioned published risk assessments. However, in several cases, the

Figure B1. Wake Atoll, including the three islets around the lagoon and selected sites referred to in the report. (WorldView 3 image, taken October 2015).

risk category was modified for Wake based on the fact that (1) a species was only detected in cultivation and unlikely to survive outside that level of care; (2) a species with a high risk factor elsewhere currently (2019) has less potential for spread and effects on Wake due to a lack of dispersal agents (for example, seed- or fruit-eating birds); or (3) a species is only in cultivation, and the conditions for its establishment on Wake are minimal due to lack of habitat (for example, waterlily or water hyacinth). Management feasibility in table B2 is identified as "high" for species that are considered to be invasive but not yet widespread and "medium" for species that are invasive but more widespread and require greater effort for control or eradication. The actual cost and capacity needed to control a species will vary depending on the distribution of the species, availability of effective control tools or protocols, and regenerative capability of the species, including persistence of the seedbank. In table B3, species distribution is coded based on the extent of the species in the field in the 2019 survey (widespread or local), and on an estimate of relative abundance (high, medium, low) for each species at that time.

The initial plant species list photo-key that was produced prior to the field survey was updated to include additional species that were identified during the 2019 survey. This photograph key (see the last section of this chapter) includes up to four images of each species and enough detail to generally allow an observer to identify the species in the field. Additionally, each taxon page includes the scientific and common names for the species, its plant family, life form, and status on Wake, as well as information on its past and current (2019) distribution. Species recorded in tables B1–B3, appendix B1, and the "Plant Field Guide to Wake Atoll" section (appendix B2) represent only taxa that had clear documentation of their presence on Wake, primarily based on records provided by Christophersen (1931), Bryan (1959), Fosberg and Sachet (Fosberg, 1959; Fosberg and Sachet, 1969), D.R. Herbst Bernice Pauahi Bishop Museum (unpub. data, 1994, 1998), and the 2019 survey. However, to reduce the Field Guide's size, only species recorded by Herbst in his two surveys and species recorded during the 2019 survey are documented in the photo-key. Common vegetable garden plants and many household ornamentals were also omitted from the Field Guide unless they had high potential to be invasive outside of cultivation.

The results of the current (2019) survey are used to identify several invasive species that resource managers may use on Wake as priorities for integrated pest management. These identifications include some species that already exist on Wake Atoll, as well as others that are not yet reported there but pose a risk to the native ecosystems if they become established (table B4). Descriptions of these species are included in the "Discussion" section, and potential management options for these species are summarized in the biosecurity and integrated pest management plan materials document (Hathaway and others, 2022).

B. Results

A total of 229 vascular plant species have been documented on Wake during previous reporting and 2019 surveys (tables B1–B3; appendix B2; "Plant Field Guide to Wake Atoll" section). Although several naturalists have visited Wake since its discovery and described some of the plants and plant communities detected there (Christophersen, 1931; Bryan, 1959), the first systematic surveys of the atoll were done by Fosberg and Sachet (Fosberg, 1959; Fosberg and Sachet, 1969). Fosberg and Sachet (Fosberg, 1959; Fosberg and Sachet, 1969) recorded 112 species, 18 of which were native and 94 introduced (table B1). Herbst also surveyed this area in 1994 and 1998 and reported 169 species, 18 native and 151 introduced. In both surveys, most of the introduced species were detected only in cultivation.

During the 2019 survey, 153 plant species were recorded. Of this species total, 19 were native and 134 introduced (tables B1–B3). These plant species numbers are similar to those detected by Herbst in 1994 and 1998, although he recorded many more cultivated species than were detected in the 2019 survey (table B1).

Most of the plants recorded during the 2019 survey were detected on Wake Islet (151 species), with lesser amounts detected on Peale (56) and Wilkes (34) Islets (table B3; fig. B2). One of the native species, *Heliotropium anomalum* (fig. B3), is quite rare and detected in only two locations on Wake Islet. The only endemic species to this atoll, *Gossypium stephensii* (fig. B4), was detected abundantly on Wake and Peale Islets and on the south part of Wilkes Islet, northwest of the harbor. This species seems to be a successful colonizer of open, previously disturbed habitats (Gallagher and others, 2017). There were 15 species detected during the 2019 survey that had not been previously documented by Fosberg and Sachet (Fosberg, 1959; Fosberg and Sachet, 1969) or D.R. Herbst (Bernice Pauahi Bishop Museum, unpub. data, 1994, 1998); however, many of these species were included in an unpublished species list compiled by M. Waite while he was working on Wake (J. Gilardi, Island Conservation, written commun. May 29, 2019).

Areas sampled in 2019 included most of the Habitat Management Units described in the 2017 Wake Integrated Natural Resources Management Plan (U.S. Air Force, unpub. data, 2017). Voucher specimens were collected for 44 of the species detected during the survey in 2019 to aid with their identification or to document new records (appendix B3). These specimens are deposited in the herbarium at the B.P. Bishop Museum in Honolulu, Hawai‘i.

Figure B2. Location of sites on Wake Atoll where plant species were recorded during the 2019 field survey. (WorldView 3 image, taken October 2015).

Figure B3. *Heliotropium anomalum* growing in open habitat on the northeast side of Wake Islet. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B4. Native species of cotton (Gossypium stephensii) that is endemic to Wake Atoll. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

B. Discussion

Current (2019) Status of Plants and Plant Communities

The low topographic range, meager precipitation, and biogeographic isolation of Wake have all contributed to a flora that is relatively simple, capable of natural recovery from disturbance but also susceptible to change. The dynamic nature of the flora on Wake is a result of both natural perturbations, such as hurricanes or tsunamis, and other factors that include landscape alteration, human disturbance, and effects from introduced species. Primary documented invasive species effects are from introduced rats (*Rattus exulans* and *R. tanezumi*; Griffiths and others, 2014; U.S. Air Force, unpub. data, 2017) and from a select number of ecosystem-altering plant species (U.S. Air Force, unpub. data, 2017). It is currently (2019) unclear how introduced invertebrates have affected the native flora and plant communities.

The 2019 survey reported that the dominant native plant communities generally appeared to be maintaining their structure and composition in the lesser disturbed areas throughout the atoll. These communities are relatively simple and include (1) a widespread *Heliotropium foertherianum* woodland with a native grass and shrub understory (fig. B5); (2) a *Pemphis acidula* (fig. B6) shrubland that primarily grows along the shoreline, particularly on the lagoon sides of the islets; (3) a mixed *Heliotropium* woodland with *Cordia subcordata* (fig. B7) and *Pisonia grandis* trees (fig. B8); (4) a shrubland dominated by *Scaevola sericea* (fig. B9), currently (2019) limited in distribution primarily on the southeast tip of Wake Islet; (5) a small community dominated by *Sesuvium portulacastrum* (fig. B10) that grows around the edges of the few small wetland areas on Wake and Peale Islets; and (6) a very narrow fringe of native grass, primarily *Lepturus repens* (fig. B11), and scattered native shrubs that form a strand community just above the water's edge around all the islets. Additionally, there is a unique low-stature native shrubland in the area referred to as the "Bird Sanctuary" on the northwestern part of Wilkes Islet. The area is dominated by the native shrubs *Tribulus cistoides* and *Lepidium bidentatum*, but also includes *Sida fallax*, two *Boerhavia* species, and the herb *Portulaca lutea* (fig. B12). This area has been mechanically mowed repeatedly to provide habitat for several species of ground-nesting seabirds (U.S. Air Force, unpub. data, 2017), and native plant species there appear to be able to tolerate this level of disturbance and continue to dominate the vegetation.

The rest of the landscape on the three islets is comprised of a variety of communities that are in various stages of disturbance or recovery from disturbance but primarily dominated by introduced plant species. These communities include grass-dominated areas that are frequently mowed or cleared, such as along roadsides and the sides of the airstrip or in the industrial area on Wake Islet and the harbor area at the southwest tip of Wake. Also included in these communities, are large areas on all the islets that are dominated primarily by ironwood (*Casuarina equisetifolia*; fig. B13), with little growing under its dense canopy and thick layer of litter on the ground. Additionally, many of the roadsides beyond the regular mowing zone have been invaded by numerous introduced shrubs, including *Pluchea carolinensis*, *Stachytarpheta jamaicensis*, *Bidens alba*, and several introduced grasses.

Most of the introduced plant species detected during the previous and current (2019) surveys on Wake were cultivated plants that were grown either as ornamentals around the residence areas or in vegetable gardens (table B2; figs. B14–B23). The variation in numbers of cultivated species recorded during the three surveys reflects what the residents grew at that time. From 1969 to 2019, there was a slow increase in the number of naturalized and invasive species recorded on Wake (table B1). When all the survey results are combined, 67 introduced species were reported to be naturalized, and 33 of these species are considered invasive in other areas of the Pacific (U.S. Forest Service, 2018; Florida Invasive Species Council, 2019; Hawai‘i-Pacific Weed Risk Assessment, 2019; U.S. Department of Agriculture, 2019).

Figure B5. Open *Heliotropium foertherianum* woodland on Peale Islet. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B6. Flowers and immature fruit of *Pemphis acidula*, which forms a dense shrub community, particularly around the lagoon sides of Wake, Wilkes, and Peale Islets. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B7. Flower of the tree *Cordia subcordata,* which grows in a mixed woodland-shrub community with *Heliotropium foertherianum* and *Pisonia grandis* on Wake Atoll. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B8. *Pisonia grandis* and its *A*, habitat; *B*, leaves; *C*, flowers; and *D*, sticky seed pods. (Photographs *A*, *B*, and *D* by J. Jacobi, U.S. Geological Survey, 2019, and photograph *C* by Forest and Kim Starr, Starr Environmental, 2018).

Figure B9. A native shrubland dominated by *Scaevola sericea* was probably more widely distributed prior to human disturbance; it is now detected in a few locations, primarily on the southeastern tip of Wake Islet. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B10. *Sesuvium portulacastrum*, a succulent herb that forms dense mats around the edges of brackish wetlands on Wake and Peale Islets. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B11. The native grass, *Lepturus repens,* is detected in the strand vegetation on Wake Atoll and in more inland sites, particularly on Peale Islet, where it forms a dense grass cover under an open *Heliotropium foertherianum* woodland. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B12. View of the mowed Bird Sanctuary area on the north part of Wilkes Islet; this community is dominated by several native plants, including *Tribulus cistoides* and *Lepidium bidentatum*. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B13. Large *Casuarina equisetifolia* (ironwood) tree growing in the open near the residential area on Wake Islet. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B14. *Coccoloba uvifera* (sea grape) trees are becoming established in several locations on Wake and Peale Islets and have the potential to rapidly spread and dominate the native vegetation if not controlled. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B15. *Cenchrus setaceus* has aggressively invaded dry lowland habitats in Hawai'i, dominating the vegetation and posing a high risk for wildfire. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B16. *Clusia rosea* is a small tree that grows along dry shorelines and lowland habitats in many areas across the Pacific. (Photograph by Forest and Kim Starr, Starr Environmental, 2019).

Figure B17. *Lantana camara* is a small woody shrub that has been able to dominate lowland dry and mesic habitats in Pacific Island ecosystems, such as those in Hawai'i. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B18. The aggressive, invasive vine, *Neonotonia wightii*, has the ability to smother the vegetation in lowland habitats, as seen in many areas in Hawai'i. (Photograph by Forest and Kim Starr, Starr Environmental).

Figure B19. Black noddy tern (*Anous minutus*) perching on a branch of a *Casuarina equisetifolia* (ironwood) tree. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B20. Closeup of foliage and cones of *Casuarina equisetifolia*. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B21. The introduced sandbur grass (*Cenchrus echinatus*) is becoming established in many sites on Wake and Peale Islets. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B22. Flowers, immature seed pods, and foliage of the introduced invasive tree *Leucaena leucocephala*, which is becoming established in several locations on Wake and Peale Islets. (Photograph by J. Jacobi, U.S. Geological Survey, 2019).

Figure B23. The introduced vine *Passiflora foetida* var. *hispida* is currently (2019) detected on Wake Islet and the southeastern part of Wilkes Islet just north of the harbor inlet and storage tanks. (Photograph by J. Gilardi, Island Conservation, 2018).

Table B1. Summary of plant species recorded on Wake Atoll in the 2019 survey or during previous surveys by Fosberg and Sachet (1969) and D.R. Herbst (B.P. Bishop Museum, unpub. data, 1998).

[—, not applicable; I+E, indigenous plus endemic]

Description	Combined lists	Percentage of total	Fosberg and Sachet, 1969	Herbst, 1998	2019 Survey
Total species	229	—	112	169	153
Indigenous	19	8.3	17	17	18
Endemic	1	0.4	1	1	1
Native (I+E)	20	8.7	18	18	19
Alien	209	91.3	94	151	134
Cultivated	140	61.1	51	107	82
Naturalized	36	15.7	22	20	27
Invasive	33	14.4	21	24	25

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https:www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Monocots									
Amaryllidaceae	*Allium cepa*	Bulb onion, globe onion	Herb	Cul	B	L	—	N	Wake 2019
Amaryllidaceae	*Allium fistulosum*	Green onion, scallion	Herb	Cul	B	L	—	N	Wake 2019
Amaryllidaceae	*Allium tuberosum*	Garlic chives	Herb	Cul	B	L	—	N	Wake 2019
Amaryllidaceae	*Crinum amabile*	Spider lily, Queen Emma crinum	Herb	Cul	B	L	—	N	Wake 2019
Amaryllidaceae	*Crinum asiaticum*	Spider lily, giant crinum lily	Herb	Cul	B	L	—	L	HPWRA
Amaryllidaceae	*Hippeastrum* sp.	Amaryllis	Herb	Cul	B	L	—	L	HPWRA
Amaryllidaceae	*Hymenocallis littoralis*	Beach spider lily	Herb	Cul	B	L	—	N	Wake 2019
Araceae	*Caladium bicolor*	Caladium, heart of Jesus	Herb	Cul	B	L	—	N	Wake 2019
Araceae	*Colocasia esculenta*	Taro	Herb	Cul	B	L	—	N	Wake 2019
Araceae	*Dieffenbachia seguine*	Dumb cane	Herb	Cul	B	M	—	H	HPWRA
Araceae	*Epipremnum aureum*	Devil's ivy, taro vine	Vine	Cul	B	M	—	H	HPWRA
Araceae	*Epipremnum pinnatum*	Pothos, taro vine	Vine	Cul	B	M	—	H	FISC
Araceae	*Philodendron hederaceum* var. *oxycardium*	Heartleaf philodendron, vilevine	Vine	Cul	B	L	—	N	Wake 2019
Araceae	*Philodendron undulatum*	Philodendron	Vine	Cul	B	L	—	N	Wake 2019
Araceae	*Syngonium auritum*	Syngoniurn, arrowhead vine	Vine	Cul	B	L	—	L	HPWRA
Arecaceae	*Adonidia merrillii*	Manila palm; Christmas palm	Tree	Cul	B	L	—	N	Wake 2019
Arecaceae	*Cocos nucifera*	Coconut	Tree	A-N	B	M	H	L	HPWRA
Arecaceae	*Phoenix* sp.	Date palm	Tree	Cul	B	M	—	H	HPWRA
Asparagaceae	*Agave americana*	Century plant	Shrub	A-I	B	M	—	H	HPWRA
Asparagaceae	*Agave angustifolia*	Century plant	Shrub	A-N	B	L	—	N	Wake 2019
Asparagaceae	*Agave sisalana*	Sisal	Shrub	A-I	B	H	H	H	HPWRA
Asparagaceae	*Asparagus densiflorus*	Asparagus fern	Shrub	Cul	B	M	—	H	HPWRA
Asparagaceae	*Chlorophytum comosum*	Spider plant	Herb	Cul	B	L	—	H	HPWRA
Asparagaceae	*Cordyline fruticosa*	ti	Shrub	Cul	B	L	—	E	HPWRA

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Monocots—Continued									
Asparagaceae	*Dracaena reflexa* var. *angustifolia*	Song of India, pleomele	Shrub	Cul	B	L	—	L	HPWRA
Asparagaceae	*Sansevieria hyacinthoides*	Iguana tail, African bowstring hemp	Herb	A-I	B	M	—	H	FISC
Asparagaceae	*Sansevieria trifasciata*	Snake plant, mother-in-law's tongue	Herb	Cul	B	M	—	H	HPWRA
Asphodelaceae	*Aloe vera*	Aloe	Herb	Cul	B	L	—	N	Wake 2019
Bromeliaceae	*Ananas comosus*	Pineapple	Herb	Cul	B	L	—	L	HPWRA
Bromeliaceae	*Nidularium* sp.	Nidularium, nest bromeliad	Shrub	Cul	B	L	—	N	Wake 2019
Commelinaceae	*Tradescantia pallida*	Purple tradescantia, wandering jew	Herb	Cul	B	L	—	N	Wake 2019
Commelinaceae	*Tradescantia spathacea*	Oyster plant	Herb	Cul	B	M	—	H	HPWRA
Cyperaceae	*Cyperus alternifolius*	Umbrella sedge	Sedge	Cul	B	L	—	N	Wake 2019
Cyperaceae	*Cyperus pumilus*	Low flatsedge	Sedge	A-N	B	L	—	N	Wake 2019
Cyperaceae	*Cyperus rotundus*	Nutgrass, umbrella sedge	Sedge	A-N	B	L	—	N	Wake 2019
Cyperaceae	*Fimbristylis cymosa*	Tropical fimbry	Sedge	Nat	n/a	n/a	—	n/a	—
Cyperaceae	*Fimbristylis dichotoma*	Forked fimbry	Sedge	A-N	B	L	—	N	Wake 2019
Hydrocharitaceae	*Egeria densa*	Brazilian waterweed	Herb	Cul	B	L	—	H	PIER
Musaceae	*Musa acuminata*	Cavendish banana	Herb	Cul	B	L	—	L	HPWRA
Orchidaceae	Orchid sp.	Orchid species	Herb	Cul	B	L	—	N	Wake 2019
Pandanaceae	*Pandanus tectorius*	Hala, screwpine	Tree	Cul	B	L	—	N	Wake 2019
Poaceae	*Bothriochloa pertusa*	Pitted beardgrass	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Cenchrus brownii*	Slim-bristle sandbur	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Cenchrus echinatus*	Sandbur	Grass	A-I	B	H	H	H	PIER
Poaceae	*Chloris barbata*	Swollen fingergrass	Grass	A-I	B	M	—	H	HPWRA
Poaceae	*Cymbopogon citratus*	Lemon grass	Grass	Cul	B	L	—	L	HPWRA
Poaceae	*Cynodon dactylon*	Bermuda grass	Grass	A-I	B	M	—	H	HPWRA
Poaceae	*Dactyloctenium aegyptium*	Beach wiregrass, crowfoot grass	Grass	A-N	B	L	—	N	Wake 2019

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Monocots—Continued									
Poaceae	*Digitaria ciliaris*	Henry's crabgrass, southern crabgrass	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Digitaria gaudichaudii*	Crabgrass	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Digitaria insularis*	Sourgrass	Grass	A-I	B	M	—	H	HPWRA
Poaceae	*Eleusine indica*	Indian goosegrass, wiregrass	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Eragrostis amabilis*	Japanese lovegrass (syn: *E. tenella*)	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Eragrostis minor*	Lesser love grass, small stink grass	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Eragrostis scabriflora*	No common name found	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Eustachys petraea*	Pinewoods fingergrass	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Lepturus repens*	Pacific Island thintail	Grass	Nat	n/a	n/a	—	n/a	—
Poaceae	*Paspalum scrobiculatum*	Ricegrass, Kodo millet (Syn: P. orbiculare)	Grass	A-I	B	M	—	Noxious	USDA-APHIS
Poaceae	*Paspalum setaceum*	Thin paspalum, fringeleaf paspalum	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Paspalum vaginatum*	Seashore paspalum, biscuit grass	Grass	A-I	B	H	M	H	HPWRA
Poaceae	*Setaria verticillata*	Bristly foxtail	Grass	A-N	B	L	—	N	Wake 2019
Poaceae	*Sorghum bicolor*	Sweet sorghum	Grass	Cul	B	L	—	L	HPWRA
Poaceae	*Zea mays*	Corn	Grass	Cul	B	L	—	N	Wake 2019
Poaceae	*Zoysia matrella*	Manila grass	Grass	Cul	B	L	—	H	HPWRA
Pontederiaceae	*Eichhornia crassipes*	Water hyacinth	Aquatic herb	Cul	B	L	—	H	HPWRA
Strelitziaceae	*Strelitzia reginae*	Bird of paradise	Large herb	Cul	B	L	—	L	HPWRA
Zingiberaceae	*Alpinia galanga*	Galanga, Thai ginger, blue ginger	Large herb	Cul	B	L	—	L	HPWRA
Zingiberaceae	*Alpinia purpurata*	Red ginger	Large herb	Cul	B	L	—	E	HPWRA
Zingiberaceae	*Hedychium coronarium*	White ginger	Large herb	Cul	B	L	—	H	HPWRA

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
			Gymnosperms						
Araucariaceae	*Araucaria heterophylla*	Norfolk Island pine	Tree	Cul	B	L	—	L	HPWRA
			Ferns						
Polypodiaceae	*Phymatosorus scolopendria*	Laua'e fern, wart fern	Fern	Cul	B	L	—	E	HPWRA
Psilotaceae	*Psilotum nudum*	Moa; wisk fern	Fern	A-N	B	L	—	N	Wake 2019
			Dicots						
Acanthaceae	*Pseuderanthemum carruthersii*	Carruthers' falseface; yellow-veined eranthemum	Shrub	Cul	B	L	—	L	HPWRA
Acanthaceae	*Pseuderanthemum carruthersii* var. *atropurpureum*	Purple false eranthemum	Shrub	Cul	B	L	—	L	HPWRA
Aizoaceae	*Sesuvium portulacastrum*	Shoreline seapurslane; `akulikuli	Herb	Nat	n/a	n/a	—	n/a	—
Amaranthaceae	*Amaranthus blitum*	Purple amaranth, sender amaranth	Herb	A-N	B	L	—	N	Wake 2019
Amaranthaceae	*Amaranthus dubius*	Spleen amaranth, red spinach	Herb	A-N	B	L	—	N	Wake 2019
Amaranthaceae	*Amaranthus graecizans*	Mediterranean amaranth, short-tepalled pigweed	Herb	A-N	B	L	—	N	Wake 2019
Amaranthaceae	*Gomphrena globosa*	Bachelor`s button; globe amaranth	Herb	Cul	B	L	—	H	HPWRA
Anacardiaceae	*Mangifera indica*	Mango	Tree	Cul	B	L	—	L	HPWRA
Anacardiaceae	*Spondias pinnata*	Wild mango, hog plum	Tree	Cul	B	L	—	N	Wake 2019
Annonaceae	*Annona muricata*	Soursop	Tree	Cul	B	L	—	L	HPWRA
Annonaceae	*Annona squamosa*	Sugar apple, custard apple, sweetsop	Tree	Cul	B	L	—	L	HPWRA
Apiaceae	*Anethum graveolens*	Dill	Herb	Cul	B	L	—	N	Wake 2019
Apiaceae	*Coriandrum sativum*	Cilantro, coriander, Chinese parsley	Herb	Cul	B	L	—	N	Wake 2019
Apiaceae	*Eryngium foetidum*	False coriander, serrated coriander	Herb	Cul	B	L	—	N	Wake 2019

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Dicots—Continued									
Apiaceae	*Petroselinum crispum*	Parsley	Herb	Cul	B	L	—	L	HPWRA
Apocynaceae	*Adenium obesum*	Desert rose	Shrub	Cul	B	L	—	L	HPWRA
Apocynaceae	*Calotropis gigantea*	Crown flower	Shrub	Cul	B	M	—	H	HPWRA
Apocynaceae	*Catharanthus roseus*	Periwinkle, Madagascar perwinkle	Herb	Cul	B	L	—	H	HPWRA
Apocynaceae	*Nerium oleander*	Oleander	Shrub	Cul	B	L	—	L	HPWRA
Apocynaceae	*Plumeria obtusa*	Plumeria, frangipani	Tree	Cul	B	L	—	L	HPWRA
Apocynaceae	*Plumeria rubra*	Common frangipani, red frangipani	Tree	Cul	B	L	—	L	HPWRA
Araliaceae	*Polyscias fruticosa*	Ming aralia	Shrub	Cul	B	L	—	L	HPWRA
Araliaceae	*Polyscias guilfoylei*	Panax, geranium aralia	Shrub	Cul	B	L	—	L	HPWRA
Araliaceae	*Polyscias scutellaria*	Shield aralia, plum aralia	Shrub	Cul	B	L	—	N	Wake 2019
Araliaceae	*Schefflera actinophylla*	Octopus tree, umbrella tree	Tree	Cul	B	M	—	H	HPWRA
Asteraceae	*Bidens alba*	Beggarticks, Spanish needles	Herb	A-I	B	M	—	H	HPWRA
Asteraceae	*Erigeron bonariensis*	Hairy horseweed, hairy fleabane	Herb	A-I	B	M	—	H	HPWRA
Asteraceae	*Erigeron canadensis*	Canada fleabane, horseweed	Herb	A-N	B	H	M	N	Wake 2019
Asteraceae	*Helianthus annuus*	Common sunflower	Herb	Cul	B	M	—	H	HPWRA
Asteraceae	*Lactuca sativa*	Lettuce	Herb	Cul	B	L	—	N	Wake 2019
Asteraceae	*Pluchea carolinensis*	Sourbush, fleabane	Shrub	A-I	B	H	M	H	HPWRA
Asteraceae	*Pluchea odorata*	Camphor-weed, saltmarsh fleabane	Shrub	A-N	B	L	—	N	Wake 2019
Asteraceae	*Sonchus oleraceus*	Common sowthistle	Herb	A-I	B	L	—	H	HPWRA
Asteraceae	*Tagetes erecta*	Marigold	Herb	Cul	B	L	—	N	Wake 2019
Asteraceae	*Tridax procumbens*	Coatbuttons, tridax daisy	Herb	A-I	B	L	—	H	HPWRA
Asteraceae	*Zinnia elegans*	Garden zinnia	Herb	Cul	B	L	—	N	Wake 2019
Bignoniaceae	*Tabebuia aurea*	Silver trumpet-tree	Tree	Cul	B	L	—	L	HPWRA

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Dicots—Continued									
Brassicaceae	*Brassica nigra*	Black mustard	Herb	Cul	B	L	—	N	Wake 2019
Brassicaceae	*Brassica oleracea*	Cabbage, kale, kohlrabi, cauliflower, broccoli, etc.	Herb	Cul	B	L	—	N	Wake 2019
Brassicaceae	*Lepidium bidentatum*	Pepperwort	Herb	Nat	n/a	n/a	—	n/a	—
Brassicaceae	*Lobularia maritima*	Sweet alyssum or sweet alison	Herb	Cul	B	L	—	H	HPWRA
Brassicaceae	*Raphanus sativus*	Raddish	Herb	Cul	B	L	—	H	HPWRA
Cactaceae	*Nopalea cochenillifera*	Cochinilla cactus	Shrub	A-I	B	H	H	H	HPWRA
Cactaceae	*Opuntia littoralis*	Coastal prickley pear cactus	Shrub	A-N	B	L	—	N	Wake 2019
Caricaceae	*Carica papaya*	Papaya	Tree	Cul	B	L	—	L	HPWRA
Casuarinaceae	*Casuarina equisetifolia*	Ironwood; Australian pine tree	Tree	A-I	B	H	H	H	HPWRA
Cleomaceae	*Gynandropsis gynandra*	African spider-flower	Herb	A-N	B	L	—	N	Wake 2019
Commelinaceae	*Terminalia catappa*	Indian almond, false kamani	Tree	Cul	B	L	—	L	HPWRA
Convolvulaceae	*Cuscuta pentagona*	Fiveangled dodder	Vine	A-N	B	M	—	N	—
Convolvulaceae	*Ipomoea aquatica*	Swamp morning-glory, Chinese watercress	Vine	Cul	B	L	—	N	Wake 2019
Convolvulaceae	*Ipomoea batatas*	Sweet potato	Vine	Cul	B	L	—	L	HPWRA
Convolvulaceae	*Ipomoea pes-caprae* subsp. *brasiliensis*	Beach morning-glory, pohue-hue; puhuehue	Vine	Nat	n/a	n/a	—	n/a	—
Convolvulaceae	*Ipomoea violacea*	Beach moon-flower, heaven-lyblue morning-glory	Vine	Nat	n/a	n/a	—	n/a	—
Crassulaceae	*Crassula ovata*	Jade plant	Herb	Cul	B	L	—	L	HPWRA
Crassulaceae	*Kalanchoe daigremontiana*	Devil's backbone, alligator plant	Herb	A-I	B	M	—	H	HPWRA
Crassulaceae	*Kalanchoe delagoensis*	Chandelier plant	Herb	A-I	B	M	—	H	HPWRA
Crassulaceae	*Kalanchoe pinnata*	Air plant, cathedral bells	Herb	A-I	B	H	H	H	HPWRA
Crassulaceae	*Sedum* sp.	Stonecrop	Herb	Cul	B	L	—	N	Wake 2019
Crassulaceae	*Sempervivum tectorum*	Common houseleek	Herb	Cul	B	L	—	N	Wake 2019

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Dicots—Continued									
Cucurbitaceae	*Coccinia grandis*	Ivy gourd	Vine	Cul	B	H	H	H	HPWRA
Cucurbitaceae	*Cucumis melo*	Cantaloupe, muskmelon	Vine	Cul	B	L	—	N	Wake 2019
Cucurbitaceae	*Cucurbita pepo*	Pumpkin, squash	Vine	Cul	B	L	—	N	Wake 2019
Cucurbitaceae	*Momordica charantia*	Bitter melon	Vine	Cul	B	M	—	H	HPWRA
Ehretiaceae	*Cordia subcordata*	Kou	Tree	Nat	n/a	n/a	—	n/a	—
Euphorbiaceae	*Codiaeum variegatum*	Garden croton or variegated croton	Shrub	Cul	B	L	—	L	HPWRA
Euphorbiaceae	*Euphorbia heterophylla* var. *cyathophora*	Dwarf poinsettia, wild poinsettia	Herb	A-I	B	M	—	N	Wake 2019
Euphorbiaceae	*Euphorbia hirta*	Hairy spurge, garden spurge	Herb	A-N	B	L	—	N	Wake 2019
Euphorbiaceae	*Euphorbia hypericifolia*	Graceful spurge	Shrub	A-I	B	M	—	H	HPWRA
Euphorbiaceae	*Euphorbia lactea*	Mottled spurge, frilled fan, candlestick tree	Shrub	Cul	B	M	—	H	HPWRA
Euphorbiaceae	*Euphorbia milii*	Crown of thorns, Christ plant, or Christ thorn	Shrub	Cul	B	L	—	L	HPWRA
Euphorbiaceae	*Euphorbia prostrata*	Prostrate purge or prostrate sandmat	Herb	A-I	B	L	—	H	HPWRA
Euphorbiaceae	*Euphorbia pulcherrima*	Poinsettia; Christmas star	Shrub	Cul	B	L	—	L	HPWRA
Euphorbiaceae	*Euphorbia thymifolia*	Chickenweed	Herb	A-N	B	L	—	N	Wake 2019
Euphorbiaceae	*Euphorbia tirucalli*	Firestick, pencil tree, pencil cactus	Shrub	Cul	B	L	—	H	HPWRA
Euphorbiaceae	*Euphorbia tithymaloides*	Redbird cactus, buck-thorn, Christmas candle	Shrub	Cul	B	L	—	N	Wake 2019
Euphorbiaceae	*Jatropha integerrima*	Rose-flowered jatropha	Shrub	Cul	B	L	—	L	HPWRA
Euphorbiaceae	*Ricinus communis*	Castor bean or castor oil plant	Shrub	Cul	B	H	H	H	HPWRA
Fabaceae	*Bauhinia* sp.	Orchid tree	Tree	Cul	B	M	—	L to H	HPWRA
Fabaceae	*Caesalpinia bonduc*	Grey nicker, nicker bean, kakalaoa	Vine	Cul	B	M	—	N	—

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Dicots—Continued									
Fabaceae	*Dalea emarginata*	Wedgeleaf prairie clover	Herb	A-N	B	L	—	N	Wake 2019
Fabaceae	*Delonix regia*	Poinciana, flame tree	Tree	Cul	B	L	—	L	HPWRA
Fabaceae	*Desmanthus pernambucanus*	Wild tantan, prostrate bundleflower, dwarf koa	Shrub	A-I	B	M	—	N	Wake 2019
Fabaceae	*Desmanthus virgatus*	Wild tantan, prostrate bundleflower, dwarf koa	Shrub	A-I	B	L	—	H	HPWRA
Fabaceae	*Gliricidia sepium*	Gliricidia	Tree	Cul	B	L	—	L	HPWRA
Fabaceae	*Leucaena leucocephala*	Koa haole, tangantangan, lead tree	Tree	A-I	B	H	M	H	HPWRA
Fabaceae	*Phaseolus coccineus*	Snap bean, scarlet runner bean	Vine	Cul	B	L	—	N	Wake 2019
Fabaceae	*Phaseolus vulgaris*	Common bean, snap bean	Vine	Cul	B	L	—	N	Wake 2019
Fabaceae	*Pithecellobium dulce*	Opiuma, Manila tamarind	Tree	Cul	B	L	—	H	HPWRA
Fabaceae	*Psophocarpus tetragonolobus*	Wing bean	Vine	Cul	B	L	—	N	Wake 2019
Fabaceae	*Samanea saman*	Monkeypod	Tree	Cul	B	L	—	L	HPWRA
Fabaceae	*Sesbania grandiflora*	Hummingbird tree, scarlet wisteria	Tree	Cul	B	L	—	L	HPWRA
Fabaceae	*Tamarindus indica*	Tamarind	Tree	Cul	B	L	—	L	HPWRA
Fabaceae	*Vigna unguiculata* subsp. *sesquipedalis*	Asparagus bean, yard-long bean	Vine	Cul	B	L	—	N	Wake 2019
Goodeniaceae	*Scaevola sericea*	Beach naupaka, naupaka kahakai	Shrub	Nat	n/a	n/a	—	n/a	—
Heliotropiaceae	*Euploca procumbens* var. *depressum*	Fourspike heliotrope (*Heliotropium procumbens*)	Herb	A-N	B	L	—	N	Wake 2019
Heliotropiaceae	*Heliotropium anomalum*	Hinahina, Polynesian heliotrope	Herb	Nat	n/a	n/a	—	n/a	—
Heliotropiaceae	*Heliotropium foertherianum*	Tree heliotrope, octopus bush	Tree	Nat	n/a	n/a	—	n/a	—
Lamiaceae	*Coleus scutellarioides*	Coleus	Herb	Cul	B	L	—	N	Wake 2019

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

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Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Dicots—Continued									
Lamiaceae	*Mentha spicata*	Mint, spearmint	Herb	Cul	B	L	—	H	HPWRA
Lamiaceae	*Ocimum basilicum*	Sweet basil	Herb	Cul	B	L	—	N	Wake 2019
Lamiaceae	*Ocimum tenuiflorum*	Holy basil, tulasi	Herb	Cul	B	L	—	N	Wake 2019
Lamiaceae	*Vitex trifolia*	Blue vitex	Shrub	Cul	B	M	—	H	HPWRA
Lecythidaceae	*Barringtonia asiatica*	Fish poison tree	Tree	Cul	B	L	—	L	HPWRA
Lythraceae	*Pemphis acidula*	Pemphis	Shrub	Nat	n/a	n/a	—	n/a	—
Malvaceae	*Abutilon indicum* subsp. *albescens*	Indian mallow	Shrub	A-N	B	H	H	N	Wake 2019
Malvaceae	*Gossypium stephensii*	Wake Island cotton	Shrub	End	n/a	n/a	—	n/a	—
Malvaceae	*Hibiscus* hybrid	Hibiscus	Shrub	Cul	B	L	—	N	Wake 2019
Malvaceae	*Sida ciliaris*	Fringed sida	Herb	A-N	B	L	—	—	Wake 2019
Malvaceae	*Sida fallax*	Ilima	Shrub	Nat	n/a	n/a	—	n/a	—
Malvaceae	*Talipariti tiliaceum*	Hau, sea hibiscus	Tree	Cul	B	M	—	N	Wake 2019
Malvaceae	*Thespesia populnea*	Milo	Tree	Cul	B	H	H	H	HPWRA
Malvaceae	*Waltheria indica*	Uhaloa	Herb	Nat	n/a	n/a	—	n/a	—
Moraceae	*Ficus benghalensis*	Banyan	Tree	Cul	B	L	—	L	HPWRA
Moraceae	*Ficus carica*	Edible fig	Tree	Cul	B	L	—	L	HPWRA
Moraceae	*Ficus microcarpa*	Chinese banyan, Indian laurel fig	Tree	Cul	B	M	—	H	HPWRA
Moraceae	*Ficus rubiginosa*	Port Jackson fig, rusty fig	Tree	Cul	B	M	—	H	HPWRA
Moraceae	*Moringa oleifera*	Horseradish tree, drumstick tree	Tree	Cul	B	L	—	L	HPWRA
Myrtaceae	*Corymbia citriodora*	Lemon-scented gum	Tree	Cul	B	L	—	H	HPWRA
Myrtaceae	*Psidium guajava*	Common guava, lemon guava	Tree	Cul	B	M	—	H	HPWRA
Nyctaginaceae	*Boerhavia albiflora*	Spiderling	Herb	Nat	n/a	n/a	—	n/a	—
Nyctaginaceae	*Boerhavia coccinea*	Scarlet spiderling	Herb	A-N	B	L	—	N	—
Nyctaginaceae	*Boerhavia repens*	Red spiderling, hogweed	Herb	Nat	n/a	n/a	—	n/a	—

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Dicots—Continued									
Nyctaginaceae	*Bougainvillea spectabilis*	Bougainvillea	Shrub	Cul	B	L	—	N	Wake 2019
Nyctaginaceae	*Pisonia grandis*	Papala kepau	Tree	Nat	n/a	n/a	—	n/a	—
Nymphaeaceae	*Nymphaea* sp.	Lotus, waterlily	Aquatic herb	Cul	B	L	—	H	HPWRA
Oleaceae	*Jasminum sambac*	Arabian jasmine, Sambac jasmine	Shrub	Cul	B	L	—	N	Wake 2019
Oleaceae	*Noronhia emarginata*	Madagascar olive	Shrub	Cul	B	M	—	E	HPWRA
Passifloraceae	*Passiflora foetida* var. *hispida*	Passion fruit, scarletfruit passionflower	Vine	A-I	B	H	H	H	HPWRA
Phyllanthaceae	*Phyllanthus acidus*	Otaheite gooseberry	Shrub	Cul	B	L	—	L	HPWRA
Phyllanthaceae	*Phyllanthus amarus*	Hurricane weed, carry me seed	Shrub	A-I	B	L	—	H	HPWRA
Polygonaceae	*Coccoloba uvifera*	Sea grape	Tree	A-I	B	H	H	H	HPWRA
Portulacaceae	*Portulaca lutea*	Yellow purslane	Herb	Nat	n/a	n/a	—	n/a	—
Portulacaceae	*Portulaca oleracea*	Purslane, hogweed, pigweed	Herb	A-N	B	L	—	N	Wake 2019
Portulacaceae	*Portulaca pilosa* subsp. *pilosa*	Seashore purslane, rose-flowered purslane	Herb	Nat	n/a	n/a	—	n/a	—
Rhamnaceae	*Ziziphus mauritiana*	Indian jujube, Chinese date	Tree	Cul	B	M	—	H	HPWRA
Rosaceae	*Rosa* sp.	Rose	Shrub	Cul	B	L	—	N	Wake 2019
Rubiaceae	*Gardenia taitensis*	Tiare	Shrub	Cul	B	L	—	L	HPWRA
Rubiaceae	*Ixora* sp.	Ixora	Shrub	Cul	B	L	—	L or E	HPWRA
Rubiaceae	*Morinda citrifolia*	Noni, Indian-mulberry	Tree	A-I	B	M	—	H	HPWRA
Rubiaceae	*Oldenlandia corymbosa*	Flat-top mille graines, diamond flower	Herb	A-N	B	L	—	N	Wake 2019
Rutaceae	*Citrus hystrix*	Kaffir lime, Thai lime	Tree	Cul	B	L	—	E	HPWRA
Rutaceae	*Citrus* sp.	Citrus	Tree	Cul	B	L	—	L	HPWRA
Sapotaceae	*Chrysophyllum cainito*	Star apple, cainito	Tree	Cul	B	L	—	L	HPWRA
Sapotaceae	*Manilkara zapota*	Sapodilla	Tree	Cul	B	L	—	H	HPWRA

Table B2. List and status of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status:** Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; E, endemic; Nat, native; A, alien. **Impact Description:** B, biodiversity; n/a, native species so no impact. **Wake risk assessment:** H, high; M, medium; L, low; n/a, native species. **Management feasibility:** H, high, M, medium. **Published risk-assessment status:** High risk, High risk invasive species; No Assessment, No risk assessment conducted. **Published risk-assessment reference:** HPWRA, Hawai'i-Pacific Weed Risk Assessment, 2019 (www.hpwra.org); FISC database, Florida Invasive Species Council, 2019 (https://www.fleppc.org/); PIER, Pacific Island Ecosystems at Risk, U.S. Forest Service, 2018 (http://www.hear.org/pier/); USDA-APHIS, U.S. Department of Agriculture Animal and Plant Health Inspection Service; Wake 2019, Wake 2019 Survey. **Published risk**: N, no assessment; L, low risk; H, high risk; E, evaluate; n/a, not applicable. **Abbreviation**: —, not determined]

Taxonomy				Status and risk					
Family	Scientific name	Common name	Function/life form	Status code	Impact type	Wake risk	Management feasibility	Published risk	Risk reference
Dicots—Continued									
Solanaceae	*Capsicum annuum*	Chili pepper, bell pepper, etc.	Shrub	Cul	B	L	—	L	HPWRA
Solanaceae	*Capsicum frutescens*	Chili pepper	Shrub	Cul	B	L	—	L	HPWRA
Solanaceae	*Nicotiana tabacum*	Tobacco	Shrub	Cul	B	M	—	H	HPWRA
Solanaceae	*Solanum lycopersicum*	Tomato	Shrub	Cul	B	L	—	N	Wake 2019
Solanaceae	*Solanum melongena*	Egg plant	Shrub	Cul	B	L	—	N	Wake 2019
Solanaceae	*Solanum torvum*	Turkeyberry, pea eggplant	Shrub	Cul	B	M	—	H	HPWRA
Tetrachondraceae	*Polypremnum procumbens*	Juniper leaf	Herb	A-N	B	L	—	N	Wake 2019
Urticaceae	*Pilea microphylla*	Artillery plant	Herb	A-I	B	L	—	H	HPWRA
Urticaceae	*Piper sarmentosum*	Lolot, wild betel	Shrub	Cul	B	L	—	N	Wake 2019
Verbenaceae	*Stachytarpheta jamaicensis*	Jamaica vervain, light-blue snakeweed	Shrub	A-I	B	M	—	N	Wake 2019
Verbenaceae	*Stachytarpheta urticifolia*	Blue rat's tail, nettleleaf velvetberry	Shrub	A-I	B	M	—	N	Wake 2019
Zygophyllaceae	*Tribulus cistoides*	Nohu	Shrub	Nat	n/a	n/a	—	n/a	—
Zygophyllaceae	*Tribulus terrestris*	Puncture vine	Shrub	A-I	B	L	—	H	HPWRA

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution							Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
						Monocots						
Amaryllidaceae	*Allium cepa*	Cul	L: low	X	—	—	—	—	X	—	—	—
Amaryllidaceae	*Allium fistulosum*	Cul	L: low	X	—	—	—	—	X	—	—	X
Amaryllidaceae	*Allium tuberosum*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Amaryllidaceae	*Crinum amabile*	Cul	L: low	X	—	—	—	—	X	—	—	X
Amaryllidaceae	*Crinum asiaticum*	Cul	L: low	X	—	—	—	—	X	—	—	X
Amaryllidaceae	*Hippeastrum* sp.	Cul	L: low	X	—	Y	—	—	X	—	—	—
Amaryllidaceae	*Hymenocallis littoralis*	Cul	Unknown	—	—	—	—	—	—	—	X	X
Araceae	*Caladium bicolor*	Cul	L: low	X	—	—	—	—	X	—	—	X
Araceae	*Colocasia esculenta*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Araceae	*Dieffenbachia seguine*	Cul	L: low	X	—	—	—	—	X	—	—	X
Araceae	*Epipremnum aureum*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Araceae	*Epipremnum pinnatum*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Araceae	*Philodendron hederaceum* var. *oxycardium*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Araceae	*Philodendron undulatum*	Cul	Unknown	—	—	—	—	—	—	—	X	X
Araceae	*Syngonium auritum*	Cul	L: low	X	—	—	—	—	X	—	—	X
Arecaceae	*Adonidia merrillii*	Cul	L: low	X	—	Y	—	—	X	—	—	X
Arecaceae	*Cocos nucifera*	A-N	W: mod	X	—	—	—	—	X	X	X	X
Arecaceae	*Phoenix* sp.	Cul	L: low	X	—	—	—	—	X	—	—	X
Asparagaceae	*Agave americana*	A-I	L: low	—	—	—	—	—	—	—	—	X
Asparagaceae	*Agave angustifolia*	A-N	L: low	—	—	—	—	—	—	—	—	X
Asparagaceae	*Agave sisalana*	A-I	L: low	X	—	—	—	—	X	X	—	X
Asparagaceae	*Asparagus densiflorus*	Cul	L: low	X	—	—	—	—	X	—	—	X
Asparagaceae	*Chlorophytum comosum*	Cul	L: low	X	—	—	—	—	X	—	—	X
Asparagaceae	*Cordyline fruticosa*	Cul	L: low	X	—	—	—	—	X	—	X	X

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
Monocots—Continued												
Asparagaceae	*Dracaena reflexa* var. *angustifolia*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Asparagaceae	*Sansevieria hyacinthoides*	A-I	Unknown	—	—	—	—	—	—	—	X	—
Asparagaceae	*Sansevieria trifasciata*	Cul	L: low	X	—	—	—	—	X	—	—	—
Asphodelaceae	*Aloe vera*	Cul	L: low	X	—	—	—	—	X	X	—	X
Bromeliaceae	*Ananas comosus*	Cul	L: low	X	—	—	—	—	X	—	X	X
Bromeliaceae	*Nidularium* sp.	Cul	Unknown	—	—	—	—	—	—	—	—	X
Commelinaceae	*Tradescantia pallida*	Cul	Unknown	—	—	—	—	—	—	—	X	X
Commelinaceae	*Tradescantia spathacea*	Cul	L: low	X	—	—	—	—	X	—	X	X
Cyperaceae	*Cyperus alternifolius*	Cul	L: low	X	—	—	—	—	X	—	—	X
Cyperaceae	*Cyperus pumilus*	A-N	Unknown	—	—	—	—	—	—	—	X	—
Cyperaceae	*Cyperus rotundus*	A-N	L: low	X	—	—	—	—	X	—	X	X
Cyperaceae	*Fimbristylis cymosa*	Nat	W: mod	X	C	—	X	X	X	X	X	X
Cyperaceae	*Fimbristylis dichotoma*	A-N	L: low	X	C	—	—	X	X	—	X	—
Hydrocharitaceae	*Egeria densa*	Cul	L: low	X	—	Y	—	—	X	—	—	—
Musaceae	*Musa acuminata*	Cul	L: low	X	—	—	—	—	X	—	—	X
Orchidaceae	Orchid sp.	Cul	L: low	X	—	—	—	—	X	X	—	X
Pandanaceae	*Pandanus tectorius*	Cul	L: low	X	—	—	—	—	X	—	X	X
Poaceae	*Bothriochloa pertusa*	A-N	W: mod	X	C	—	—	—	X	X	—	X
Poaceae	*Cenchrus brownii*	A-N	Unknown	—	—	—	—	—	—	—	X	—
Poaceae	*Cenchrus echinatus*	A-I	W: mod	X	—	—	—	X	X	X	X	X
Poaceae	*Chloris barbata*	A-I	L: low	X	C	—	—	—	X	X	X	X
Poaceae	*Cymbopogon citratus*	Cul	L: low	X	—	—	—	—	X	—	—	X
Poaceae	*Cynodon dactylon*	A-I	L: low	X	—	—	—	—	X	X	X	X
Poaceae	*Dactyloctenium aegyptium*	A-N	W: low	X	C	—	X	—	X	X	X	X
Poaceae	*Digitaria ciliaris*	A-N	Unknown	—	—	—	—	—	—	—	X	—
Poaceae	*Digitaria gaudichaudii*	A-N	Unknown	—	—	—	—	—	—	—	X	—

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
Monocots—Continued												
Poaceae	*Digitaria insularis*	A-I	Unknown	—	—	—	—	—	—	—	X	—
Poaceae	*Eleusine indica*	A-N	L: low	X	C	—	X	—	X	—	X	X
Poaceae	*Eragrostis amabilis*	A-N	L: low	X	C	—	—	X	X	—	X	X
Poaceae	*Eragrostis minor*	A-N	Unknown	—	—	—	—	—	—	—	X	—
Poaceae	*Eragrostis scabriflora*	A-N	W: low	X	C	—	—	X	X	X	—	X
Poaceae	*Eustachys petraea*	A-N	W: low	X	C	—	X	X	X	X	—	X
Poaceae	*Lepturus repens*	Nat	W: mod	X	C	—	X	X	X	X	X	X
Poaceae	*Paspalum scrobiculatum*	A-I	L: low	X	C	—	—	—	X	X	X	—
Poaceae	*Paspalum setaceum*	A-N	L: low	X	C	—	—	—	X	X	—	X
Poaceae	*Paspalum vaginatum*	A-I	Unknown	—	—	—	—	—	—	—	X	—
Poaceae	*Setaria verticillata*	A-N	Unknown	—	—	—	—	—	—	—	X	—
Poaceae	*Sorghum bicolor*	Cul	Unknown	—	—	—	—	—	—	—	X	X
Poaceae	*Zea mays*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Poaceae	*Zoysia matrella*	Cul	L: low	X	—	—	—	—	X	—	—	X
Pontederiaceae	*Eichhornia crassipes*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Strelitziaceae	*Strelitzia reginae*	Cul	L: low	X	—	—	—	—	X	—	—	X
Zingiberaceae	*Alpinia galanga*	Cul	L: low	X	—	—	—	—	X	—	—	X
Zingiberaceae	*Alpinia purpurata*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Zingiberaceae	*Hedychium coronarium*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Gymnosperms												
Araucariaceae	*Araucaria heterophylla*	Cul	L: low	X	—	—	—	—	X	—	—	X
Ferns												
Polypodiaceae	*Phymatosorus scolopendria*	Cul	L: low	X	—	—	—	—	X	—	—	X
Psilotaceae	*Psilotum nudum*	A-N	L: low	X	—	Y	—	—	—	—	—	—

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
						Dicots						
Acanthaceae	*Pseuderanthemum carruthersii*	Cul	L: low	X	—	—	—	—	X	—	X	X
Acanthaceae	*Pseuderanthemum carruthersii* var. *atropurpureum*	Cul	L: low	X	—	—	—	—	X	—	X	X
Aizoaceae	*Sesuvium portulacastrum*	Nat	L: mod to high	X	—	—	—	—	X	X	X	X
Amaranthaceae	*Amaranthus blitum*	A-N	L: low	X	C	—	—	X	X	—	X	—
Amaranthaceae	*Amaranthus dubius*	A-N	L: low	X	C	—	—	—	X	—	X	X
Amaranthaceae	*Amaranthus graecizans*	A-N	L: low	X	—	—	—	—	X	—	X	—
Amaranthaceae	*Gomphrena globosa*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Anacardiaceae	*Mangifera indica*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Anacardiaceae	*Spondias pinnata*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Annonaceae	*Annona muricata*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Annonaceae	*Annona squamosa*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Apiaceae	*Anethum graveolens*	Cul	L: low	X	—	—	—	—	X	—	X	X
Apiaceae	*Coriandrum sativum*	Cul	L: low	X	—	—	—	—	X	—	—	X
Apiaceae	*Eryngium foetidum*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Apiaceae	*Petroselinum crispum*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Apocynaceae	*Adenium obesum*	Cul	L: low	X	—	Y	—	—	X	X	—	—
Apocynaceae	*Calotropis gigantea*	Cul	L: low	—	—	—	—	—	—	—	—	X
Apocynaceae	*Catharanthus roseus*	Cul	L: low	X	—	—	—	—	X	—	X	X
Apocynaceae	*Nerium oleander*	Cul	L: low	X	—	—	—	—	X	—	X	X
Apocynaceae	*Plumeria obtusa*	Cul	L: low	X	—	—	—	—	X	—	X	X
Apocynaceae	*Plumeria rubra*	Cul	L: low	X	—	—	—	—	X	—	—	X
Araliaceae	*Polyscias fruticosa*	Cul	L: low	X	—	—	—	—	X	—	—	X
Araliaceae	*Polyscias guilfoylei*	Cul	L: low	X	—	—	—	—	X	—	X	X
Araliaceae	*Polyscias scutellaria*	Cul	L: low	X	—	—	—	—	X	—	—	X

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
Dicots—Continued												
Araliaceae	*Schefflera actinophylla*	Cul	L: low	X	—	—	—	—	X	—	X	X
Asteraceae	*Bidens alba*	A-I	W: mod	X	—	—	—	X	X	—	—	X
Asteraceae	*Erigeron bonariensis*	A-I	Unknown	—	—	—	—	—	—	—	X	—
Asteraceae	*Erigeron canadensis*	A-N	W: mod	X	C	—	X	X	X	X	X	X
Asteraceae	*Helianthus annuus*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Asteraceae	*Lactuca sativa*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Asteraceae	*Pluchea carolinensis*	A-I	W: mod	X	C	—	—	X	X	X	—	X
Asteraceae	*Pluchea odorata*	A-N	Unknown	—	—	—	—	—	—	—	X	—
Asteraceae	*Sonchus oleraceus*	A-I	Unknown	—	—	—	—	—	—	—	X	—
Asteraceae	*Tagetes erecta*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Asteraceae	*Tridax procumbens*	A-I	W: low	X	—	—	—	—	X	X	—	X
Asteraceae	*Zinnia elegans*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Bignoniaceae	*Tabebuia aurea*	Cul	L: low	X	C	Y	—	—	X	—	—	—
Brassicaceae	*Brassica nigra*	Cul	L: low	X	C	—	—	—	X	—	—	X
Brassicaceae	*Brassica oleracea*	Cul	L: low	X	—	—	—	—	X	—	X	—
Brassicaceae	*Lepidium bidentatum*	Nat	L: mod to high	X	C	—	X	—	—	X	X	X
Brassicaceae	*Lobularia maritima*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Brassicaceae	*Raphanus sativus*	Cul	Unknown	—	—	—	—	—	—	—	X	X
Cactaceae	*Nopalea cochenillifera*	A-I	L: low	X	—	—	—	—	X	X	—	X
Cactaceae	*Opuntia littoralis*	A-N	L: low	X	—	—	—	—	—	X	—	X
Caricaceae	*Carica papaya*	Cul	L: low	X	—	—	—	—	X	—	X	X
Casuarinaceae	*Casuarina equisetifolia*	A-I	W: high	X	—	—	X	X	X	X	X	X
Cleomaceae	*Gynandropsis gynandra*	A-N	L: low	X	C	—	—	—	X	X	—	X
Commelinaceae	*Terminalia catappa*	Cul	L: low	X	—	—	—	—	X	—	X	X

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

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Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
Dicots—Continued												
Convolvulaceae	*Cuscuta pentagona*	A-N	Unknown	—	—	—	—	—	—	—	—	X
Convolvulaceae	*Ipomoea aquatica*	Cul	L: low	X	—	—	—	—	X	—	—	X
Convolvulaceae	*Ipomoea batatas*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Convolvulaceae	*Ipomoea pes-caprae* subsp. *brasiliensis*	Nat	L: mod to high	X	—	—	—	X	X	X	X	X
Convolvulaceae	*Ipomoea violacea*	Nat	L: mod	X	—	—	X	X	X	X	X	X
Crassulaceae	*Crassula ovata*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Crassulaceae	*Kalanchoe daigremontiana*	A-I	Unknown	—	—	—	—	—	—	—	—	X
Crassulaceae	*Kalanchoe delagoensis*	A-I	L: low	X	—	—	—	—	X	—	—	X
Crassulaceae	*Kalanchoe pinnata*	A-I	L: low	X	—	—	—	—	X	—	X	X
Crassulaceae	*Sedum* sp.	Cul	Unknown	—	—	—	—	—	—	—	—	X
Crassulaceae	*Sempervivum tectorum*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Cucurbitaceae	*Coccinia grandis*	Cul	L: low	X	—	—	—	—	X	—	—	X
Cucurbitaceae	*Cucumis melo*	Cul	L: low	X	—	—	—	—	X	—	X	X
Cucurbitaceae	*Cucurbita pepo*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Cucurbitaceae	*Momordica charantia*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Ehretiaceae	*Cordia subcordata*	Nat	W: mod	X	—	—	X	—	X	X	X	X
Euphorbiaceae	*Codiaeum variegatum*	Cul	L: low	X	—	—	—	—	X	—	X	X
Euphorbiaceae	*Euphorbia heterophylla* var. *cyathophora*	A-I	L: low	X	—	—	—	—	X	X	X	X
Euphorbiaceae	*Euphorbia hirta*	A-N	W: mod	X	C	—	X	X	X	X	X	X
Euphorbiaceae	*Euphorbia hypericifolia*	A-I	W: low	X	C	—	—	X	X	X	X	X
Euphorbiaceae	*Euphorbia lactea*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Euphorbiaceae	*Euphorbia milii*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Euphorbiaceae	*Euphorbia prostrata*	A-I	L: low	X	—	—	—	—	X	—	X	X
Euphorbiaceae	*Euphorbia pulcherrima*	Cul	Unknown	—	—	—	—	—	—	—	X	—

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
Dicots—Continued												
Euphorbiaceae	*Euphorbia thymifolia*	A-N	L: low	X	C	—	—	—	X	—	X	X
Euphorbiaceae	*Euphorbia tirucalli*	Cul	Unknown	—	—	—	—	—	—	—	X	X
Euphorbiaceae	*Euphorbia tithymaloides*	Cul	Unknown	—	—	—	—	—	—	—	X	X
Euphorbiaceae	*Jatropha integerrima*	Cul	L: low	X	—	—	—	—	X	—	—	X
Euphorbiaceae	*Ricinus communis*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Fabaceae	*Bauhinia* sp.	Cul	L: low	X	—	—	—	—	X	—	X	—
Fabaceae	*Caesalpinia bonduc*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Fabaceae	*Dalea emarginata*	A-N	L: low	X	C	Y	—	—	X	—	—	—
Fabaceae	*Delonix regia*	Cul	L: low	X	—	—	—	—	X	—	—	X
Fabaceae	*Desmanthus pernambucanus*	A-I	L: low	X	C	—	—	—	X	X	—	X
Fabaceae	*Desmanthus virgatus*	A-I	L: low	X	C	—	—	—	X	—	X	—
Fabaceae	*Gliricidia sepium*	Cul	L: low	X	C	Y	—	—	X	—	—	—
Fabaceae	*Leucaena leucocephala*	A-I	L: mod to high	X	—	—	—	X	X	X	X	X
Fabaceae	*Phaseolus coccineus*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Fabaceae	*Phaseolus vulgaris*	Cul	L: low	X	—	—	—	—	X	—	X	—
Fabaceae	*Pithecellobium dulce*	Cul	L: low	X	—	—	—	—	X	X	—	X
Fabaceae	*Psophocarpus tetragonolobus*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Fabaceae	*Samanea saman*	Cul	L: low	X	—	Y	—	—	X	—	—	—
Fabaceae	*Sesbania grandiflora*	Cul	L: low	X	—	—	—	—	X	X	—	X
Fabaceae	*Tamarindus indica*	Cul	L: low	X	—	—	—	—	X	X	—	X
Fabaceae	*Vigna unguiculata* subsp. *sesquipedalis*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Goodeniaceae	*Scaevola sericea*	Nat	L: mod to high	X	—	—	—	X	X	—	X	X

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
Dicots—Continued												
Heliotropiaceae	*Euploca procumbens* var. *depressum*	A-N	W: mod	X	C	—	—	X	X	X	X	X
Heliotropiaceae	*Heliotropium anomalum*	Nat	L: low	X	—	—	—	—	X	—	X	X
Heliotropiaceae	*Heliotropium foertherianum*	Nat	W: high	X	—	—	X	X	X	X	X	X
Lamiaceae	*Coleus scutellarioides*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Lamiaceae	*Mentha spicata*	Cul	L: low	X	—	Y	—	—	X	—	—	—
Lamiaceae	*Ocimum basilicum*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Lamiaceae	*Ocimum tenuiflorum*	Cul	L: low	X	—	—	—	—	X	—	—	X
Lamiaceae	*Vitex trifolia*	Cul	L: low	X	C	—	—	—	X	X	X	—
Lecythidaceae	*Barringtonia asiatica*	Cul	L: low	X	—	—	—	—	X	—	—	X
Lythraceae	*Pemphis acidula*	Nat	W: high	X	—	—	X	X	X	X	X	X
Malvaceae	*Abutilon indicum* subsp. *albescens*	A-N	W: mod	X	C	—	—	—	X	X	X	X
Malvaceae	*Gossypium stephensii*	End	W: mod	X	—	—	—	X	X	X	X	X
Malvaceae	*Hibiscus* hybrid	Cul	L: low	X	—	—	—	—	X	X	X	X
Malvaceae	*Sida ciliaris*	A-N	L: low	X	C	Y	—	—	X	—	—	—
Malvaceae	*Sida fallax*	Nat	W: mod	X	—	—	X	X	X	X	X	X
Malvaceae	*Taliparitiliaceum*	Cul	L: low	X	C	—	—	—	X	—	—	X
Malvaceae	*Thespesia populnea*	Cul	L: low	X	—	—	—	—	X	X	X	X
Malvaceae	*Waltheria indica*	Nat	W: mod	X	—	—	—	X	X	X	—	X
Moraceae	*Ficus benghalensis*	Cul	L: low	X	—	Y	—	—	X	—	—	—
Moraceae	*Ficus carica*	Cul	L: low	X	—	—	—	—	X	—	X	X
Moraceae	*Ficus microcarpa*	Cul	L: low	X	—	—	—	—	X	X	—	X
Moraceae	*spondias pinnata*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Moraceae	*Moringa oleifera*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Myrtaceae	*Corymbia citriodora*	Cul	Unknown	—	—	—	—	—	—	—	X	—

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
Dicots—Continued												
Myrtaceae	*Psidium guajava*	Cul	L: low	X	—	—	—	—	X	—	—	X
Nyctaginaceae	*Boerhavia albiflora*	Nat	L: low	X	C	—	—	—	—	X	—	—
Nyctaginaceae	*Boerhavia coccinea*	A-N	W: mod	X	C	Y	—	—	X	—	—	—
Nyctaginaceae	*Boerhavia repens*	Nat	W: mod	X	C	—	X	—	X	—	X	X
Nyctaginaceae	*Bougainvillea spectabilis*	Cul	L: low	X	—	—	—	—	X	X	X	X
Nyctaginaceae	*Pisonia grandis*	Nat	L: mod to high	X	—	—	X	—	X	X	X	X
Nymphaeaceae	*Nymphaea* sp.	Cul	L: low	X	—	—	—	—	X	—	—	X
Oleaceae	*Jasminum sambac*	Cul	L: low	X	—	—	—	—	X	—	—	X
Oleaceae	*Noronhia emarginata*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Passifloraceae	*Passiflora foetida* var. *hispida*	A-I	L: mod	X	C	—	—	X	X	—	X	X
Phyllanthaceae	*Phyllanthus acidus*	Cul	L: low	X	—	—	—	—	X	—	—	X
Phyllanthaceae	*Phyllanthus amarus*	A-I	W: mod	X	—	—	—	X	X	X	X	—
Polygonaceae	*Coccoloba uvifera*	A-I	L: mod to high	X	—	—	—	—	X	X	X	X
Portulacaceae	*Portulaca lutea*	Nat	L: mod	X	C	—	X	X	X	X	X	X
Portulacaceae	*Portulaca oleracea*	A-N	W: mod	X	C	—	X	X	X	X	X	X
Portulacaceae	*Portulaca pilosa* subsp. *pilosa*	Nat	Unknown	—	—	—	—	—	—	—	X	—
Rhamnaceae	*Ziziphus mauritiana*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Rosaceae	*Rosa* sp.	Cul	Unknown	—	—	—	—	—	—	—	—	X
Rubiaceae	*Gardenia taitensis*	Cul	L: low	X	—	—	—	—	X	—	—	X
Rubiaceae	*Ixora* sp.	Cul	L: low	X	—	—	—	—	X	—	—	X
Rubiaceae	*Morinda citrifolia*	A-I	L: low	X	—	—	—	—	X	—	—	X
Rubiaceae	*Oldenlandia corymbosa*	A-N	L: low	X	C	Y	—	—	X	X	—	—
Rutaceae	*Citrus hystrix*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Rutaceae	*Citrus* sp.	Cul	L: low	X	—	—	—	—	X	—	—	X

Table B3. Distribution of plant species recorded in 2019 or during previous botanical surveys on Wake Atoll.—Continued

[Taxonomy follows Roskov and others (2019). **Status**: Cul, cultivated; A-N, alien naturalized; A-I, alien invasive; A, alien; E, endemic; Nat, native. **Distribution level**: W: high, widespread distribution with high abundance; W: mod, widespread distribution with moderate abundance; W: low, widespread distribution with low abundance; L: mod to high, local distribution with moderate to high abundance; L: mod, local distribution with moderate abundance; L: low, local distribution with low abundance; Unknown: not recorded in 2019 survey. **Historical distribution references:** Fosberg and Sachet, 1969. **Wake Island vegetation and flora, 1961–63:** Atoll Research Bulletin 1231–15; D.R. Herbst, Bernice Pauahi Bishop Museum, unpub. data, 1998. **Abbreviations:** X, species was detected; —, not applicable; Y, yes; C, collected]

Taxonomy			2019 distribution								Historical distribution	
Family	Scientific name	Status code	Distribution level	Recorded in 2019	Collected in 2019	New in 2019	Wilkes North 2019	Wilkes South 2019	Wake 2019	Peale 2019	Fosberg and Sachet, 1969	Herbst, unpub. data, 1998
Dicots—Continued												
Sapotaceae	*Chrysophyllum cainito*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Sapotaceae	*Manilkara zapota*	Cul	L: low	X	—	—	—	—	X	—	—	X
Solanaceae	*Capsicum annuum*	Cul	L: low	X	—	—	—	—	X	—	X	X
Solanaceae	*Capsicum frutescens*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Solanaceae	*Nicotiana tabacum*	Cul	Unknown	—	—	—	—	—	—	—	X	—
Solanaceae	*Solanum lycopersicum*	Cul	L: low	X	—	—	—	—	X	—	X	—
Solanaceae	*Solanum melongena*	Cul	L: low	X	—	—	—	—	X	—	—	X
Solanaceae	*Solanum torvum*	Cul	L: low	X	C	—	—	—	X	—	—	X
Tetrachondraceae	*Polypremnum procumbens*	A-N	L: low	X	C	Y	—	—	X	—	—	—
Urticaceae	*Pilea microphylla*	A-I	L: low	X	—	—	—	—	X	—	—	X
Urticaceae	*Piper sarmentosum*	Cul	Unknown	—	—	—	—	—	—	—	—	X
Verbenaceae	*Stachytarpheta jamaicensis*	A-I	W: mod	X	C	—	—	X	X	X	X	X
Verbenaceae	*Stachytarpheta urticifolia*	A-I	Unknown	—	—	—	—	—	—	—	X	—
Zygophyllaceae	*Tribulus cistoides*	Nat	L: mod to high	X	C	—	X	—	X	—	X	X
Zygophyllaceae	*Tribulus terrestris*	A-I	L: low	X	C	—	—	—	X	—	—	X

Table B4. List of invasive plant species that could become established on Wake Atoll if introduced.

[—, not applicable]

Family	Scientific name	Common name	Function/ life form	Synonyms
		Monocots		
Poaceae	*Cenchrus setaceus* (Forssk.) Morrone	Fountaingrass	Grass	*Pennisetum setaceum*
Poaceae	*Cenchrus ciliaris* L.	Buffelgrass	Grass	—
Poaceae	*Melinis minutiflora* P. Beauv.	Molasses grass	Grass	—
Poaceae	*Panicum maximum* Jacq.	Guinea grass	Grass	*Megathyrsus maximus*
		Dicots		
Asteraceae	*Chromolaena odorata* (L.) R.King and H.Rob.	Devil weed	Herb	—
Asteraceae	*Pluchea indica* (L.) Less.	Indian fleabane	Shrub	—
Asteraceae	*Verbesina encelioides* (Cav.) Benth. and Hook.	golden crown-beard	Shrub	—
Clusiaceae	*Clusia rosea* Jacq.	Autograph tree	Tree	—
Euphorbiaceae	*Ricinus communis* L.	Castor bean	Herb	—
Fabaceae	*Neonotonia wightii* (Wight & Arn.) Lackey	Glycine	Vine	—
Fabaceae	*Prosopis pallida* (Willd.) Kunth	Kiawe, mesquite	Tree	—
Fabaceae	*Prosopis juliflora* (Sw.) DC.	Mesquite	Tree	—
Verbenaceae	*Lantana camara* L.	Lantana	Shrub	—

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Appendix B1. Plant Species Recorded from Wake Atoll in 2019

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Monocots			
Amaryllidaceae	Amaryllis family	*Allium cepa* L.	Herb	Bulb onion, globe onion	—
Amaryllidaceae	Amaryllis family	*Allium fistulosum* L.	Herb	Green onion, scallion	—
Amaryllidaceae	Amaryllis family	*Allium tuberosum* Rottler ex Spreng.	Herb	Garlic chives	—
Amaryllidaceae	Amaryllis family	*Crinum amabile* Donn ex Ker Gawl.	Herb	Spider lily, Queen Emma crinum	*Crinum augustum*
Amaryllidaceae	Amaryllis family	*Crinum asiaticum* L.	Herb	Spider lily, giant crinum lily	—
Amaryllidaceae	Amaryllis family	*Hippeastrum* sp.	Herb	Amaryllis	—
Amaryllidaceae	Amaryllis family	*Hymenocallis littoralis* (Jacq.) Salisb.	Herb	Beach spider lily	*Hymenocallis pedalis*
Araceae	Aroid family	*Caladium bicolor* (Aiton) Vent.	Herb	Caladium, heart of Jesus	—
Araceae	Aroid family	*Colocasia esculenta* (L.) Schott	Herb	Taro	—
Araceae	Aroid family	*Dieffenbachia seguine* (Jacq.) Schott	Herb	Dumb cane	—
Araceae	Aroid family	*Epipremnum aureum* (Linden & André) G.S. Bunting	Vine	Devil's ivy, taro vine	*Rhaphidophora aurea*
Araceae	Aroid family	*Epipremnum pinnatum* (L.) Engl.	Vine	Pothos, taro vine	—
Araceae	Aroid family	*Philodendron hederaceum* var. *oxycardium* (Schott) Croat	Vine	Heartleaf philodendron, vilevine	*Phyllodendron oxycardium*
Araceae	Aroid family	*Philodendron undulatum* Engl.	Vine	Philodendron	—
Araceae	Aroid family	*Syngonium auritum* (L.) Schott	Vine	Syngoniurn, arrowhead vine	—
Arecaceae	Palm family	*Adonidia merrillii* (Becc.) Becc.	Tree	Manila palm; Christmas palm	—
Arecaceae	Palm family	*Cocos nucifera* L.	Tree	Coconut	—
Arecaceae	Palm family	*Phoenix* sp.	Tree	Date palm	—
Asparagaceae	Asparagus family	*Agave americana* L.	Shrub	Century plant	—
Asparagaceae	Asparagus family	*Agave angustifolia* Haw.	Shrub	Century plant	—
Asparagaceae	Asparagus family	*Agave sisalana* Perrine	Shrub	Sisal	—
Asparagaceae	Asparagus family	*Asparagus densiflorus* (Kunth) Jessop	Shrub	Asparagus fern	—
Asparagaceae	Asparagus family	*Chlorophytum comosum* (Thunb.) Jacques	Herb	Spider plant	—
Asparagaceae	Asparagus family	*Cordyline fruticosa* (L.) A.Chev.	Shrub	Ti	*Cordyline terminalis*
Asparagaceae	Asparagus family	*Dracaena reflexa* var. *angustifolia* Baker	Shrub	Song of India, pleomele	*Dracaena marginata*
Asparagaceae	Asparagus family	*Sansevieria hyacinthoides* (L.) Druce	Herb	Iguana tail, African bowstring hemp	*Sansevieria guineensis*

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Monocots—Continued			
Asparagaceae	Asparagus family	*Sansevieria trifasciata* Prain	Herb	Snake plant, mother-in-law's tongue	—
Asphodelaceae	Asphodelus family	*Aloe vera* (L.) Burm.f.	Herb	Aloe	—
Bromeliaceae	Bromeliad family	*Ananas comosus* (L.) Merr.	Herb	Pineapple	—
Bromeliaceae	Bromeliad family	*Nidularium* sp.	Shrub	Nidularium, nest bromeliad	—
Commelinaceae	Spiderwort family	*Tradescantia pallida* (Rose) D.R. Hunt	Herb	Purple tradescantia, wandering jew	*Setcreasea purpurea*
Commelinaceae	Spiderwort family	*Tradescantia spathacea* Sw.	Herb	Oyster plant	*Rhoeo spathacea*
Cyperaceae	Sedge family	*Cyperus alternifolius* L.	Sedge	Umbrella sedge	—
Cyperaceae	Sedge family	*Cyperus pumilus* L.	Sedge	Low flatsedge	—
Cyperaceae	Sedge family	*Cyperus rotundus* L.	Sedge	Nutgrass, umbrella sedge	—
Cyperaceae	Sedge family	*Fimbristylis cymosa* R.Br.	Sedge	Tropical fimbry	—
Cyperaceae	Sedge family	*Fimbristylis dichotoma* (L.) Vahl	Sedge	Forked fimbry	—
Hydrocharitaceae	Frog's-bit family	*Egeria densa* Planch.	Herb	Brazilian waterweed	—
Musaceae	Banana family	*Musa acuminata* Colla	Herb	Cavendish banana	—
Orchidaceae	Orchid family	Orchid sp.	Herb	Orchid species	—
Pandanaceae	Screw pine family	*Pandanus tectorius* Parkinson ex Du Roi	Tree	Hala, screwpine	—
Poaceae	Grass family	*Bothriochloa pertusa* (L.) A.Camus	Grass	Pitted beardgrass	—
Poaceae	Grass family	*Cenchrus brownii* Roem. & Schult.	Grass	Slim-bristle sandbur	—
Poaceae	Grass family	*Cenchrus echinatus* L.	Grass	Sandbur	—
Poaceae	Grass family	*Chloris barbata* Sw.	Grass	Swollen fingergrass	*Chloris inflata*
Poaceae	Grass family	*Cymbopogon citratus* (DC.) Stapf	Grass	Lemon grass	—
Poaceae	Grass family	*Cynodon dactylon* (L.) Pers.	Grass	Bermuda grass	—
Poaceae	Grass family	*Dactyloctenium aegyptium* (L.) Willd.	Grass	Beach wiregrass, crowfoot grass	—
Poaceae	Grass family	*Digitaria ciliaris* (Retz.) Koeler	Grass	Henry's crabgrass, southern crabgrass	—
Poaceae	Grass family	*Digitaria gaudichaudii* (Kunth) Henrard	Grass	Crabgrass	—
Poaceae	Grass family	*Digitaria insularis* (L.) Mez ex Ekman	Grass	Sourgrass	—
Poaceae	Grass family	*Eleusine indica* (L.) Gaertn.	Grass	Indian goosegrass, wiregrass	—
Poaceae	Grass family	*Eragrostis amabilis* (L.) Wight & Arn.	Grass	Japanese lovegrass (syn: *E. tenella*)	*Eragrostis tenella*
Poaceae	Grass family	*Eragrostis minor* Host	Grass	Lesser love grass, small stink grass	*Eragrostis poaeoides*

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Monocots—Continued			
Poaceae	Grass family	*Eragrostis scabriflora* Swallen	Grass	No common name found	—
Poaceae	Grass family	*Eustachys petraea* (Sw.) Desv.	Grass	Pinewoods fingergrass	—
Poaceae	Grass family	*Lepturus repens* (G.Forst.) R.Br.	Grass	Pacific Island thintail	*Lepturus gasparriciensis*
Poaceae	Grass family	*Paspalum scrobiculatum* L.	Grass	Ricegrass, Kodo millet (Syn: *P. orbiculare*)	*Paspalum auriculatum*, *P. cartilagineum*
Poaceae	Grass family	*Paspalum setaceum* Michx.	Grass	Thin paspalum, fringeleaf paspalum	—
Poaceae	Grass family	*Paspalum vaginatum* Sw.	Grass	Seashore paspalum, biscuit grass	—
Poaceae	Grass family	*Setaria verticillata* (L.) P.Beauv.	Grass	Bristly foxtail	—
Poaceae	Grass family	*Sorghum bicolor* (L.) Moench	Grass	Sweet sorghum	*Sorghum dochna* var. *technicum*
Poaceae	Grass family	*Zea mays* L.	Grass	Corn	—
Poaceae	Grass family	*Zoysia matrella* (L.) Merr.	Grass	Manila grass	—
Pontederiaceae	Pickerel weed family	*Eichhornia crassipes* (Mart.) Solms	Aquatic herb	Water hyacinth	—
Strelitziaceae	Bird of paradise family	*Strelitzia reginae* Banks	Large herb	Bird-of-paradise	—
Zingiberaceae	Ginger family	*Alpinia galanga* (L.) Willd.	Large herb	Galanga, Thai ginger, blue ginger	—
Zingiberaceae	Ginger family	*Alpinia purpurata* (Vieill.) K.Schum.	Large herb	Red ginger	—
Zingiberaceae	Ginger family	*Hedychium coronarium* J.Koenig	Large herb	White ginger	—
		Gymnosperms			
Araucariaceae	Araucaria family	*Araucaria heterophylla* (Salisb.) Franco	Tree	Norfolk Island pine	—
		Ferns			
Polypodiaceae	Polypody family	*Phymatosorus scolopendria* (Burm. fil.) Pic. Serm.	Fern	Laua'e fern, wart fern	—
Psilotaceae	Whisk fern family	*Psilotum nudum* (L.) P. Beauv.	Fern	Moa; wisk fern	—
		Dicots			
Acanthaceae	Acanthus family	*Pseuderanthemum carruthersii* (Seem.) Guill.	Shrub	Carruthers' falseface; yellow-veined Eranthemum	*Pseuderanthemum carruthersii* var. *carruthersii*
Acanthaceae	Acanthus family	*Pseuderanthemum carruthersii* var. *atropurpureum* (Bull) Fosberg	Shrub	Purple false Eranthemum	*Pseuderanthemum carruthersii* var. *atropurpura*
Aizoaceae	Fig-marigold family	*Sesuvium portulacastrum* (L.) L.	Herb	Shoreline seapurslane; `akulikuli	—
Amaranthaceae	Amaranth family	*Amaranthus blitum* L.	Herb	Purple amaranth, sender amaranth	*Amaranthus viridis*

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Dicots—Continued			
Amaranthaceae	Amaranth family	*Amaranthus dubius* Mart.	Herb	Spleen amaranth, red spinach	—
Amaranthaceae	Amaranth family	*Amaranthus graecizans* L.	Herb	Mediterranean amaranth, short-tepalled pigweed	—
Amaranthaceae	Amaranth family	*Gomphrena globosa* L.	Herb	Bachelor`s button; globe amaranth	—
Anacardiaceae	Mango family	*Mangifera indica* L.	Tree	Mango	—
Anacardiaceae	Mango family	*Spondias pinnata* (L. fil.) Kurz	Tree	Wild mango, hog plum	—
Annonaceae	Custard apple family	*Annona muricata* L.	Tree	Soursop	—
Annonaceae	Custard apple family	*Annona squamosa* L.	Tree	Sugar apple, custard apple, sweetsop	—
Apiaceae	Parsley family	*Anethum graveolens* L.	Herb	Dill	—
Apiaceae	Parsley family	*Coriandrum sativum* L.	Herb	Cilantro, coriander, Chinese parsley	—
Apiaceae	Parsley family	*Eryngium foetidum* L.	Herb	False coriander, serrated coriander	—
Apiaceae	Parsley family	*Petroselinum crispum* (Mill.) Fuss	Herb	Parsley	*Apium petroselinum*
Apocynaceae	Dogbane family	*Adenium obesum* (Forsk.) Roem. & Schult.	Shrub	Desert rose	—
Apocynaceae	Dogbane family	*Calotropis gigantea* (L.) W. T. Aiton	Shrub	Crown flower	—
Apocynaceae	Dogbane family	*Catharanthus roseus* (L.) G. Don	Herb	Periwinkle, Madagascar periwinkle	—
Apocynaceae	Dogbane family	*Nerium oleander* L.	Shrub	Oleander	—
Apocynaceae	Dogbane family	*Plumeria obtusa* L.	Tree	Plumeria, frangipani	—
Apocynaceae	Dogbane family	*Plumeria rubra* L.	Tree	Common frangipani, red frangipani	—
Araliaceae	Ginseng family	*Polyscias fruticosa* (L.) Harms	Shrub	Ming aralia	—
Araliaceae	Ginseng family	*Polyscias guilfoylei* (W.Bull) L.H.Bailey	Shrub	Panax, geranium aralia	—
Araliaceae	Ginseng family	*Polyscias scutellaria* (Burm.f.) Fosberg	Shrub	Shield aralia, plum aralia	—
Araliaceae	Ginseng family	*Schefflera actinophylla* (Endl.) Harms	Tree	Octopus tree, umbrella tree	*Brassaia actinophylla*
Asteraceae	Sunflower family	*Bidens alba* (L.) DC	Herb	Beggarticks, Spanish needles	—
Asteraceae	Sunflower family	*Erigeron bonariensis* L.	Herb	Hairy horseweed, hairy fleabane	*Conyza bonariensis*
Asteraceae	Sunflower family	*Erigeron canadensis* L.	Herb	Canada fleabane, horseweed	*Conyza canadensis*

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Dicots—Continued			
Asteraceae	Sunflower family	*Helianthus annuus* L.	Herb	Common sunflower	—
Asteraceae	Sunflower family	*Lactuca sativa* L.	Herb	Lettuce	—
Asteraceae	Sunflower family	*Pluchea carolinensis* (Jacq.) G. Don	Shrub	Sourbush, fleabane	—
Asteraceae	Sunflower family	*Pluchea odorata* (L.) Cass.	Shrub	Camphor-weed, saltmarsh fleabane	—
Asteraceae	Sunflower family	*Sonchus oleraceus* L.	Herb	Common sowthistle	—
Asteraceae	Sunflower family	*Tagetes erecta* L.	Herb	Marigold	*Tagetes patula*
Asteraceae	Sunflower family	*Tridax procumbens* L.	Herb	Coatbuttons, tridax daisy	—
Asteraceae	Sunflower family	*Zinnia elegans* Jacq.	Herb	Garden zinnia	*Zinnia violacea*
Bignoniaceae	Bignonia family	*Tabebuia aurea* (Manso) Benth. & Hook. fil. ex S. Moore	Tree	Silver trumpet-tree	*Tabebuia argentea*
Brassicaceae	Mustard family	*Brassica nigra* (L.) W.D.J. Koch	Herb	Black mustard	—
Brassicaceae	Mustard family	*Brassica oleracea* L.	Herb	Cabbage, kale, kohlrabi, cauliflower, broccoli, etc.	—
Brassicaceae	Mustard family	*Lepidium bidentatum I*	Herb	Pepperwort	—
Brassicaceae	Mustard family	*Lobularia maritima* (L.) Desv.	Herb	Sweet alyssum or sweet alison	—
Brassicaceae	Mustard family	*Raphanus sativus* L.	Herb	Raddish	—
Cactaceae	Cactus family	*Nopalea cochenillifera* (L.) Salm-Dyck	Shrub	Cochinilla cactus	*Opuntia cochenillifera*
Cactaceae	Cactus family	*Opuntia littoralis* (Engelm.) Cockerell	Shrub	Coastal prickly pear cactus	—
Caricaceae	Papaya family	*Carica papaya* L.	Tree	Papaya	—
Cleomaceae	Cleome family	*Gynandropsis gynandra* (L.) Briq.	Tree	Ironwood; Australian pine tree	*Cleome gynandra*
Commelinaceae	Spiderwort family	*Casuarina equisetifolia* L.	Herb	African spider-flower	—
Commelinaceae	Spiderwort family	*Terminalia catappa* L.	Tree	Indian almond, false kamani	—
Convolvulaceae	Morning glory family	*Cuscuta pentagona* Engelm.	Vine	Fiveangled dodder	—
Convolvulaceae	Morning glory family	*Ipomoea aquatica* Forsk.	Vine	Swamp morning-glory, Chinese watercress	—
Convolvulaceae	Morning glory family	*Ipomoea batatas* (L.) Lam.	Vine	Sweet potato	—
Convolvulaceae	Morning glory family	*Ipomoea pes-caprae* subsp. *brasiliensis* (L.) Ooststr.	Vine	Beach morning-glory, pohuehue; puhuehue	—

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Dicots—Continued			
Convolvulaceae	Morning glory family	*Ipomoea violacea* L.	Vine	Beach moon-flower, heavenlyblue morning-glory	*Ipomoea tuba*
Crassulaceae	Orpine family	*Crassula ovata* (Mill.) Druce	Herb	Jade plant	—
Crassulaceae	Orpine family	*Kalanchoe daigremontiana* R.-Hamet & Perrier	Herb	Devil's backbone, alligator plant	—
Crassulaceae	Orpine family	*Kalanchoe delagoensis* Eckl. & Zeyh.	Herb	Chandelier plant	—
Crassulaceae	Orpine family	*Kalanchoe pinnata* (Lam.) Pers.	Herb	Air plant, cathedral bells	—
Crassulaceae	Orpine family	*Sedum* sp.	Herb	Stonecrop	—
Crassulaceae	Orpine family	*Sempervivum tectorum* L.	Herb	Common houseleek	—
Cucurbitaceae	Gourd family	*Coccinia grandis* (L.) Voigt	Vine	Ivy gourd	—
Cucurbitaceae	Gourd family	*Cucumis melo* L.	Vine	Cantaloupe, muskmelon	—
Cucurbitaceae	Gourd family	*Cucurbita pepo* L.	Vine	Pumpkin, squash	—
Cucurbitaceae	Gourd family	*Momordica charantia* L.	Vine	Bitter melon	—
Ehretiaceae	Ehretiaceae family	*Cordia subcordata* Lamarck	Tree	Kou	—
Euphorbiaceae	Spurge family	*Codiaeum variegatum* (L.) Rumph. ex A.Juss.	Shrub	Garden croton or variegated croton	—
Euphorbiaceae	Spurge family	*Euphorbia heterophylla* var. *cyathophora* (Murray) Griseb.	Herb	Dwarf poinsettia, wild poinsettia	*Euphorbia cyathophora*
Euphorbiaceae	Spurge family	*Euphorbia hirta* L.	Herb	Hairy spurge, garden spurge	*Chamaesyce hirta*
Euphorbiaceae	Spurge family	*Euphorbia hypericifolia* L.	Shrub	Graceful spurge	*Euphorbia hypericifolia, Euphorbia glomerifera*
Euphorbiaceae	Spurge family	*Euphorbia lactea* Haw.	Shrub	Mottled spurge, frilled fan, candlestick tree	—
Euphorbiaceae	Spurge family	*Euphorbia milii* Des Moul.	Shrub	Crown of thorns, Christ plant, or Christ thorn	—
Euphorbiaceae	Spurge family	*Euphorbia prostrata* Aiton	Herb	Prostrate purge or prostrate sandmat	*Chamaesyce prostrata*
Euphorbiaceae	Spurge family	*Euphorbia pulcherrima* Willd. ex Klotzsch	Shrub	Poinsettia; Christmas star	—
Euphorbiaceae	Spurge family	*Euphorbia thymifolia* L.	Herb	Chickenweed	*Chamaesyce thymifolia*
Euphorbiaceae	Spurge family	*Euphorbia tirucalli* L.	Shrub	Firestick, pencil tree, pencil cactus	—

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Dicots—Continued			
Euphorbiaceae	Spurge family	*Euphorbia tithymaloides* L.	Shrub	Redbird cactus, buck-thorn, Christmas candle	*Pedilanthus tithymaloides*
Euphorbiaceae	Spurge family	*Jatropha integerrima* Jacq.	Shrub	Rose-flowered jatropha	—
Euphorbiaceae	Spurge family	*Ricinus communis* L.	Shrub	Castor bean or castor oil plant	—
Fabaceae	Pea family	*Bauhinia* sp.	Tree	Orchid tree	—
Fabaceae	Pea family	*Caesalpinia bonduc* (L.)Roxb.	Vine	Grey nicker, nicker bean, kakalaoa	—
Fabaceae	Pea family	*Dalea emarginata* (Torr. & A.Gray)Shinners	Herb	Wedgeleaf prairie clover	—
Fabaceae	Pea family	*Delonix regia* (Hook.) Raf.	Tree	Poinciana, flame tree	—
Fabaceae	Pea family	*Desmanthus pernambucanus* (L.)Thell.	Shrub	Wild tantan, prostrate bundleflower, dwarf koa	—
Fabaceae	Pea family	*Desmanthus virgatus* (L.)Willd.	Shrub	Wild tantan, prostrate bundleflower, dwarf koa	—
Fabaceae	Pea family	*Gliricidia sepium* (Jacq.)Walp.	Tree	Gliricidia	—
Fabaceae	Pea family	*Leucaena leucocephala* (Lam.)de Wit	Tree	Koa haole, tangantangan, lead tree	—
Fabaceae	Pea family	*Phaseolus coccineus* L.	Vine	Snap bean, scarlet runner bean	—
Fabaceae	Pea family	*Phaseolus vulgaris* L.	Vine	Common bean, snap bean	—
Fabaceae	Pea family	*Pithecellobium dulce* (Roxb.)Benth.	Tree	Opiuma, Manila tamarind	—
Fabaceae	Pea family	*Psophocarpus tetragonolobus* (L.)DC.	Vine	Wing bean	—
Fabaceae	Pea family	*Samanea saman* (Jacq.) Merr.	Tree	Monkeypod	*Albizia saman*
Fabaceae	Pea family	*Sesbania grandiflora* (L.)Pers.	Tree	Hummingbird tree, scarlet wisteria	—
Fabaceae	Pea family	*Tamarindus indica* L.	Tree	Tamarind	—
Fabaceae	Pea family	*Vigna unguiculata* subsp. *sesquipedalis* (L.) Verdc.	Vine	Asparagus bean, yard-long bean	—
Goodeniaceae	Goodenia family	*Scaevola sericea* Forst. fil.	Shrub	Beach naupaka, naupaka kahakai	*Scaevola sericea* var. *taccada*, *S. taccada*
Heliotropiaceae	Heliotrop family	*Euploca procumbens* var. *depressum* (Chamisso)	Herb	Fourspike heliotrope (*Heliotropium procumbens*)	*Heliotropium procumbens* var. *depressum*
Heliotropiaceae	Heliotrop family	*Heliotropium anomalum* Hook. & Arn.	Herb	Hinahina, Polynesian heliotrope	—

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Dicots—Continued			
Heliotropiaceae	Heliotrop family	*Heliotropium foertherianum* Diane & Hilger	Tree	Tree heliotrope, octopus bush	*Tournefortia argentea*
Lamiaceae	Mint family	*Coleus scutellarioides* (L.) Benth.	Herb	Coleus	*Solenostemon scutellarioides*, *Plectranthus scutellarioides*
Lamiaceae	Mint family	*Mentha spicata* L.	Herb	Mint, spearmint	—
Lamiaceae	Mint family	*Ocimum basilicum* L.	Herb	Sweet basil	—
Lamiaceae	Mint family	*Ocimum tenuiflorum* L.	Herb	Holy basil, tulasi	—
Lamiaceae	Mint family	*Vitex trifolia* L.	Shrub	Blue vitex	—
Lecythidaceae	Brazil-nut family	*Barringtonia asiatica* (L.) Kurz	Tree	Fish poison tree	—
Lythraceae	Loosestrife family	*Pemphis acidula* J.R. Forster & G. Forster	Shrub	Pemphis	—
Malvaceae	Mallow family	*Abutilon indicum* subsp. *albescens* (Miq.) Borssum Waalkes	Shrub	Indian mallow	*Abutilon asiaticum* var. *albescens*
Malvaceae	Mallow family	*Gossypium stephensii* J.P.Gallagher, C.E.Grover & Wendel	Shrub	Wake Island cotton	—
Malvaceae	Mallow family	*Hibiscus* hybrid	Shrub	Hibiscus	—
Malvaceae	Mallow family	*Sida ciliaris* L.	Herb	Fringed Sida	—
Malvaceae	Mallow family	*Sida fallax* Walp.	Shrub	Ilima	—
Malvaceae	Mallow family	*Talipariti tiliaceum* (L.) Fryxell	Tree	Hau, sea hibiscus	*Hibiscus tiliaceus*
Malvaceae	Mallow family	*Thespesia populnea* (L.) Soland. ex Correa	Tree	Milo	—
Malvaceae	Mallow family	*Waltheria indica* L.	Herb	Uhaloa	—
Moraceae	Mulberry family	*Ficus benghalensis* L.	Tree	Banyan	—
Moraceae	Mulberry family	*Ficus carica* L.	Tree	Edible fig	—
Moraceae	Mulberry family	*Ficus microcarpa* L. fil.	Tree	Chinese banyan, Indian laurel fig	—
Moraceae	Mulberry family	*Ficus rubiginosa* Desf.	Tree	Port Jackson fig, rusty fig	—
Moraceae	Mulberry family	*Moringa oleifera* Lam.	Tree	Horseradish tree, drumstick tree	—
Myrtaceae	Myrtle family	*Corymbia citriodora* (Hook.) K.D. Hill & L.A.S. Johnson	Tree	Lemon-scented gum	*Eucalyptus citriodora*
Myrtaceae	Myrtle family	*Psidium guajava* L.	Tree	Common guava, lemon guava	—
Nyctaginaceae	Four-o'clock family	*Boerhavia albiflora* Fosberg	Herb	Spiderling	—
Nyctaginaceae	Four-o'clock family	*Boerhavia coccinea* Mill.	Herb	Scarlet spiderling	—
Nyctaginaceae	Four-o'clock family	*Boerhavia repens* L.	Herb	Red spiderling, hogweed	—
Nyctaginaceae	Four-o'clock family	*Bougainvillea spectabilis* Willd.	Shrub	Bougainvillea	—
Nyctaginaceae	Four-o'clock family	*Pisonia grandis* R. Br.	Tree	Papala kepau	—

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Dicots—Continued			
Nymphaeaceae	Water lily family	*Nymphaea* sp.	Aquatic herb	Lotus, waterlily	—
Oleaceae	Olive family	*Jasminum sambac* (L.) Aiton	Shrub	Arabian jasmine, Sambac jasmine	—
Oleaceae	Olive family	*Noronhia emarginata* (Lam.) Poir.	Shrub	Madagascar olive	—
Passifloraceae	Passion flower family	*Passiflora foetida* var. *hispida* (DC. ex Triana & Planchon) Killip ex Gleason	Vine	Passion fruit, scarletfruit passionflower	—
Phyllanthaceae	Phyllanthus family	*Phyllanthus acidus* (L.) Skeels	Shrub	Otaheite gooseberry	—
Phyllanthaceae	Phyllanthus family	*Phyllanthus amarus* Schumach. & Thonn.	Shrub	Hurricane weed, carry me seed	—
Polygonaceae	Buckwheat family	*Coccoloba uvifera* (L.) L.	Tree	Sea grape	—
Portulacaceae	Purslane family	*Portulaca lutea* SoI. ex Seem.	Herb	Yellow purslane	—
Portulacaceae	Purslane family	*Portulaca oleracea* L.	Herb	Purslane, hogweed, pigweed	—
Portulacaceae	Purslane family	*Portulaca pilosa* subsp. *pilosa* L.	Herb	Seashore purslane, rose-flowered purslane	*Portulaca samoensis, P. australis*
Rhamnaceae	Buckthorn family	*Ziziphus mauritiana* Lam.	Tree	Indian jujube, Chinese date	—
Rosaceae	Rose family	*Rosa* sp.	Shrub	Rose	—
Rubiaceae	Coffee family	*Gardenia taitensis* DC.	Shrub	Tiare	—
Rubiaceae	Coffee family	*Ixora* sp.	Shrub	Ixora	—
Rubiaceae	Coffee family	*Morinda citrifolia* L., nom. cons.	Tree	Noni, Indian-mulberry	—
Rubiaceae	Coffee family	*Oldenlandia corymbosa* L.	Herb	Flat-top mille graines, diamond flower	*Hedyotis corymbosa* (L.) Lam.
Rutaceae	Rue or citrus family	*Citrus hystrix* DC.	Tree	Kaffir lime, Thai lime	—
Rutaceae	Rue or citrus family	*Citrus* sp.	Tree	Citrus	—
Sapotaceae	Sapodilla family	*Chrysophyllum cainito* L.	Tree	Star apple, cainito	—
Sapotaceae	Sapodilla family	*Manilkara zapota* (L.) P.Royen	Tree	Sapodilla	—
Solanaceae	Nightshade family	*Capsicum annuum* L.	Shrub	Chili pepper, bell pepper, etc.	—
Solanaceae	Nightshade family	*Capsicum frutescens* L.	Shrub	Chili pepper	—
Solanaceae	Nightshade family	*Nicotiana tabacum* L.	Shrub	Tobacco	—
Solanaceae	Nightshade family	*Solanum lycopersicum* L.	Shrub	Tomato	*Lycopersicon esculentum*
Solanaceae	Nightshade family	*Solanum melongena* L.	Shrub	Egg plant	—
Solanaceae	Nightshade family	*Solanum torvum* Swartz	Shrub	Turkeyberry, pea eggplant	—

Table B1.1. List of plant species recorded from Wake Atoll, with full taxonomic nomenclature and selected synonyms.—Continued

[Taxonomy follows Roskov and others (2019). **Abbreviation**: —, not applicable]

Family	Family common name	Full taxonomic name	Life form	Common name	Synonyms
		Dicots—Continued			
Tetrachondraceae	Tetrachondra family	*Polypremum procumbens* L.	Herb	Juniper leaf	—
Urticaceae	Nettle family	*Pilea microphylla* (L.) Liebm.	Herb	Artillery plant	—
Urticaceae	Nettle family	*Piper sarmentosum* Roxb.	Shrub	Lolot, wild betel	*Piper lolot*
Verbenaceae	Verbena family	*Stachytarpheta jamaicensis* (L.) Vahl	Shrub	Jamaica vervain, light-blue snakeweed	—
Verbenaceae	Verbena family	*Stachytarpheta urticifolia* Sims	Shrub	Blue rat's tail, nettleleaf velvetberry	—
Zygophyllaceae	Creosote bush family	*Tribulus cistoides* L.	Shrub	Nohu	—
Zygophyllaceae	Creosote bush family	*Tribulus terrestris* L.	Shrub	Puncture vine	—

B1. Reference Cited

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Appendix B2. Plant Field Guide to Wake Atoll

Photograph and descriptive summary of native and introduced plant species that have been recorded on Wake Atoll. Taxa are organized with monocots first and dicots second. Within monocots and dicots, taxa are organized alphabetically by family name and then by genus within family.

Crinum amabile

Plant Group: Monocots *Family:* Amaryllidaceae *Life Form:* herb

Species Code: CriAma *Synonym(s):* *Crinum augustum*

Common Name(s): spider lily, Queen Emma crinum

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: Forest and Kim Starr, Starr Environmental

Wake Atoll Plant Photo Key From 2019 Survey

Crinum asiaticum

Plant Group: Monocots *Family:* Amaryllidaceae *Life Form:* herb

Species Code: CriAsi *Synonym(s):*

Common Name(s): spider lily, giant crinum lily

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

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Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

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Hippeastrum sp.

Plant Group: Monocots *Family:* Amaryllidaceae *Life Form:* herb

Species Code: HipSp *Synonym(s):*

Common Name(s): amaryllis

Status on Wake: cultivated *Wake Risk Assessment:* low

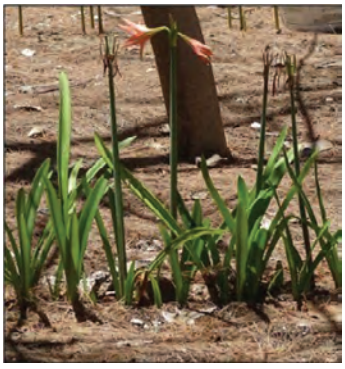
Recorded by: [ ] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [Y]

Comments:
This ornamental species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution: Wilkes: [ ] Wake: [ ] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [ ]


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Colocasia esculenta

Plant Group: Monocots *Family:* Araceae *Life Form:* herb

Species Code: ColEsc *Synonym(s):*

Common Name(s): taro

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [ ] 2019 Survey New in 2019 Survey? [ ]

Comments:
Several plants in residential gardens. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution: Wilkes: [ ] Wake: [X] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [ ] Peale: [ ]

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Syngonium auritum

Plant Group: Monocots *Family:* Araceae *Life Form:* vine

Species Code: SynAur *Synonym(s):*

Common Name(s): syngoniurn, arrowhead vine

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
Although Herbst found it on Wake and Peale Islets in 1998, it was only seen on Wake in the 2019 survey.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Adonidia merrillii

Plant Group: Monocots *Family:* Arecaceae *Life Form:* tree

Species Code: AdoMer *Synonym(s):*

Common Name(s): Manila palm; Christmas palm

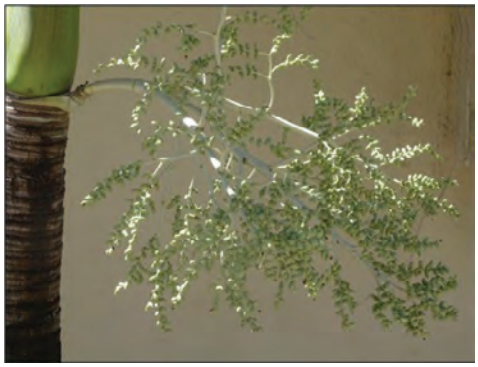
Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:
Herbst recorded an unknown palm in his 1998 survey but did not identify it; possibly it was this species, planted in several locations around buildings on Wake Islet and also at the Solid Waste Accumulation Area.

Herbst 1998 distribution:		Wilkes:		Wake:	X?	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Cocos nucifera

Plant Group: Monocots *Family:* Arecaceae *Life Form:* tree

Species Code: CocNuc *Synonym(s):*

Common Name(s): coconut

Status on Wake: alien-naturalized *Wake Risk Assessment:* medium

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
There are several coconut trees that have been planted on both Wake and Peale Islets. This species, which is not native to Wake Atoll has the potential to expand to many other areas and even dominate the coastline.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Phoenix sp.

Plant Group: Monocots *Family:* Arecaceae *Life Form:* tree

Species Code: PhoSp *Synonym(s):*

Common Name(s): date palm

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
While this introduced palm species is only found in a few places around residences on the northwest side of Wake Islet, it has the potential to spread to many other locations throughout the atoll.

Herbst 1998 distribution:		Wilkes: [ ]		Wake: [X]		Peale: [ ]	
2019 survey distribution:	Wilkes N: [ ]	Wilkes S: [ ]		Wake: [X]		Peale: [ ]	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Agave sisalana

Plant Group: Monocots *Family:* Asparagaceae *Life Form:* shrub

Species Code: AgaSis *Synonym(s):*

Common Name(s): sisal

Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
Planted as an ornamental around several residences on Wake Islet and near the old FAA facility on Peale, this highly invasive species has great potential for spread to many other areas.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Asparagus densiflorus

Plant Group: Monocots *Family:* Asparagaceae *Life Form:* shrub

Species Code: AspDen *Synonym(s):*

Common Name(s): asparagus fern

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

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Photograph: J. Jacobi, U.S. Geological Survey

Photograph: Forest and Kim Starr, Starr Environmental

Photograph: Forest and Kim Starr, Starr Environmental

Cordyline fruticosa

Plant Group: Monocots *Family:* Asparagaceae *Life Form:* shrub

Species Code: CorFru *Synonym(s):* *Cordyline terminalis*

Common Name(s): ti

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:		


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Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Sansevieria trifasciata

Plant Group: Monocots *Family:* Asparagaceae *Life Form:* herb

Species Code: SanTri *Synonym(s):*

Common Name(s): snake plant, mother-in-law's tongue

Status on Wake: cultivated *Wake Risk Assessment:* medium

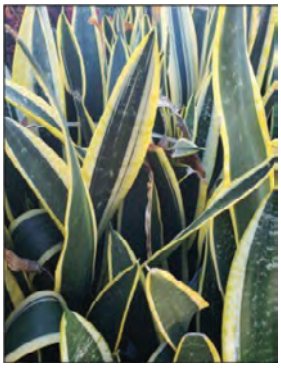
Recorded by: [ ] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution: Wilkes: [ ] Wake: [ ] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [ ]

Photograph: J. Jacobi, U.S. Geological Survey



Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Aloe vera

Plant Group: Monocots *Family:* Asphodelaceae *Life Form:* herb

Species Code: AloVer *Synonym(s):*

Common Name(s): aloe

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:	X		Wake:	X	Peale: X
2019 survey distribution:	Wilkes N:		Wilkes S:			Wake:	X	Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Tradescantia spathacea

Plant Group: Monocots *Family:* Commelinaceae *Life Form:* herb

Species Code: TraSpa *Synonym(s):* *Rhoeo spathacea*

Common Name(s): oyster plant

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:		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Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Cyperus alternifolius

Plant Group: Monocots *Family:* Cyperaceae *Life Form:* sedge

Species Code: CypAlt *Synonym(s):*

Common Name(s): umbrella sedge

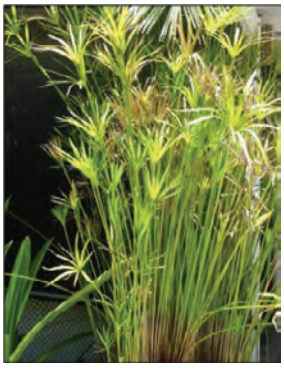
Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey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Cyperus rotundus

Plant Group: Monocots *Family:* Cyperaceae *Life Form:* sedge

Species Code: CypRot *Synonym(s):*

Common Name(s): nutgrass, umbrella sedge

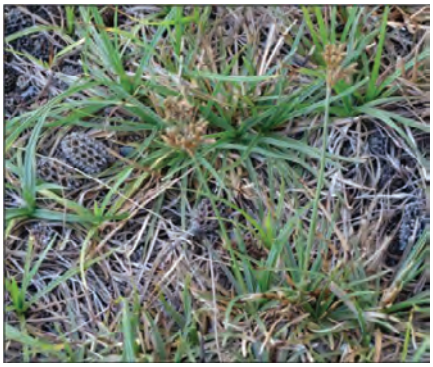
Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This species is somewhat similar in appearance to other *Cyperus* species found on Wake but can be distinguished by the presence of nut-like corms on the roots.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey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Photograph: Forest and Kim Starr, Starr Environmental


Photograph: Forest and Kim Starr, Starr Environmental

Wake Atoll Plant Photo Key From 2019 Survey

Fimbristylis cymosa

Plant Group: Monocots *Family:* Cyperaceae *Life Form:* sedge

Species Code: FimCym *Synonym(s):*

Common Name(s): tropical fimbry

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This is a very common native species that is found throughout the atoll.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X


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Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Starr Environmental


Photograph: Forest and Kim Starr, Starr Environmental

Fimbristylis dichotoma

Plant Group: Monocots *Family:* Cyperaceae *Life Form:* sedge

Species Code: FimDic *Synonym(s):*

Common Name(s): forked fimbry

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:

This uncommon species is very difficult to distinguish from the native *F. cymosa* and can also be confused with *Cyperus rotundus*.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: Forest and Kim Starr, Starr Environmental

Photograph: Forest and Kim Starr, Starr Environmental

Egeria densa

Plant Group: Monocots *Family:* Hydrocharitaceae *Life Form:* herb

Species Code: EgeDen *Synonym(s):*

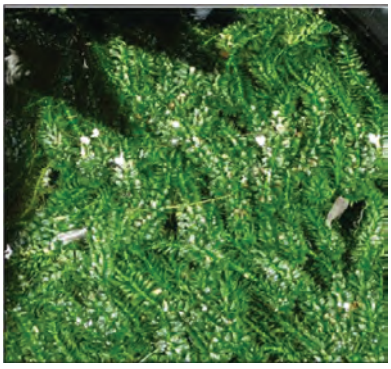
Common Name(s): Brazilian waterweed

Status on Wake: cultivated *Wake Risk Assessment:* low

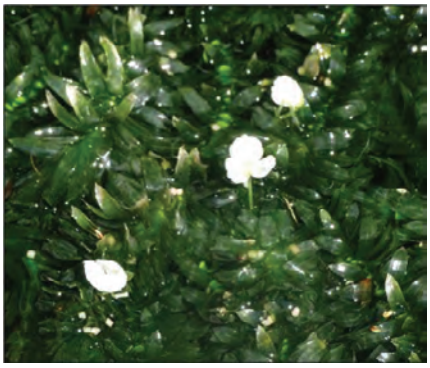
Recorded by:		Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:
This aquatic plant grows only in a small contained water pond near a residence on Wake Islet and cannot spread beyond where it is actively maintained.

Herbst 1998 distribution:			Wilkes:		Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey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Wake Atoll Plant Photo Key From 2019 Survey

Musa acuminata

Plant Group: Monocots *Family:* Musaceae *Life Form:* herb

Species Code: MusAcu *Synonym(s):*

Common Name(s): Cavendish banana

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
Banana plants are found in several of the gardens around residences. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:	Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


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Pandanus tectorius

Plant Group: Monocots *Family:* Pandanaceae *Life Form:* tree

Species Code: PanTec *Synonym(s):*

Common Name(s): hala, screwpine

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
Although *Pandanus* is a genus found naturally on many Pacific islands, it is not native to Wake Atoll. It does have the potential to spread naturally away from areas where it has been planted.

Herbst 1998 distribution: Wilkes: Wake: X Peale: X

2019 survey distribution: Wilkes N: Wilkes S: Wake: X Peale:


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Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Bothriochloa pertusa

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: BotPer *Synonym(s):*

Common Name(s): pitted beardgrass

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This is a common small grass species that was found on Wake and Peale Islets. It is likely that is also occurs on the south portion of Wilkes Islet but was missed there in the 2019 survey.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


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Photograph: J. Jacobi, U.S. Geological Survey


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Cenchrus echinatus

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: CenEch *Synonym(s):*

Common Name(s): sandbur

Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by:								New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey		

Comments:
This very invasive small grass with spiky burr seeds is established in many locations on Peale, Wake, and the south part of Wilkes Islets. It has the potential to spread widely since its seeds are easily transported on clothing and other personal gear.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


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Chloris barbata

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: ChlBar *Synonym(s):* *Chloris inflata*

Common Name(s): swollen fingergrass

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

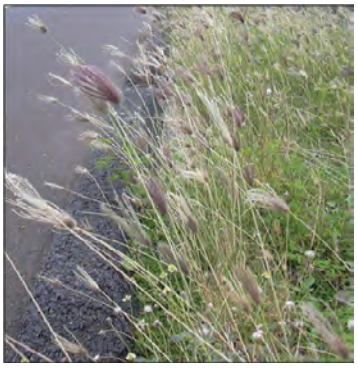
Comments:
This is a moderate-sized grass that colonizes open, disturbed areas.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Starr Environmental


Photograph: Forest and Kim Starr, Starr Environmental

Wake Atoll Plant Photo Key From 2019 Survey

Cynodon dactylon

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: CynDac *Synonym(s):*

Common Name(s): Bermuda grass

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This species of grass does not grow very well in relatively dry sites but can dominate areas that have some added moisture, such as near buildings or other managed areas.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	Wake:	X	Peale:	X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Dactyloctenium aegyptium

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: DacAeg *Synonym(s):*

Common Name(s): beach wiregrass, crowfoot grass

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This introduced grass was found to be common in many open areas on all of the islets on the atoll.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:		Wake:	X	Peale:	X


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Wake Atoll Plant Photo Key From 2019 Survey

Eleusine indica

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: EleInd *Synonym(s):*

Common Name(s): Indian goosegrass, wiregrass

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey		

Comments:
This introduced grass was documented by Herbst in 1998 on all of the islets on Wake Atoll. Although it was only recorded on Wilkes N and Wake during the 2019 survey, it was likely missed on Peale at that time.

Herbst 1998 distribution:	Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:	X	Wilkes S:		Wake:	X	Peale:


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Eragrostis amabilis

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: EraAma *Synonym(s):* *Eragrostis tenella*

Common Name(s): Japanese lovegrass

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey		

Comments:

This introduced grass was documented by Herbst in 1998 on all of the islets on Wake Atoll. Although it was only recorded on Wilkes S and Wake during the 2019 survey, it was likely missed on Peale at that time.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	

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Eragrostis scabriflora

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: EraSca *Synonym(s):*

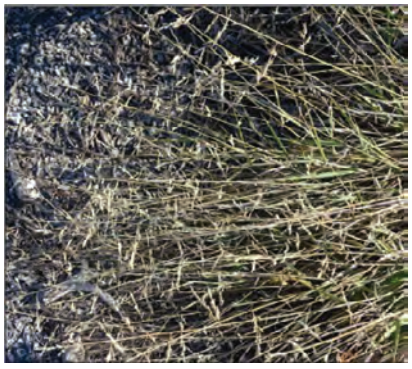
Common Name(s): no common name

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced grass was found to be common on all islets on Wake Atoll.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey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Eustachys petraea

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: EusPet *Synonym(s):*

Common Name(s): pinewoods fingergrass

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced grass was found to be common on all islets on Wake Atoll.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X


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Lepturus repens

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: LepRep *Synonym(s):* *Lepturus gasparriciensis*

Common Name(s): Pacific Island thintail

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:							New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	

Comments:
This native grass was found to be common on all islets on Wake Atoll, particularly along the shorelines as well as growing as a dense mat under the open *Heliotropium foertherianum* woodland on Peale Islet.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X

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Photograph: Forest and Kim Starr, Starr Environmental

Wake Atoll Plant Photo Key From 2019 Survey

Paspalum scrobiculatum

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: PasScr *Synonym(s):* *Paspalum auriculatum, P. cartilagineum*

Common Name(s): ricegrass, Kodo millet

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by: [X] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This introduced grass was not recorded by Herbst in either 1994 or 1998 but was found to be uncommon on both Wake and Peale Islets during the 2019 survey.

Herbst 1998 distribution: Wilkes: [ ] Wake: [ ] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [X]

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: Forest and Kim Starr, Starr Environmental

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Wake Atoll Plant Photo Key From 2019 Survey

Paspalum setaceum

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: PasSet *Synonym(s):*

Common Name(s): thin paspalum, fringeleaf paspalum

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced grass was found to be uncommon on both Wake and Peale Islets by Herbst in 1994 and 1998 as well as during the 2019 survey.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


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Zoysia matrella

Plant Group: Monocots *Family:* Poaceae *Life Form:* grass

Species Code: ZoyMat *Synonym(s):*

Common Name(s): Manila grass

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced grass was only found around some of the administration and residence buildings on the northwest side of Wake Islet where it was apparently planted.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

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Strelitzia reginae

Plant Group: Monocots *Family:* Strelitziaceae *Life Form:* large herb

Species Code: StrReg *Synonym(s):*

Common Name(s): bird-of-paradise

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


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Alpinia galanga

Plant Group: Monocots *Family:* Zingiberaceae *Life Form:* large herb

Species Code: AlpGal *Synonym(s):*

Common Name(s): galanga, Thai ginger, blue ginger

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

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Araucaria heterophylla

Plant Group: Gymnosper *Family:* Araucariaceae *Life Form:* tree

Species Code: AraHet *Synonym(s):*

Common Name(s): Norfolk Island pine

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
Several trees were found to be growing on Wake Islet near the residence and administration buildings.

Herbst 1998 distribution:		Wilkes:	X	Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


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Wake Atoll Plant Photo Key From 2019 Survey

Phymatosorus scolopendria

Plant Group: Ferns *Family:* Polypodiaceae *Life Form:* fern

Species Code: PhySco *Synonym(s):*

Common Name(s): laua'e fern, wart fern

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This fern species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:	X	Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


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Psilotum nudum

Plant Group: Ferns *Family:* Psilotaceae *Life Form:* fern

Species Code: PsiNud *Synonym(s):*

Common Name(s): moa; wisk fern

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by: [ ] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [Y]

Comments:

This primitive fern ally was found growing in only one spot at the base of one of the residence buildings on Wake Islet where there appeared to be some moisture accumulation. It is not expected to spread beyond this point.

Herbst 1998 distribution: Wilkes: [ ] Wake: [ ] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [ ]

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Pseuderanthemum carruthersii

Plant Group: Dicots *Family:* Acanthaceae *Life Form:* shrub

Species Code: PseCar *Synonym(s):* *Pseuderanthemum carruthersii* var. *carruthersii*

Common Name(s): Carruthers' falseface; yellow-veined Eranthemum

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: [X] Fosberg and Sachet 1969 [X] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:	[ ]	Wake:	[X]	Peale:	[ ]
2019 survey distribution:	Wilkes N: [ ]	Wilkes S:	[ ]	Wake:	[X]	Peale:	[ ]


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Photograph: Forest and Kim Starr, Starr Environmental

Pseuderanthemum carruthersii var. atropurpureum

Plant Group: Dicots *Family:* Acanthaceae *Life Form:* shrub

Species Code: PseCarAtr *Synonym(s):* *Pseuderanthemum carruthersii* var. *atropurpura*

Common Name(s): purple false Eranthemum

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution: Wilkes: Wake: X Peale:

2019 survey distribution: Wilkes N: Wilkes S: Wake: X Peale:


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Wake Atoll Plant Photo Key From 2019 Survey

Sesuvium portulacastrum

Plant Group: Dicots *Family:* Aizoaceae *Life Form:* herb

Species Code: SesPor *Synonym(s):*

Common Name(s): shoreline seapurslane; `akulikuli

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This native succulent plant was found to be common around wetland sites and other locations near the shoreline on Wake and Peale Islets.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


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Amaranthus blitum

Plant Group: Dicots *Family:* Amaranthaceae *Life Form:* herb

Species Code: AmaBli *Synonym(s):* *Amaranthus viridis*

Common Name(s): purple amaranth, sender amaranth

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by: [X] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This weedy herb was not seen by Herbst in his 1994 or 1998 surveys, but it was found on both Wilkes (S) and Wake Islets in 2019.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:


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Amaranthus dubius

Plant Group: Dicots *Family:* Amaranthaceae *Life Form:* herb

Species Code: AmaDub *Synonym(s):*

Common Name(s): spleen amaranth, red spinach

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:							
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?

Comments:
This weedy herb was seen by Herbst in his 1994 or 1998 surveys and was also found on both Wilkes (S) and Wake Islets in 2019.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:

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Photograph: Warren L. Wagner, courtesy of Smithsonian Institution

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Wake Atoll Plant Photo Key From 2019 Survey

Amaranthus graecizans

Plant Group: Dicots *Family:* Amaranthaceae *Life Form:* herb

Species Code: AmaGra *Synonym(s):*

Common Name(s): Mediterranean amaranth, short-tepalled pigweed

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by: [X] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This weedy herb was first recorded by Fosberg and Sachet in 1969 but not seen by Herbst in his 1994 or 1998 surveys; however, it was found only on Wake Islet in 2019.

Herbst 1998 distribution: Wilkes: [ ] Wake: [ ] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [ ]


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Adenium obesum

Plant Group: Dicots *Family:* Apocynaceae *Life Form:* shrub

Species Code: AdeObe *Synonym(s):*

Common Name(s): desert rose

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: [ ] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [Y]

Comments:
This small woody ornamental plant was recorded where during the 2019 survey where it had apparently been planted on both Wake and Peale Islets.

Herbst 1998 distribution: Wilkes: [ ] Wake: [ ] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [X]


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Catharanthus roseus

Plant Group: Dicots *Family:* Apocynaceae *Life Form:* herb

Species Code: CatRos *Synonym(s):*

Common Name(s): periwinkle, Madagascar periwinkle

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:	Wilkes:		Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


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Photograph: J. Jacobi, U.S. Geological Survey

Nerium oleander

Plant Group: Dicots *Family:* Apocynaceae *Life Form:* shrub

Species Code: NerOle *Synonym(s):*

Common Name(s): oleander

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:		


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Plumeria obtusa

Plant Group: Dicots *Family:* Apocynaceae *Life Form:* tree

Species Code: PluObt *Synonym(s):*

Common Name(s): plumeria, frangipani

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:
2019 survey distribution:	Wilkes N:		Wilkes S:	Wake:	X	Peale:

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Plumeria rubra

Plant Group: Dicots *Family:* Apocynaceae *Life Form:* tree

Species Code: PluRub *Synonym(s):*

Common Name(s): common frangipani, red frangipani

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


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Wake Atoll Plant Photo Key From 2019 Survey

Polyscias fruticosa

Plant Group: Dicots *Family:* Araliaceae *Life Form:* shrub

Species Code: PolFru *Synonym(s):*

Common Name(s): Mingaralia

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:	[ ]	Wake:	[X]	Peale:	[ ]
2019 survey distribution:	Wilkes N: [ ]	Wilkes S:	[ ]	Wake:	[X]	Peale:	[ ]


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Polyscias guilfoylei

Plant Group: Dicots *Family:* Araliaceae *Life Form:* shrub

Species Code: PolGui *Synonym(s):*

Common Name(s): panax, geranium aralia

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


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Polyscias scutellaria

Plant Group: Dicots *Family:* Araliaceae *Life Form:* shrub

Species Code: PolScu *Synonym(s):*

Common Name(s): shield aralia, plum aralia

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


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Wake Atoll Plant Photo Key From 2019 Survey

Schefflera actinophylla

Plant Group: Dicots *Family:* Araliaceae *Life Form:* tree

Species Code: SchAct *Synonym(s):* *Brassaia actinophylla*

Common Name(s): octopus tree, umbrella tree

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by: [X] Fosberg and Sachet 1969 [X] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes: [ ]		Wake: [X]		Peale: [ ]	
2019 survey distribution:	Wilkes N: [ ]		Wilkes S: [ ]		Wake: [X]		Peale: [ ]


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Bidens alba

Plant Group: Dicots *Family:* Asteraceae *Life Form:* herb

Species Code: BidAlb *Synonym(s):*

Common Name(s): beggarticks, Spanish needles

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This highly invasive herb in the sunflower family was found to be widespread on both Wake and the south part of Wilkes Islets during the 2019 survey, although Herbst also documented it from Peale Islet in 1998. In previous lists this species has been identified as *Bidens pilosa* var. *minor*.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Erigeron canadensis

Plant Group: Dicots *Family:* Asteraceae *Life Form:* herb

Species Code: EriCan *Synonym(s):* *Conyza canadensis*

Common Name(s): Canada fleabane, horseweed

Status on Wake: alien-naturalized *Wake Risk Assessment:* high

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This is a very common weedy herb species that is found throughout the atoll. However, it is currently only found in a few small areas on the north section of Wilkes Islet.

Herbst 1998 distribution:	Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Pluchea carolinensis

Plant Group: Dicots *Family:* Asteraceae *Life Form:* shrub

Species Code: PluCar *Synonym(s):*

Common Name(s): sourbush, fleabane

Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This highly invasive introduced shrub was found on all of the islets by both Herbst in 1994 and 1998, as well as during the 2019 survey. However, it was not very abundant on the north part of Wilkes Islet and potentially could be eradicated there.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Tridax procumbens

Plant Group: Dicots *Family:* Asteraceae *Life Form:* herb

Species Code: TriPro *Synonym(s):*

Common Name(s): coatbuttons, tridax daisy

Status on Wake: alien-invasive *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
Herbst found this small introduced herb to be common on all of the islets during his 1994 and 1998 surveys. However, it was only recorded on Wake and Peale during the 2019 survey.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Starr Environmental

Wake Atoll Plant Photo Key From 2019 Survey

Tabebuia aurea

Plant Group: Dicots *Family:* Bignoniaceae *Life Form:* tree

Species Code: TabAur *Synonym(s):* *Tabebuia argentea*

Common Name(s): silver trumpet-tree

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:
This introduced tree was only found planted in the residence area on the northwest part of Wake Islet. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Starr Environmental

Brassica nigra

Plant Group: Dicots *Family:* Brassicaceae *Life Form:* herb

Species Code: BraNig *Synonym(s):*

Common Name(s): black mustard

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This weedy mustard species has only been documented growing in disturbed sites on Wake Islet.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Starr Environmental


Photograph: Forest and Kim Starr, Starr Environmental

Lepidium bidentatum

Plant Group: Dicots *Family:* Brassicaceae *Life Form:* herb

Species Code: LepBid *Synonym(s):*

Common Name(s): pepperwort

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This small native shrub was found growing on the north part of Wilkes Islet and in a few locations on Peale. It is extremely abundant locally, particularly where it is found near in and adjacent to the Bird Sanctuary on Peale Islet.

Herbst 1998 distribution: Wilkes: X Wake: Peale:

2019 survey distribution: Wilkes N: X Wilkes S: Wake: Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


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Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Nopalea cochenillifera

Plant Group: Dicots *Family:* Cactaceae *Life Form:* shrub

Species Code: NopCoc *Synonym(s):* *Opuntia cochenillifera*

Common Name(s): cochinilla cactus

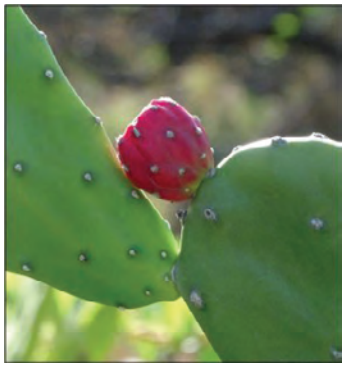
Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This potentially invasive species of cactus was found growing in a few sites around the residential area on the northwest part of Wake Islet as well as in a few locations along the central "road" that runs through the center of Peale Islet. It is likely that this species will be able to spread to more locations on Peale and the other islets if not controlled.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Opuntia littoralis

Plant Group: Dicots *Family:* Cactaceae *Life Form:* shrub

Species Code: OpuLit *Synonym(s):*

Common Name(s): coastal prickley pear cactus

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This potentially invasive species of this cactus was found growing in just one location along the central "road" that runs through the center of Peale Islet. It is likely that this species will be able to spread to more locations on Peale and the other islets if not controlled.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:		Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Carica papaya

Plant Group: Dicots *Family:* Caricaceae *Life Form:* tree

Species Code: CarPap *Synonym(s):*

Common Name(s): papaya

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Casuarina equisetifolia

Plant Group: Dicots *Family:* Casuarinaceae *Life Form:* tree

Species Code: CasEqu *Synonym(s):*

Common Name(s): Ironwood; Australian pine tree

Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by:							
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This tall introduced tree is a highly invasive species that can completely dominate the vegetation where it becomes established. This species was found on all of the islets on Wake Atoll and appears able to continue to spread without management. An intensive effort to control this species was evident on Peale Islet during the 2019 survey as well in selected areas on Wake and Wilkes Islets.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Gynandropsis gynandra

Plant Group: Dicots *Family:* Cleomaceae *Life Form:* herb

Species Code: GynGyn *Synonym(s):* *Cleome gynandra*

Common Name(s): African spider-flower

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This highly invasive herb was found to be locally common in several sites on Wake and Peale Islets during the 2019 survey. Although not seen there in 2019, there is apparently a small population of this plant on the north part of Wilkes Islet. This species may still be able to be controlled and stopped from spreading to other areas on the atoll.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Terminalia catappa

Plant Group: Dicots *Family:* Combretaceae *Life Form:* tree

Species Code: TerCat *Synonym(s):*

Common Name(s): Indian almond, false kamani

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This large tree species was found growing in several locations near the residential area at the northwest part of Wake Islet. It appears to be reproducing naturally and has the potential to continue to spread throughout this coastal habitat if not controlled.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Cuscuta pentagona

Plant Group: Dicots *Family:* Convolvulaceae *Life Form:* vine

Species Code: CusPen *Synonym(s):*

Common Name(s): fiveangled dodder

Status on Wake: alien-naturalized *Wake Risk Assessment:* medium

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [ ] 2019 Survey New in 2019 Survey? [ ]

Comments:
This native vine was not documented during the 2019 survey, but Herbst found it on Wake Islet during his 1998 survey. This species is generally found growing in the vegetation along coastlines on other islands in the Pacific, including Hawai`i. Note: the photos shown on this page are of a related species (*Cuscuta sandwichiana*) from Hawai`I but show the general growth-form of this plant.

Herbst 1998 distribution: Wilkes: [ ] Wake: [X] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [ ] Peale: [ ]


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Ipomoea pes-caprae subsp. *Brasiliensis*

Plant Group: Dicots *Family:* Convolvulaceae *Life Form:* vine

Species Code: IpoPesBra *Synonym(s):*

Common Name(s): beach morning-glory, pohuehue; puhuehue

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This native vine was found to be very common along the ocean-facing shorelines of Wilkes, Wake, and Peale Islets during all past surveys.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Starr Environmental

Wake Atoll Plant Photo Key From 2019 Survey

Ipomoea violacea

Plant Group: Dicots *Family:* Convolvulaceae *Life Form:* vine

Species Code: IpoVio *Synonym(s):* *Ipomoea tuba*

Common Name(s): beach moon-flower, heavenlyblue morning-glory

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:								New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey		

Comments:
This native vine was found to be very common growing in inland sites on Wilkes, Wake, and Peale Islets during all past surveys.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Kalanchoe delagoensis

Plant Group: Dicots *Family:* Crassulaceae *Life Form:* herb

Species Code: KalDel *Synonym(s):*

Common Name(s): chandelier plant

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This introduced ornamental species has primarily been planted around buildings and beach houses on Wake and Peale Islets. It definitely has the potential to spread much more away from cultivation with time.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Kalanchoe pinnata

Plant Group: Dicots *Family:* Crassulaceae *Life Form:* herb

Species Code: KalPin *Synonym(s):*

Common Name(s): air plant, cathedral bells

Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This succulent herb is highly invasive and has to potential to expand its range greatly if not controlled. It has so far only been located in a few locations on Wake Islet including the industrial area and near the residence areas on Wake Islet.

Herbst 1998 distribution: Wilkes: Wake: X Peale:

2019 survey distribution: Wilkes N: Wilkes S: Wake: X Peale:


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Starr Environmental

Wake Atoll Plant Photo Key From 2019 Survey

Coccinia grandis

Plant Group: Dicots *Family:* Cucurbitaceae *Life Form:* vine

Species Code: CocGra *Synonym(s):*

Common Name(s): ivy gourd

Status on Wake: cultivated *Wake Risk Assessment:* high

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This introduced, highly invasive vine has been considered noxious in Hawai'i. It was only found growing as an ornamental in one residential site on the northwest part of Wake Islet. It has great potential for spread if it is dispersed elsewhere on Wake.

Herbst 1998 distribution:		Wilkes:	[ ]	Wake:	[X]	Peale:	[ ]
2019 survey distribution:	Wilkes N: [ ]	Wilkes S:	[ ]	Wake:	[X]	Peale:	[ ]


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Starr Environmental

Cordia subcordata

Plant Group: Dicots *Family:* Ehretiaceae *Life Form:* tree

Species Code: CorSub *Synonym(s):*

Common Name(s): kou

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This native tree with bright orange flowers was found occasionally growing in many inland sites on all of the islets on Wake Atoll. It was formerly more abundant based on Fosberg's accounts in the 1960s.

Herbst 1998 distribution: Wilkes: X Wake: X Peale: X

2019 survey distribution: Wilkes N: X Wilkes S: Wake: X Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey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Codiaeum variegatum

Plant Group: Dicots *Family:* Euphorbiaceae *Life Form:* shrub

Species Code: CodVar *Synonym(s):*

Common Name(s): garden croton or variegated croton

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


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Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Euphorbia heterophylla var. *cyathophora*

Plant Group: Dicots *Family:* Euphorbiaceae *Life Form:* herb

Species Code: EupHetCya *Synonym(s):* *Euphorbia cyathophora*

Common Name(s): dwarf poinsettia, wild poinsettia

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This introduced wild poinsettia was found growing on Wake and Peale Islets during all previous surveys. It has the potential to become more abundant if not controlled.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Euphorbia hirta

Plant Group: Dicots *Family:* Euphorbiaceae *Life Form:* herb

Species Code: EupHir *Synonym(s):* *Chamaesyce hirta*

Common Name(s): hairy spurge, garden spurge

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:							New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	

Comments:
This small herb is widespread and relatively common, particularly in disturbed areas on all of the islets on the atoll.

Herbst 1998 distribution:	Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Euphorbia hypericifolia

Plant Group: Dicots *Family:* Euphorbiaceae *Life Form:* shrub

Species Code: EupHyp *Synonym(s):* *Euphorbia hypericifolia, Euphorbia glomerifera*

Common Name(s): graceful spurge

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This more upright growing introduced herb was found growing in several locations on all three islets, but only on the south part of Wilkes during the 2019 survey. This weedy plant has the potential to continue to spread if not controlled.

Herbst 1998 distribution:		Wilkes:	X	Wake:		Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Euphorbia prostrata

Plant Group: Dicots *Family:* Euphorbiaceae *Life Form:* herb

Species Code: EupPro *Synonym(s):* *Chamaesyce prostrata*

Common Name(s): prostrate purge or prostrate sandmat

Status on Wake: alien-invasive *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This small introduced herb was found growing in more disturbed sites on Wake Islet, although Herbst reported seeing it on Peale Islet in 1994.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Euphorbia thymifolia

Plant Group: Dicots *Family:* Euphorbiaceae *Life Form:* herb

Species Code: EupThy *Synonym(s):* *Chamaesyce thymifolia*

Common Name(s): chickenweed

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This small introduced herb was found growing only in a few disturbed sites on Wake Islet in both 1994 and during the 2019 survey.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


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Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Jatropha integerrima

Plant Group: Dicots *Family:* Euphorbiaceae *Life Form:* shrub

Species Code: JatInt *Synonym(s):*

Common Name(s): rose-flowered jatropha

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This ornamental tree species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


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Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Bauhinia sp.

Plant Group: Dicots *Family:* Fabaceae *Life Form:* tree

Species Code: BauSp *Synonym(s):*

Common Name(s): orchid tree

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by: [X] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This ornamental tree species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution: Wilkes: [ ] Wake: [ ] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [ ]


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Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Caesalpinia bonduc

Plant Group: Dicots *Family:* Fabaceae *Life Form:* vine

Species Code: CaeBon *Synonym(s):*

Common Name(s): grey nicker, nicker bean, kakalaoa

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [ ] 2019 Survey New in 2019 Survey? [ ]

Comments:
This native vine has only been documented by Herbst in 1998. This vine is very distinctive in that its stems have curved spines; it has relatively flat prickly pods, and its grey seeds are hard and round like marbles.

Herbst 1998 distribution: Wilkes: [ ] Wake: [X] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [ ] Peale: [ ]


Photograph: Forest and Kim Starr, Starr Environmental


Photograph: Forest and Kim Starr, Starr Environmental


Photograph: Forest and Kim Starr, Starr Environmental


Photograph: Forest and Kim Starr, Starr Environmental

Dalea emarginata

Plant Group: Dicots *Family:* Fabaceae *Life Form:* herb

Species Code: DalEma *Synonym(s):*

Common Name(s): wedgeleaf prairie clover

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:	Fosberg and Sachet 1969	Herbst 1998	2019 Survey	New in 2019 Survey?
			X	Y

Comments:
This small herb was not recorded during the previously published surveys of Wake Atoll. However, it was found and identified by M. Waite and J. Gilardi in the early 2000s. This plant is very easy to detect when it is flowering.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Gilardi, Island Conservation


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Delonix regia

Plant Group: Dicots *Family:* Fabaceae *Life Form:* tree

Species Code: DelReg *Synonym(s):*

Common Name(s): poinciana, flame tree

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This tall tree with bright red flowers has been planted in several locations around the residence area on the northwest part of Wake Islet as well as behind the Solid Waste Accumulation Area. It is not clear if it is able to spread naturally on Wake.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Desmanthus pernambucanus

Plant Group: Dicots *Family:* Fabaceae *Life Form:* shrub

Species Code: DesPer *Synonym(s):*

Common Name(s): wild tantan, dwarf koa

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This small introduced shrub was found on Wake and Peale Islets during the 2019 survey. It has compound leaves, similar to *Desmanthus virgatus* and also to *Leucaena leucocephala*. However, it can be distinguished by the bright red structures at the base of most leaf petioles (stems).

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Desmanthus virgatus

Plant Group: Dicots *Family:* Fabaceae *Life Form:* shrub

Species Code: DesVir *Synonym(s):*

Common Name(s): wild tantan, dwarf koa

Status on Wake: alien-invasive *Wake Risk Assessment:* low

Recorded by: [X] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This introduced shrub in the legume family often grows taller than *Desmanthus pernambucanus* and has long dark red to blackish seed pods. This weedy plant was found to be reproducing and spreading on the lagoon side of the industrial area as well as behind the Solid Waste Accumulation Area on Wake Islet.

Herbst 1998 distribution:		Wilkes:	[ ]	Wake:	[ ]	Peale:	[ ]
2019 survey distribution:	Wilkes N:	[ ]	Wilkes S:	[ ]	Wake:	[X]	Peale: [ ]


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Gliricidia sepium

Plant Group: Dicots *Family:* Fabaceae *Life Form:* tree

Species Code: GliSep *Synonym(s):*

Common Name(s): Gliricidia

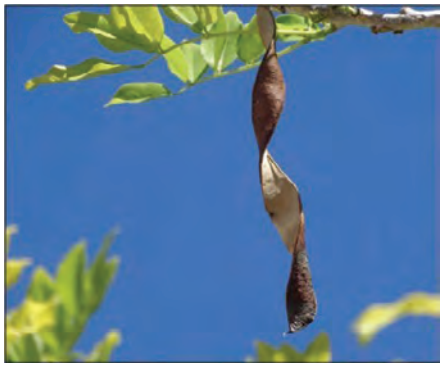
Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?
	Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey			Y

Comments:
This introduced ornamental tree was only found growing near a residence on the northwest part of Wake Islet. It has a long brown pod that often is twisted and remains on the tree after its seeds have been shed.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Leucaena leucocephala

Plant Group: Dicots *Family:* Fabaceae *Life Form:* tree

Species Code: LeuLeu *Synonym(s):*

Common Name(s): koa haole, tangantangan, lead tree

Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by:							New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	

Comments:
This highly invasive legume was recorded from both Peale and Wake Islets by Fosberg and Sachet in the 1960s and also found there in subsequent surveys. This tall shrub/small tree has the potential to spread throughout most of the inland sites on Wake Atoll and completely dominate the native vegetation.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Pithecellobium dulce

Plant Group: Dicots *Family:* Fabaceae *Life Form:* tree

Species Code: PitDul *Synonym(s):*

Common Name(s): opiuma, Manila tamarind

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This tree has been planted in two locations, one on Peale Islet and the other at a beach house on Wake Islet. It has a distinctive pink seed pod and the leaves are arranged in twos, appearing to be cleft. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Samanea saman

Plant Group: Dicots *Family:* Fabaceae *Life Form:* tree

Species Code: SamSam *Synonym(s):* *Albizia saman*

Common Name(s): monkeypod

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:
This large tree had not been recorded in previous surveys. Several large trees were found near residences on the northwest side of Wake Islet as well as a few smaller individuals in pots in the resident apartment area.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Sesbania grandiflora

Plant Group: Dicots *Family:* Fabaceae *Life Form:* tree

Species Code: SesGra *Synonym(s):*

Common Name(s): hummingbird tree, scarlet wisteria

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This legume tree/shrub was found planted in many locations near the residences on Wake Islet. It has large white flowers and long green/brown seedpods. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Tamarindus indica

Plant Group: Dicots *Family:* Fabaceae *Life Form:* tree

Species Code: TamInd *Synonym(s):*

Common Name(s): tamarind

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
Tamarind tree was found during the 2019 survey growing by the residence area on the northwest part of Wake Islet and on Peale. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Scaevola sericea

Plant Group: Dicots *Family:* Goodeniaceae *Life Form:* shrub

Species Code: ScaSer *Synonym(s):* *Scaevola sericea* var. *taccada, S. taccada*

Common Name(s): beach naupaka, naupaka kahakai

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This native shrub is very common throughout the Pacific islands where it colonizes coastal lowland sites, particularly just above the high-tide line. Although it was found only in a few locations on Wake and the southern part of Wilkes Islets, it was likely much more widely distributed throughout the atoll prior to human disturbance.

Herbst 1998 distribution:	Wilkes:	X	Wake:	X	Peale:	X		
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Euploca procumbens var. *depressum*

Plant Group: Dicots *Family:* Heliotropiaceae *Life Form:* herb

Species Code: EupProDep *Synonym(s):* *Heliotropium procumbens* var. *depressum*

Common Name(s): fourspike heliotrope

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This small introduced shrub is widely distributed on all of the islets on Wake Atoll. It has small white flowers on scorpion-like floral spikes and its leaves have long white hairs on both sides of the leaves.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Heliotropium anomalum

Plant Group: Dicots *Family:* Heliotropiaceae *Life Form:* herb

Species Code: HelAno *Synonym(s):*

Common Name(s): hinahina, Polynesian heliotrope

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:								
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This native herb is related to the tall *Heliotropium foertherianum* trees that form the dominant tree canopy in most of the relatively undisturbed or recovering sites throughout the atoll. This plant was only found in two locations on the south and northwest parts of Wake Islet. It was likely much more abundant in the past but is sensitive to disturbance.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Heliotropium foertherianum

Plant Group: Dicots *Family:* Heliotropiaceae *Life Form:* tree

Species Code: HelFoe *Synonym(s):* *Tournefortia argentea*

Common Name(s): tree heliotrope, octopus bush

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
This native tree is the dominant species throughout the undisturbed or recovering areas on all of the islets on Wake Atoll. It forms an open to closed canopy from shoreline up to the most inland sites; however, the understory is generally relatively open with either a grass or scattered shrub layer under the trees.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Vitex trifolia

Plant Group: Dicots *Family:* Lamiaceae *Life Form:* shrub

Species Code: VitTri *Synonym(s):*

Common Name(s): blue vitex

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by: [X] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This small tree has been planted as an ornamental near a few residences on both Wake and Peale Islets. It has distinctive purple-violet flowers and light-colored undersides of the leaves.

Herbst 1998 distribution: Wilkes: [ ] Wake: [ ] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [X]


Photograph: J. Gilardi, Island Conservation


Photograph: J. Gilardi, Island Conservation


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Barringtonia asiatica

Plant Group: Dicots *Family:* Lecythidaceae *Life Form:* tree

Species Code: BarAsi *Synonym(s):*

Common Name(s): fish poison tree

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This tall tree has a very distinctive large top-shaped fruit and bright white inflorescences with pink tinges on the ends of the stamens. Only one small tree was found near a residence on the northwest part of Wake Islet. It is not clear if it has the potential to spread on the atoll.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Pemphis acidula

Plant Group: Dicots *Family:* Lythraceae *Life Form:* shrub

Species Code: PemAci *Synonym(s):*

Common Name(s): pemphis

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This native shrub forms a dominant band of vegetation particularly around the lagoon-side shores of the three islets, except where this habitat has been heavily disturbed. It has very distinctive stiff, dark green leaves and bright white flowers.

Herbst 1998 distribution:	Wilkes:	X	Wake:	X	Peale:	X		
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Abutilon indicum subsp. *albescens*

Plant Group: Dicots *Family:* Malvaceae *Life Form:* shrub

Species Code: AbuIndAlb *Synonym(s):* *Abutilon asiaticum* var. *albescens*

Common Name(s): Indian mallow

Status on Wake: alien-naturalized *Wake Risk Assessment:* high

Recorded by:							
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced shrub has been recorded on Wake and Peale islets ever since the 1960s. Although its weed risk is considered to be low in the literature, it appears to be spreading in several areas on the atoll and could be problematic if not controlled.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Gossypium stephensii

Plant Group: Dicots *Family:* Malvaceae *Life Form:* shrub

Species Code: GosSte *Synonym(s):*

Common Name(s): Wake Island cotton

Status on Wake: endemic *Wake Risk Assessment:* native species

Recorded by:	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This native cotton is the only plant species that is endemic to Wake Atoll (i.e., found no where else). It has large maple-like leaves that are covered with small white hairs. The large showy flower is white with patches of red-orange at the base of each petal; its fruit is a capsule that contains white cotton fibers that remain attached to the capsule after it opens. This species appears to be easily spreading into formerly disturbed areas.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Gilardi, Island Conservation


Photograph: J. Gilardi, Island Conservation

Hibiscus hybrid

Plant Group: Dicots *Family:* Malvaceae *Life Form:* shrub

Species Code: HibHyb *Synonym(s):*

Common Name(s): Hibiscus

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by: X Fosberg and Sachet 1969 X Herbst 1998 X 2019 Survey New in 2019 Survey?

Comments:
Several different varieties of *Hibiscus* were found to be planted around residence and administrative buildings on both Wake and Peale Islets. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Sida ciliaris

Plant Group: Dicots *Family:* Malvaceae *Life Form:* herb

Species Code: SidCil *Synonym(s):*

Common Name(s): fringed Sida

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:
This small introduced woody herb in the Hibiscus family was not documented during previous published surveys but was identified by M. Waite and J. Gilardi during the 2000s. It can be distinguished by its small reddish-orange flower. It was found in a few sites near the industrial area and the residential area on Wake Islet during the 2019 survey.

Herbst 1998 distribution:			Wilkes:		Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Sida fallax

Plant Group: Dicots *Family:* Malvaceae *Life Form:* shrub

Species Code: SidFal *Synonym(s):*

Common Name(s): ilima

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:							
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This native shrub in the Hibiscus family is very widespread on all of the islets on Wake Atoll. It has very recognizable yellow-orange flowers and silvery-green foliage. It can be found growing in both natural and undisturbed sites, generally forming a scattered understory layer.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Talipariti tiliaceum

Plant Group: Dicots *Family:* Malvaceae *Life Form:* tree

Species Code: TalTil *Synonym(s):* *Hibiscus tiliaceus*

Common Name(s): hau, sea hibiscus

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by: [ ] Fosberg and Sachet 1969 [X] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
This small tree is native to many Pacific islands but is not know to naturally occur on Wake Atoll. It was found planted in just one site near a beach house on the lagoon side of Wake Islet. It is considered to be a moderate weed risk in areas like Hawai'i and has the potential to naturally spread in the few wetland areas and along the lagoon sides of the three islets on Wake.

Herbst 1998 distribution: Wilkes: [ ] Wake: [X] Peale: [ ]

2019 survey distribution: Wilkes N: [ ] Wilkes S: [ ] Wake: [X] Peale: [ ]

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Thespesia populnea

Plant Group: Dicots *Family:* Malvaceae *Life Form:* tree

Species Code: ThePop *Synonym(s):*

Common Name(s): milo

Status on Wake: cultivated *Wake Risk Assessment:* high

Recorded by:							
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced tree in the Hibiscus family is considered to be a high weed risk and has the potential to spread to many areas on Wake Atoll if not controlled. It was found only in a few sites on Wake Islet during the 2019 survey but was also previously reported from Peale Islet.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Forest and Kim Starr, Star Environmental

Wake Atoll Plant Photo Key From 2019 Survey

Waltheria indica

Plant Group: Dicots *Family:* Malvaceae *Life Form:* herb

Species Code: WalInd *Synonym(s):*

Common Name(s): uhaloa

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This native shrub was recorded on all of the islets during the 2019 plant survey. It can be found in both disturbed and undisturbed sites and forms part of the native understory along with *Sida fallax* and several other small shrub species.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: Warren L. Wagner, courtesy of Smithsonian Institution

Ficus benghalensis

Plant Group: Dicots *Family:* Moraceae *Life Form:* tree

Species Code: FicBen *Synonym(s):*

Common Name(s): banyan

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:
This introduced species in the fig family was found only planted near one residence on the northwest part of Wake Islet. Although many fig species are considered to be highly invasive elsewhere, the dry habitat will likely limit the distribution and impact of these species on Wake Atoll.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Ficus carica

Plant Group: Dicots *Family:* Moraceae *Life Form:* tree

Species Code: FicCar *Synonym(s):*

Common Name(s): edible fig

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey			

Comments:
This introduced edible fig species was found growing in a few sites near residences on the northwest part of Wake Islet. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Ficus microcarpa

Plant Group: Dicots *Family:* Moraceae *Life Form:* tree

Species Code: FicMic *Synonym(s):*

Common Name(s): Chinese banyan, Indian laurel fig

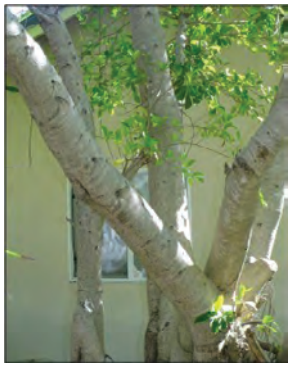
Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced species in the fig family was found only planted near one residence on the northwest part of Wake Islet and at Peale Islet. Although many fig species are considered to be highly invasive elsewhere, the dry habitat will likely limit the distribution and impact of these species on Wake Atoll.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Psidium guajava

Plant Group: Dicots *Family:* Myrtaceae *Life Form:* tree

Species Code: PsiGua *Synonym(s):*

Common Name(s): common guava, lemon guava

Status on Wake: cultivated *Wake Risk Assessment:* medium

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced shrub/small tree is considered to be invasive in Hawai'i and many other areas in the Pacific. It definitely has the potential to spread to many areas on Wake Atoll but currently lacks a means for dispersal (fruit-eating birds). Only one plant was recorded during the 2019 survey near a residence on the northwest part of Wake Islet. This species should be considered for removal to reduce its potential threat.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Boerhavia albiflora

Plant Group: Dicots *Family:* Nyctaginaceae *Life Form:* herb

Species Code: BoeAlb *Synonym(s):*

Common Name(s): spiderling

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by: [ ] Fosberg and Sachet 1969 [ ] Herbst 1998 [X] 2019 Survey New in 2019 Survey? [ ]

Comments:
Three species of *Boerhavia* were recorded on Wake Atoll during the 2019 survey. One species was identified as *B. albiflora* based on its leaf and flower characteristics. It was found only on Peale Islet during this survey. This species was not previously recorded by either Fosberg or Herbst during their earlier surveys.

Herbst 1998 distribution:		Wilkes: [ ]	Wake: [ ]	Peale: [ ]
2019 survey distribution:	Wilkes N: [ ]	Wilkes S: [ ]	Wake: [ ]	Peale: [X]


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Gilardi, Island Conservation


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Boerhavia coccinea

Plant Group: Dicots *Family:* Nyctaginaceae *Life Form:* herb

Species Code: BoeCoc *Synonym(s):*

Common Name(s): scarlet spiderling

Status on Wake: alien-naturalized *Wake Risk Assessment:* native species

Recorded by:		Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:
Three species of *Boerhavia* were recorded on Wake Atoll during the 2019 survey. One species, not previously recorded, was identified as *B. coccinea* based on its leaf and flower characteristics. It was found only on Wake Islet during this survey.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Boerhavia repens

Plant Group: Dicots *Family:* Nyctaginaceae *Life Form:* herb

Species Code: BoeRep *Synonym(s):*

Common Name(s): red spiderling, hogweed

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:							
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
Three species of *Boerhavia* were recorded on Wake Atoll during the 2019 survey. One species (described here) was keyed out to be *B. repens* based on its leaf and flower characteristics. It was found on Wake and Wilkes Islets during this survey. This species was previously recorded by both Fosberg and Herbst during their earlier surveys.

Herbst 1998 distribution:		Wilkes:	X	Wake:		Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Bougainvillea spectabilis

Plant Group: Dicots *Family:* Nyctaginaceae *Life Form:* shrub

Species Code: BouSpe *Synonym(s):*

Common Name(s): bougainvillea

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:								New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey		

Comments:
This showy introduced ornamental was found planted in many sites near residences or other buildings on both Wake and Peale Islets. Although it generally seems to not spread beyond where it was planted, numerous seedlings and small plants were found growing near older planted individuals near the "golf course" building on Wake Islet.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Pisonia grandis

Plant Group: Dicots *Family:* Nyctaginaceae *Life Form:* tree

Species Code: PisGra *Synonym(s):*

Common Name(s): papala kepau

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:							
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:

This native tree was found growing among the *Heliotropium* and *Cordia* trees on all of the islets during the 2019 survey. Fosberg reported that it was previously much more abundant in the early 1960s, but many trees were destroyed during clearing of its habitat. This species has very distinctively sticky seed pods.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:		Wake:	X	Peale: X

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Nymphaea sp.

Plant Group: Dicots *Family:* Nymphaeaceae *Life Form:* aquatic herb

Species Code: NymSp *Synonym(s):*

Common Name(s): lotus, waterlily

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
Introduced waterlilies were only found growing in small container ponds sited near a few residences on Wake Islet. Although this species can be invasive in other areas, habitat does not exist for it to expand into beyond cultivated sites on Wake Atoll.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Jasminum sambac

Plant Group: Dicots *Family:* Oleaceae *Life Form:* shrub

Species Code: JasSam *Synonym(s):*

Common Name(s): Arabian jasmine, Sambac jasmine

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This small introduced ornamental shrub was found planted in a few sites on the northwest part of Wake Islet. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Passiflora foetida var. *hispida*

Plant Group: Dicots *Family:* Passifloraceae *Life Form:* vine

Species Code: PasFoeHis *Synonym(s):*

Common Name(s): passion fruit, scarletfruit passionflower

Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by:								
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced vine in the passion fruit family was found to be established in a few wild sites on both Wake and Wilkes (south) Islets. This species is considered to be highly invasive and can spread over and smother the ground vegetation if not controlled.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Gilardi, Island Conservation


Photograph: J. Gilardi, Island Conservation

Wake Atoll Plant Photo Key From 2019 Survey

Phyllanthus acidus

Plant Group: Dicots *Family:* Phyllanthaceae *Life Form:* shrub

Species Code: PhyAci *Synonym(s):*

Common Name(s): Otaheite gooseberry

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced ornamental tree was found planted near residence and administration buildings on the northwest part of Wake Islet. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Phyllanthus amarus

Plant Group: Dicots *Family:* Phyllanthaceae *Life Form:* shrub

Species Code: PhyAma *Synonym(s):*

Common Name(s): hurricane weed, carry me seed

Status on Wake: alien-invasive *Wake Risk Assessment:* low

Recorded by:							
	X	Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?

Comments:
This small introduced weedy herb was found on all of the islets during the 2019 Wake Atoll survey. Although it was found to be widespread, it does not form much vegetative cover and is a low weed risk species.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Coccoloba uvifera

Plant Group: Dicots *Family:* Polygonaceae *Life Form:* tree

Species Code: CocUvi *Synonym(s):*

Common Name(s): seagrape

Status on Wake: alien-invasive *Wake Risk Assessment:* high

Recorded by:								New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey		

Comments:
The introduced sea grape tree is considered to be highly invasive in many areas throughout the Pacific islands and definitely has the potential for spread and dominance of the native vegetation on Wake Atoll. This species was found on both Wake and Peale Islets during the 2019 survey and was also previously recorded by Fosberg and Herbst during their early surveys.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Portulaca lutea

Plant Group: Dicots *Family:* Portulacaceae *Life Form:* herb

Species Code: PorLut *Synonym(s):*

Common Name(s): yellow purslane

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:								New in 2019 Survey?
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey		

Comments:
This native succulent herb was found on all of the islets on Wake Atoll during the 2019 survey and was also recorded by Fosberg and Herbst during their earlier surveys. Although this species appears to be very similar in appearance to the introduced *Portulaca oleracea*, the native species can be recognized by the presence of stiff brown hairs at the base of the leaves where they attach to the stem of the plant.

Herbst 1998 distribution:	Wilkes:	X	Wake:	X	Peale:	X	
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale: X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Portulaca oleracea

Plant Group: Dicots *Family:* Portulacaceae *Life Form:* herb

Species Code: PorOle *Synonym(s):*

Common Name(s): purslane, hogweed, pigweed

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:							New in 2019 Survey?	
	X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey		

Comments:
This introduced *Portulaca* species is very similar in appearance to the native *Portulaca lutea*. However, it can generally be distinguished by its red stems and the lack of stiff brown hairs at the base of the leaves where they attach the main stem of the plant.

Herbst 1998 distribution:			Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: Warren L. Wagner, courtesy of Smithsonian Institution


Photograph: Warren L. Wagner, courtesy of Smithsonian Institution

Gardenia taitensis

Plant Group: Dicots *Family:* Rubiaceae *Life Form:* shrub

Species Code: GarTai *Synonym(s):*

Common Name(s): tiare

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced ornamental shrub species was found planted around several residence buildings on Wake Islet. It is a low weed risk threat and is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Ixora sp.

Plant Group: Dicots *Family:* Rubiaceae *Life Form:* shrub

Species Code: IxoSp *Synonym(s):*

Common Name(s): ixora

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced ornamental shrub with very showy orange-red (sometimes white) flowers was found planted around several residences on the northwest part of Wake Islet. This species is unlikely to spread beyond where it is actively planted and cultivated.

Herbst 1998 distribution:			Wilkes:		Wake:		Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Morinda citrifolia

Plant Group: Dicots *Family:* Rubiaceae *Life Form:* tree

Species Code: MorCit *Synonym(s):*

Common Name(s): noni, Indian-mulberry

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
Although this species is naturally found on many Pacific islands, it is not considered to be native to Wake Atoll and exists there because it has been introduced. This species was found only in a few locations on Wake Islet, but seedlings and small plants were also found adjacent to the larger plants indicating it is capable of spreading beyond where it was originally planted.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Oldenlandia corymbosa

Plant Group: Dicots *Family:* Rubiaceae *Life Form:* herb

Species Code: OldCor *Synonym(s):* *Hedyotis corymbosa*

Common Name(s): flat-top mille graines, diamond flower

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:

This small introduced herb was not recorded previously by either Fosberg or Herbst but was identified on Wake by M. Waite and J. Gilardi in the early 2000s. This plant has very small, inconspicuous flowers and indistinctive foliage and can be easily missed. It was found established in a few sites on both Wake and Peale Islets during the 2019 survey.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale: X

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Photograph: J. Jacobi, U.S. Geological Survey

Manilkara zapota

Plant Group: Dicots *Family:* Sapotaceae *Life Form:* tree

Species Code: ManZap *Synonym(s):*

Common Name(s): sapodilla

Status on Wake: cultivated *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced tree was found planted in only one site near the residence compound on the northwest part of Wake Islet. It appears to pose a low weed risk and is unlikely to spread beyond where it is currently planted.

Herbst 1998 distribution:			Wilkes:		Wake:	X	Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Solanum torvum

Plant Group: Dicots *Family:* Solanaceae *Life Form:* shrub

Species Code: SolTor *Synonym(s):*

Common Name(s): turkeyberry, pea eggplant

Status on Wake: alien-naturalized *Wake Risk Assessment:* medium

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced shrub/small tree was found planted in several locations in the residence area on the northwest part of Wake Islet as well as growing naturally near the Solid Waste Accumulation Area on the southeastern part of Wake Islet. This species is considered to pose a medium weed risk for spreading into other areas on the atoll.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Polypremnum procumbens

Plant Group: Dicots *Family:* Tetrachondraceae *Life Form:* herb

Species Code: PolPro *Synonym(s):*

Common Name(s): Juniper leaf

Status on Wake: alien-naturalized *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969		Herbst 1998	X	2019 Survey	New in 2019 Survey?	Y

Comments:
This small and inconspicuous introduced herb was found only in a few locations on Wake Islet during the 2019 survey. Although it is definitely established in the wild, it likely poses little threat to impacting or altering the native vegetation on Wake Atoll.

Herbst 1998 distribution:		Wilkes:		Wake:		Peale:	
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake: X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Pilea microphylla

Plant Group: Dicots *Family:* Urticaceae *Life Form:* herb

Species Code: PilMic *Synonym(s):*

Common Name(s): artillery plant

Status on Wake: alien-invasive *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This small introduced herb was only found around residence and other buildings on the northwest part of Wake Islet where there appeared to be additional moisture. This species is not considered to be a threat for spreading beyond these unique habitats.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Wake Atoll Plant Photo Key From 2019 Survey

Stachytarpheta jamaicensis

Plant Group: Dicots *Family:* Verbenaceae *Life Form:* shrub

Species Code: StaJam *Synonym(s):*

Common Name(s): Jamaica vervain, light-blue snakeweed

Status on Wake: alien-invasive *Wake Risk Assessment:* medium

Recorded by:							
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This introduced shrub was found to be established on all of the islets on Wake Atoll during the 2019 survey. It was also recorded previously by Fosberg and Herbst during their earlier surveys. While several other species of *Stachytarpheta* have been listed as being found on Wake previously, all of the plants found during the 2019 survey keyed out to *S. jamaicensis.* This species does pose a weed risk and may be considered for control.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:		Wilkes S:	X	Wake:	X	Peale:	X


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Tribulus cistoides

Plant Group: Dicots *Family:* Zygophyllaceae *Life Form:* shrub

Species Code: TriCis *Synonym(s):*

Common Name(s): nohu

Status on Wake: native *Wake Risk Assessment:* native species

Recorded by:							
X	Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:
This native shrub with bright yellow flowers and silky-green foliage was found in a few locations on Wake Islet. However, it was very abundant in the Bird Sanctuary area on Wilkes Islet where it formed a dense native shrub community intermixed with *Lepidium bidentatum* and *Portulaca lutea*.

Herbst 1998 distribution:		Wilkes:	X	Wake:	X	Peale:	X
2019 survey distribution:	Wilkes N:	X	Wilkes S:		Wake:	X	Peale:


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey


Photograph: J. Jacobi, U.S. Geological Survey

Tribulus terrestris

Plant Group: Dicots *Family:* Zygophyllaceae *Life Form:* shrub

Species Code: TriTer *Synonym(s):*

Common Name(s): puncture vine

Status on Wake: alien-invasive *Wake Risk Assessment:* low

Recorded by:		Fosberg and Sachet 1969	X	Herbst 1998	X	2019 Survey	New in 2019 Survey?	

Comments:

This small introduced species of *Tribulus* was found in just a few locations, primarily in the lawns near the residence areas, on the northwest part of Wake Islet. It was also recorded previously by Herbst in his 1994 and 1998 surveys.

Herbst 1998 distribution:		Wilkes:		Wake:	X	Peale:		
2019 survey distribution:	Wilkes N:		Wilkes S:		Wake:	X	Peale:	

Photograph: James L. Reveal, courtesy of Smithsonian Institution

Photograph: James L. Reveal, courtesy of Smithsonian Institution

Photograph: Forest and Kim Starr, Starr Environmental

Photograph: Forest and Kim Starr, Starr Environmental

Appendix B3. Plant Specimens Collected on Wake Atoll in 2019

Table B3.1. List of plant specimens collected during U.S. Geological Survey sampling on Wake Atoll in 2019. Names for two *Boerhavia* species have been updated after these specimens were deposited in the B.P. Bishop Museum Herbarium: *B. diffusa=B. coccinea* and *B. tetrandra=B. albiflora*.

Islet: Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet); P, Peale. **Status**: A, alien; A-I, alien invasive; A-N, alien naturalized; Nat, native; Cul, cultivated]

Date	Collector	Islet	Collection number	Plant group	Family	Taxon name	Life form	Status
27 May 2019	J. Jacobi	Wa	JDJ-2019-22	Monocots	Cyperaceae	*Fimbristylis cymosa* R.Br.	Sedge	Nat
27 May 2019	J. Jacobi	Wa	JDJ-2019-27	Monocots	Cyperaceae	*Fimbristylis dichotoma* (L.) Vahl	Sedge	A-N
28 May 2019	J. Jacobi	Wa	JDJ-2019-39	Monocots	Cyperaceae	*Fimbristylis dichotoma* (L.) Vahl	Sedge	A-N
27 May 2019	J. Jacobi	Wa	JDJ-2019-25	Monocots	Poaceae	*Bothriochloa pertusa* (L.) A.Camus	Grass	A-N
01 Jun 2019	J. Jacobi	Wa	JDJ-2019-56	Monocots	Poaceae	*Bothriochloa pertusa* (L.) A.Camus	Grass	A-N
01 Jun 2019	J. Jacobi	Wa	JDJ-2019-59	Monocots	Poaceae	*Bothriochloa pertusa* (L.) A.Camus	Grass	A-N
01 Jun 2019	J. Jacobi	Wa	JDJ-2019-61	Monocots	Poaceae	*Bothriochloa pertusa* (L.) A.Camus	Grass	A-N
03 Jun 2019	J. Jacobi	Wa	JDJ-2019-68	Monocots	Poaceae	*Bothriochloa pertusa* (L.) A.Camus	Grass	A-N
28 May 2019	J. Jacobi	Wa	JDJ-2019-43	Monocots	Poaceae	*Cenchrus echinatus* L.	Grass	A-I
05 Jun 2019	J. Jacobi	Wa	JDJ-2019-75	Monocots	Poaceae	*Cenchrus echinatus* L.	Grass	A-I
01 Jun 2019	J. Jacobi	Wa	JDJ-2019-60	Monocots	Poaceae	*Chloris barbata* Sw.	Grass	A-I
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-12	Monocots	Poaceae	*Dactyloctenium aegyptium* (L.) Willd.	Grass	A-N
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-6	Monocots	Poaceae	*Eleusine indica* (L.) Gaertn.	Grass	A-N
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-13	Monocots	Poaceae	*Eleusine indica* (L.) Gaertn.	Grass	A-N
27 May 2019	J. Jacobi	Wa	JDJ-2019-28	Monocots	Poaceae	*Eleusine indica* (L.) Gaertn.	Grass	A-N
27 May 2019	J. Jacobi	Wa	JDJ-2019-21	Monocots	Poaceae	*Eragrostis amabilis* (L.) Wight & Arn.	Grass	A-N
27 May 2019	J. Jacobi	Wa	JDJ-2019-16	Monocots	Poaceae	*Eragrostis scabriflora* Swallen	Grass	A-N
28 May 2019	J. Jacobi	Wi-S	JDJ-2019-33	Monocots	Poaceae	*Eragrostis scabriflora* Swallen	Grass	A-N
01 Jun 2019	J. Jacobi	Wa	JDJ-2019-62	Monocots	Poaceae	*Eragrostis scabriflora* Swallen	Grass	A-N
03 Jun 2019	J. Jacobi	Wa	JDJ-2019-67	Monocots	Poaceae	*Eragrostis scabriflora* Swallen	Grass	A-N
28 May 2019	J. Jacobi	Wi-S	JDJ-2019-40	Monocots	Poaceae	*Eustachys petraea* (Sw.) Desv.	Grass	A-N
30 May 2019	J. Jacobi	P	JDJ-2019-47	Monocots	Poaceae	*Eustachys petraea* (Sw.) Desv.	Grass	A-N
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-4	Monocots	Poaceae	*Lepturus repens* (G.Forst.) R.Br.	Grass	Nat
28 May 2019	J. Jacobi	Wi-S	JDJ-2019-31	Monocots	Poaceae	*Lepturus repens* (G.Forst.) R.Br.	Grass	Nat
28 May 2019	J. Jacobi	Wa	JDJ-2019-37	Monocots	Poaceae	*Lepturus repens* (G.Forst.) R.Br.	Grass	Nat
28 May 2019	J. Jacobi	Wa	JDJ-2019-38	Monocots	Poaceae	*Lepturus repens* (G.Forst.) R.Br.	Grass	Nat
28 May 2019	J. Jacobi	Wa	JDJ-2019-41	Monocots	Poaceae	*Lepturus repens* (G.Forst.) R.Br.	Grass	Nat
28 May 2019	J. Jacobi	Wa	JDJ-2019-42	Monocots	Poaceae	*Lepturus repens* (G.Forst.) R.Br.	Grass	Nat
31 May 2019	J. Jacobi	P	JDJ-2019-52	Monocots	Poaceae	*Lepturus repens* (G.Forst.) R.Br.	Grass	Nat

Table B3.1. List of plant specimens collected during U.S. Geological Survey sampling on Wake Atoll in 2019. Names for two *Boerhavia* species have been updated after these specimens were deposited in the B.P. Bishop Museum Herbarium: *B. diffusa=B. coccinea* and *B. tetrandra=B. albiflora*.—Continued

[**Islet**: Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet); P, Peale. **Status**: A, alien; A-I, alien invasive; A-N, alien naturalized; Nat, native; Cul, cultivated]

Date	Collector	Islet	Collection number	Plant group	Family	Taxon name	Life form	Status
27 May 2019	J. Jacobi	Wa	JDJ-2019-29	Monocots	Poaceae	*Paspalum scrobiculatum* L.	Grass	A-I
30 May 2019	J. Jacobi	P	JDJ-2019-49	Monocots	Poaceae	*Paspalum setaceum* Michx.	Grass	A-N
01 Jun 2019	J. Jacobi	Wa	JDJ-2019-58	Monocots	Poaceae	*Paspalum setaceum* Michx.	Grass	A-N
03 Jun 2019	J. Jacobi	Wa	JDJ-2019-66	Monocots	Poaceae	*Paspalum setaceum* Michx.	Grass	A-N
29 May 2019	J. Jacobi	Wi-S	JDJ-2019-45	Dicots	Amaranthaceae	*Amaranthus blitum* L.	Herb	A-N
04 Jun 2019	J. Jacobi	Wa	JDJ-2019-69	Dicots	Amaranthaceae	*Amaranthus dubius* Mart.	Herb	A-N
28 May 2019	J. Jacobi	Wi-S	JDJ-2019-34	Dicots	Asteraceae	*Erigeron canadensis* L.	Herb	A-N
30 May 2019	J. Jacobi	Wa	JDJ-2019-50	Dicots	Asteraceae	*Erigeron canadensis* L.	Herb	A-N
28 May 2019	J. Jacobi	Wi-S	JDJ-2019-30	Dicots	Asteraceae	*Pluchea carolinensis* (Jacq.) G. Don	Shrub	A-I
06 Jun 2019	J. Jacobi	Wa	JDJ-2019-77	Dicots	Bignoniaceae	*Tabebuia aurea* (Manso) Benth. & Hook. fil. ex S. Moore	Tree	Cul
25 May 2019	J. Jacobi	Wa	JDJ-2019-2	Dicots	Brassicaceae	*Brassica nigra* (L.) W.D.J. Koch	Herb	A-N
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-9	Dicots	Brassicaceae	*Lepidium bidentatum* Montin	Herb	Nat
25 May 2019	J. Jacobi	Wa	JDJ-2019-3	Dicots	Cleomaceae	*Gynandropsis gynandra* (L.) Briq.	Herb	A-N
04 Jun 2019	J. Jacobi	Wa	JDJ-2019-71	Dicots	Euphorbiaceae	*Euphorbia hirta* L.	Herb	A-N
29 May 2019	J. Jacobi	Wi-S	JDJ-2019-44	Dicots	Euphorbiaceae	*Euphorbia hypericifolia* L.	Shrub	A-I
30 May 2019	J. Jacobi	P	JDJ-2019-48	Dicots	Euphorbiaceae	*Euphorbia hypericifolia* L.	Shrub	A-I
27 May 2019	J. Jacobi	Wa	JDJ-2019-19	Dicots	Euphorbiaceae	*Euphorbia thymifolia* L.	Herb	A-N
03 Jun 2019	J. Jacobi	Wa	JDJ-2019-65	Dicots	Euphorbiaceae	*Euphorbia thymifolia* L.	Herb	A-N
27 May 2019	J. Jacobi	Wa	JDJ-2019-15	Dicots	Fabaceae	*Dalea emarginata* (Torr. and A.Gray) Shinners	Herb	A-N
27 May 2019	J. Jacobi	Wa	JDJ-2019-18	Dicots	Fabaceae	*Desmanthus pernambucanus* (L.)Thell.	Shrub	A-I
01 Jun 2019	J. Jacobi	Wa	JDJ-2019-57	Dicots	Fabaceae	*Desmanthus pernambucanus* (L.)Thell.	Shrub	A-I
04 Jun 2019	J. Jacobi	Wa	JDJ-2019-70	Dicots	Fabaceae	*Desmanthus virgatus* (L.)Willd.	Shrub	A-I
06 Jun 2019	J. Jacobi	Wa	JDJ-2019-79	Dicots	Fabaceae	*Gliricidia sepium* (Jacq.)Walp.	Tree	Cul
27 May 2019	J. Jacobi	Wa	JDJ-2019-20	Dicots	Heliotropiaceae	*Euploca procumbens* var. *depressum* (Chamisso)	Herb	A-N
31 May 2019	J. Jacobi	P	JDJ-2019-54	Dicots	Lamiaceae	*Vitex trifolia* L.	Shrub	Cul
06 Jun 2019	J. Jacobi	Wa	JDJ-2019-78	Dicots	Lamiaceae	*Vitex trifolia* L.	Shrub	Cul
31 May 2019	J. Jacobi	P	JDJ-2019-51	Dicots	Malvaceae	*Abutilon indicum* subsp. *albescens* (Miq.) Borssum Waalkes	Shrub	A-N
02 Jun 2019	J. Jacobi	Wa	JDJ-2019-64	Dicots	Malvaceae	*Sida ciliaris* L.	Herb	A-N
05 Jun 2019	J. Jacobi	Wa	JDJ-2019-73	Dicots	Malvaceae	*Sida ciliaris* L.	Herb	A-N
05 Jun 2019	J. Jacobi	Wa	JDJ-2019-76	Dicots	Malvaceae	*Taliparitiliaceum* (L.) Fryxell	Tree	Cul

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[**Islet**: Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet); P, Peale. **Status**: A, alien; A-I, alien invasive; A-N, alien naturalized; Nat, native; Cul, cultivated]

Date	Collector	Islet	Collection number	Plant group	Family	Taxon name	Life form	Status
27 May 2019	J. Jacobi	Wa	JDJ-2019-26	Dicots	Nyctaginaceae	*Boerhavia diffusa* L.	Herb	Nat
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-5	Dicots	Nyctaginaceae	*Boerhavia repens* L.	Herb	Nat
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-7	Dicots	Nyctaginaceae	*Boerhavia repens* L.	Herb	Nat
31 May 2019	J. Jacobi	P	JDJ-2019-53	Dicots	Nyctaginaceae	*Boerhavia tetrandra* Forst. fil.	Herb	Nat
28 May 2019	J. Jacobi	Wi-S	JDJ-2019-35	Dicots	Passifloraceae	*Passiflora foetida* var. *hispida* (DC. ex Triana & Planchon) Killip ex Gleason	Vine	A-I
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-10	Dicots	Portulacaceae	*Portulaca lutea* SoI. ex Seem.	Herb	Nat
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-8	Dicots	Portulacaceae	*Portulaca oleracea* L.	Herb	A-N
28 May 2019	J. Jacobi	Wi-S	JDJ-2019-36	Dicots	Portulacaceae	*Portulaca oleracea* L.	Herb	A-N
01 Jun 2019	J. Jacobi	Wa	JDJ-2019-55	Dicots	Rubiaceae	*Oldenlandia corymbosa* L.	Herb	A-N
04 Jun 2019	J. Jacobi	Wa	JDJ-2019-72	Dicots	Solanaceae	*Solanum torvum* Swartz	Shrub	A-N
27 May 2019	J. Jacobi	Wa	JDJ-2019-14	Dicots	Tetrachondraceae	*Polypremum procumbens* L.	Herb	A-N
27 May 2019	J. Jacobi	Wa	JDJ-2019-17	Dicots	Verbenaceae	*Stachytarpheta jamaicensis* (L.) Vahl	Shrub	A-I
26 May 2019	J. Jacobi	Wi-N	JDJ-2019-11	Dicots	Zygophyllaceae	*Tribulus cistoides* L.	Shrub	Nat
25 May 2019	J. Jacobi	Wa	JDJ-2019-1	Dicots	Zygophyllaceae	*Tribulus terrestris* L.	Shrub	A-I

Chapter C. Wake Atoll 2019 Arthropod Species Survey Report and Field Guide

By Robert Peck

C. Introduction

The first systematic survey for terrestrial arthropods on Wake Atoll (hereafter Wake) was led by E.H. Bryan during the 1923 Tanager Expedition. From July 27 to August 5, 1923, Bryan and his colleagues collected and identified 44 species or morpho-species from within 11 arthropod orders (Bryan and others, 1926). After Bryan and others' publication (1926), at least 23 notes and papers identifying additional specimens collected during the expedition, or possibly at other times, were published between 1928 and 1951 (publications listed in Bryan, 1959).

After the Tanager collection, relatively few additional arthropod species were recorded on Wake—notable among these was Bryan's (1959) report that three species of mosquitoes were present during 1951: *Culex quinquefasciatus*, *Aedes aegypti*, and *Aedes* sp. (possibly *A. scutellaris* or *A. albopictus*). Because of their ability to vector pathogens harmful to humans, these mosquitoes became targets of an eradication attempt (Bryan, 1959). The effort primarily involved eliminating small reservoirs of water (for example, tires, cans, and other potential breeding habitats) and introducing western mosquitofish (*Gambusia affinis*) into larger bodies of fresh water, including ponds, bomb craters, and cisterns. Bryan (1959) reported that mosquitoes were not detected during his 2.5-day visit on the atoll in 1952, which indicates the eradication effort, or at least considerable control, seemed to have been successful.

Additional findings of arthropods on Wake Atoll include the identification of ectoparasitic mites (*Laelaps nuttalli* and *Radfordia ensifera*) and lice (*Hoplopleura pacifica*) on rats (Reeves and others, 2012) and the presence of the mango flower beetle (*Protaetia fusca*; Krell and Breidenbaugh, 2016). During 2009, a survey of terrestrial arthropods was done on Wake as part of an ecological monitoring program prior to an attempt to eradicate invasive rats from the atoll (Hebshi and others, 2011). In that study, at least 86 taxa were collected, 14 of which were identified to the species or near-species level. Subsequently, several arthropod taxa were identified during a survey for potential pollinators of plants being considered for propagation and habitat restoration (Center for Environmental Management—Military Lands, unpub. data, 2017). During the pollinator study, 7 species were detected visiting flowers, and 11 were identified from substrates other than flowers.

The objective of our work was to complete a broad survey of arthropods on Wake, which includes the three islets of Peale, Wake, and Wilkes, to provide a more complete understanding of the fauna, identify species that may pose a significant biosecurity risk, and create a photographic guide that can be used by resource managers and researchers as a tool to more easily identify arthropods that are encountered. This work also will provide a benchmark for comparison in future studies. To attain the goals of this project, our time and effort focused on sampling the atoll as extensively as possible rather than attempting to quantify the fauna within and among habitats or mapping distributions of individual species.

C. Methods

Arthropods were sampled from May 25 to June 8, 2019, using a suite of standard sampling methods, including pitfall traps, yellow pan traps, malaise traps, baiting for ants, light traps, litter sampling, yellow sticky card traps, mosquito traps, and collecting by hand (fig. C1). Each method targeted a slightly different sector of the fauna, but there was overlap in many instances. We attempted to survey as much of the atoll as possible, although the focus was on areas most affected by human activity (for example, dorms, operations facilities, storage areas, the airport, the boat harbor, the solid waste accumulation area, and ecologically complex habitats; fig. C2). We primarily surveyed outside habitats, but we also targeted the insides of several closed shipping containers. A brief description of each sampling method used during this study is listed here:

a. Malaise traps: Malaise traps are mesh tent-like structures that primarily intercept insects as they fly along the ground, but they also collect some ground-dwelling arthropods that may climb up onto vegetation. Bi-directional, Townes-style malaise traps fitted with a polyethylene collecting jar (BioQuip Products, Gardena, California) were used. Ethylene glycol mixture (antifreeze; a 50-percent solution with water) was used as a preservative in the collecting jars. Two malaise traps were deployed at seven locations representative of different habitats on Wake (five locations) and Peale (two locations) Islets. Once deployed, traps operated continuously and were moved to a new location about every 2–3 days.

b. Light traps: Lights operated at 9 are highly attractive to many adult Lepidoptera, Diptera, and Coleoptera. Battery-operated 25-watt ultraviolet lights were used to draw insects onto a white cotton sheet suspended vertically above the ground. Insects representing the different taxa encountered were collected by hand. A single light was operated for 1–2 hours after sunset at a variety of locations during 6 nights on Wake (5 nights) and Peale (1 night) Islets.

c. Pitfall traps: Pitfall traps primarily collect arthropods as they walk along the ground and can be effective at capturing spiders, Collembola, Isopods, and other flightless taxa. Traps consisted of 120 milliliter (mL) plastic specimen cups (5.7 centimeter [cm] diameter 7.2 cm deep) placed into the ground, so the top lip was even with the surface. Approximately 40 mL of an ethylene glycol mixture was placed into each cup to act as a preservative. A 27-cm diameter plastic picnic plate was suspended about 15 cm above each trap using rocks and sticks to prevent flooding during rain. Pitfall traps were placed in arrays of four to six traps at two locations on Wake. Each pitfall trap was allowed to operate for 3–4 days at each sample point.

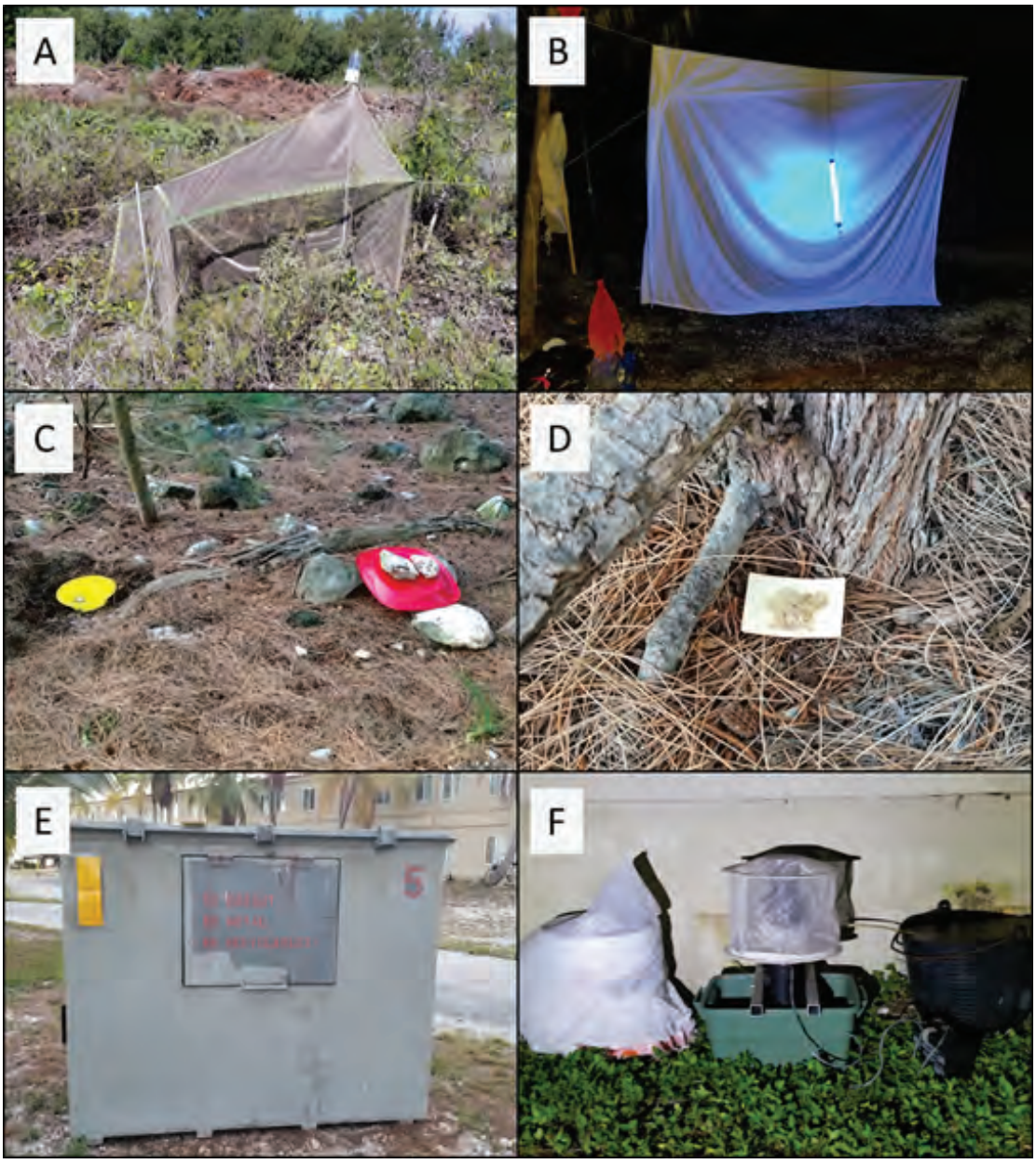

Figure C1. Methods used to collect arthropods, including malaise trapping: *A*, light trapping; *B*, pan trapping; *C*, (left) pitfall trapping, (right) under red rain cover; *D*, tuna baiting for ants; *E*, yellow sticky cards placed on dumpster; and *F*, (center) mosquito trapping. Methods used for extracting arthropods from leaf litter and for hand collecting are not shown. (Photographs by R. Peck, Hawai‘i Cooperative Studies Unit, University of Hawai‘i at Hilo, 2019).

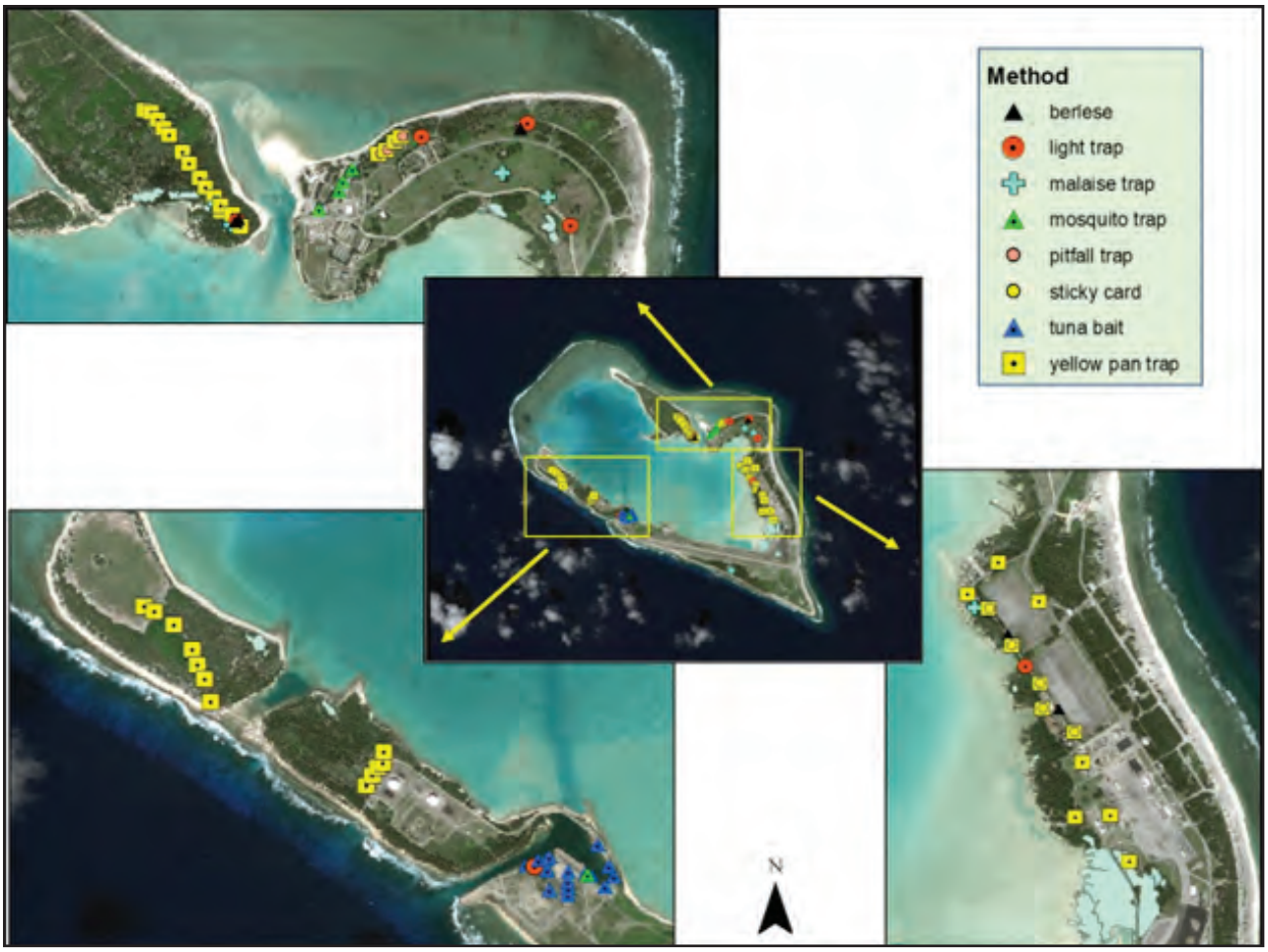

Figure C2. Locations where the collection methods took place. Note that hand-searching, particularly for ants, took place over much of the atoll, and specific locations are not indicated. (WorldView 3 image, taken October 2015).

d. Pan traps: Yellow-colored pan traps are designed to mimic flowers and foliage and are generally attractive to flying insects, such as Diptera and Hymenoptera but also collect arthropods attracted to water or that haphazardly fall into the traps. Traps were 15-cm diameter plastic picnic bowls that contained approximately 100 mL of water into which a drop of unscented liquid detergent was added to reduce surface tension and facilitate capture of insects. Pans were generally placed along transects at numerous locations (ranged from 4 to 14 pans per transect) under tree and shrub canopies on Peale, Wake, and Wilkes Islets. Pan traps were checked daily and operated for 1–2 days at each sample point.

e. Baiting for ants: Bait was used to attract and collect ants. Each bait consisted of approximately 5 gram of canned tuna mixed with a dollop of honey and placed on a 5×7 cm paper card and nestled within leaf litter. The baits were placed along the edges of buildings, shipping containers, or other structures. After about 60 minutes, ants were identified on the card, or the card containing the ants was collected. Baited sampling took place near the marina and around the shipping containers.

f. Litter sampling: Plant litter supports a variety of small, cryptic arthropods that are generally not collected using other methods. Litter was collected using a trowel and placed into 3.8 liter plastic Ziplock bags. In the dorm room, arthropods were separated from the litter using Berlese extractors powered by a 15-watt incandescent light bulb. Berlese extractors operate by creating a heat and moisture gradient that drives arthropods out of the litter (away from the light) and into a collecting vial placed at the bottom of the funnel. Litter was collected at six locations on Wake (four locations) and Peale (two locations) Islets. Extraction of arthropods from each litter sample took about 48 hours.

g. Yellow sticky cards: Yellow sticky cards (Seabright Laboratories, Emeryville, Calif.) are similar to pan traps in that they are designed to capture flying insects that are attracted to bright colors and can be effective at collecting parasitoid wasps and small flies. A clear sticky substance applied to the surface of the card captures insects upon contact. Yellow sticky cards were placed on inside and outside surfaces of several shipping containers and in the vegetation near the containers. Cards operated for 3–6 days at each sample point.

h. Mosquito traps: Center for Disease Control and Prevention (CDC) gravid mosquito traps (Model 1712; www.JohnWHock.com) were used to survey for mosquitoes. These traps consisted of a battery-operated fan-driven collection head placed over a 7.6 liter basin containing about 3.8 liter of "stinky water" that is attractive to female mosquitoes looking for egg-laying habitat. Stinky water was made by placing about 0.25 cubic meter of leaf litter (primarily ironwood litter) and several tablespoons of yeast starter (equal parts by weight of brewer's yeast and lactalbumin) into 18.9 liter of water. This mixture was allowed to steep for at least 3 days before it was used in the mosquito traps. Traps were operated throughout the night at six locations near potential mosquito habitat (generally where there was a source of standing fresh water near buildings) on Wake Islet (near the dorms, mess hall, residential housing area, and main marina building).

i. Hand searching: Hand searching generally consists of shaking vegetation to dislodge arthropods onto a 70×70 cm nylon sheet supported by a wooden frame, sweeping vegetation with a net, overturning rocks and downed coarse wood debris, and excavating dead wood. Forceps or suction-driven aspirators were used to collect arthropods from the sheet, ground, or wood. Hand searching took place at numerous locations on Peale, Wake, and Wilkes Islets. Hand searching was used extensively for surveying for ants, particularly yellow crazy ants.

Most of the arthropods were identified by R. Peck by using existing keys, reference material in the entomology collection at the B.P. Bishop Museum, and online searches from reputable websites (for example, https://www.antweb.org). Neal Evenhuis (B.P. Bishop Museum) identified many of the Diptera, and Karl Magnacca (O'ahu Army Natural Resources Program) identified most of the Hymenoptera, except the ants. In several cases, it was not possible to confidently identify a specimen, or series of similar specimens, to the species level. In those cases, the species most closely thought to represent the specimen in question was preceded by an "nr.," which indicates that it is near, or similar to, that species. In some other instances, specimens could only be identified to the genus, family, or in a few cases, order level.

For each taxon collected, we estimated the relative risk posed to base operations (for example, human health and operational effectiveness) or the ecology of the atoll and the feasibility of successfully managing the risk. Risk assessments were based on the expected effects for each species, whereas management feasibility was based on the likelihood of controlling the effect. These assessments were broadly categorized as low, medium, or high. A wide variety of published sources were used to estimate risks; the Invasive Species Specialist Group (ISSG) Global Invasive Species Database (GISD; International Union for Conservation of Nature, 2019) and Nishida and Evenhuis (2000) represent two of the more comprehensive sources. For many taxa, little or no information was available to guide the assessments. For these species, information from related species was used if available.

Figure C3. *A*, Shipping containers lined up in the industrial area on Wake Islet; and *B*, Debris in the shipping containers (provides habitat for some arthropods). (Photographs by R. Peck, 2019, Hawai'i Cooperative Studies Unit, University of Hawai'i at Hilo).

C. Results

Overall, 173 species or morpho-species from within at least 29 orders were identified during the survey (table C1; appendix C1). *Hymenoptera* (ants, bees, and wasps) were most diverse (33 species), followed by *Coleoptera* (beetles; 30 species), *Diptera* (flies; 25 species), and *Araneae* (spiders; 16 species). It was beyond the scope of this report to identify species and their abundances obtained using each collection method, but arthropods were generally collected as expected (see the "Methods" section). For example, flies and wasps were most commonly collected in malaise traps; spiders and true bugs were primarily obtained by collecting directly from vegetation; moths, termites, and some beetles and flies were collected using an ultraviolet light; many ants were attracted to baits; and mites, millipedes, and terrestrial spiders were extracted from litter using Berlese funnels.

To our knowledge, 81 arthropod species or morpho-species from 20 orders were previously documented on Wake (table C2). Most of those taxa appear to have been first collected during the Tanager Expedition (Bryan and others, 1926; Bryan, 1959), although 21 species were reported for the first time during the past 10 years. Overall, at least 17 of the previously documented species were collected during our survey, although it is possible that we detected an additional 16 taxa collected earlier; incomplete levels of identification (by us or by previous researchers) sometimes precluded species-level comparisons among surveys. Therefore, we report 140–156 arthropod species on Wake for the first time. In contrast, 48–64 species eluded us or are no longer present on the atoll.

Hebshi and others (2011) identified about 86 discrete arthropod taxa (in several additional cases it was unclear if taxa listed were different from those already listed), 15 of which were identified to species or near (listed as "nr.") species level. Of those taxa, we collected as many as nine species. Unfortunately, we were not able to locate the collection described in Hebshi and others (2011; Bishop Museum Accession Number 2010.010), so we were unable to identify their undetermined taxa or compare our specimens to those in their collection.

Shipping containers are a significant biosecurity concern because arthropods that can survive conditions within containers are easily transported between locations. In two accessible containers that housed pallets, cardboard, or other material (fig. C3), we detected one or more of the following arthropods: orange-flanged millipede (*Polydesmida: Paradoxosomatidae*), juvenile cockroach (*Blattodea*), silverfish (*Zygentoma: Lepismatidae*), pholcid spider (*Araneae: Pholcidae*), isopod (*Isopoda*), springtail (*Collembola: Entomobryidae*), pygmy stinkbug (*Hemiptera: Cydnidae*), and several ant species, including the Singapore ant, the robust crazy ant, and the ghost ant. Each species collected tolerates dark, enclosed locations (for example, pholcids), particularly where moisture may persist, like under cardboard or wooden boards. Holes in the containers may allow some taxa to move freely to the outside, although pholcids, isopods and cockroaches may reside fully within the containers. A robust crazy ant nest (including a queen and her brood) was detected under a cardboard box in one container. Three small flies (not identified) were caught on a yellow sticky card placed in one container. Insects were not collected on a yellow sticky card placed in a second container.

C. Discussion

In natural conditions, the arthropod community detected on a remote, low-lying atoll like Wake would be expected to be relatively depauperate due to the low diversity of habitats and plant species richness. However, arthropod species diversity may increase with human colonization as additional plant species are introduced and the habitat is modified in ways that benefit species that thrive in proximity to humans. During our survey of Wake, we collected about 170 species across much of the three islets that comprise the 655-hectare (ha) atoll, revealing a relatively rich arthropod fauna. For comparison, 115 arthropods were identified on Palmyra Atoll (less than 500 ha; Handler and others, 2007), and about 73 species were identified on Rose Atoll (6.6 ha; Peck and others 2014). In contrast, we detected considerably fewer species than observed on Midway Atoll, which is similar in size to Wake Atoll (627 ha; Nishida and Beardsley, 2002). On Midway, 546 species were reported from 1891 to 1999. The number of arthropods identified on Midway increased dramatically during the past century because only 38 species were collected during the Tanager Expedition (Bryan and others, 1926). By 1960, the number of species identified had increased to 221 (Suehiro, 1960), and 331 species were collected during 1997–99 (Nishida and Beardsley, 2002). The tremendous increase in arthropod species richness over time on Midway was largely attributed to a parallel increase in the diversity of plants that led to an increase in available niches.

It is not surprising that we failed to collect numerous arthropod species that had been reported previously from Wake. Many species can be expected to be uncommon, temporally variable in abundance, or very patchily distributed, making them difficult to collect during a brief survey. For several species, we collected only one individual, indicating that more species could have been identified with additional effort. Similarly, we detected additional species on the day we departed the atoll (at the airport terminal), indicating that more work could have resulted in more species being detected. It also is possible that some species detected by earlier researchers no longer exist on Wake. It is likely that some species became extirpated over time through depredation, competitive displacement, changes in habitat quality, or by other mechanisms. Small islands and islets, such as those that make up Wake Atoll, are particularly susceptible to stochastic events (for example, storms and drought) that sometimes have significant effects on small populations.

Many of the arthropods collected during our survey pose a low level of risk to the biosecurity of Wake Atoll, but several species pose medium to high levels of risk. One important group is ants, which is a suite of species that have increased greatly in diversity since the Tanager Expedition. Most of the ant species we collected are considered tramp species (strongly associated with humans) and are widespread across the Pacific Basin. Overall, we collected 14 ant species that were not reported by Bryan and others (1926). The yellow crazy ant (*Anoplolepis gracilipes*), big-headed ants (three species of *Pheidole*), longhorn crazy ant (*Paratrechina longicornis*), and tropical fire ant (*Solenopsis geminata*) are significant because they pose considerable risk to the biodiversity of Wake (O'Dowd and others, 2003; Wetterer, 2007; Wetterer, 2008; Wetterer, 2011). The habitation of the yellow crazy ant on the atoll is of particular concern because it has been indicated to have detrimental effects on ground-nesting seabirds (Plentovich and others, 2009; Plentovich and others, 2018). We detected three of the four ant species collected by Bryan and others (1926) during our survey.

A species that is considered to pose a medium-high level of risk to the biodiversity of Wake is the urbicola scale (*Pulvinaria urbicola*). This herbivorous insect was detected on *Pisonia grandis* trees and may affect the health of this tree species on the atoll. The urbicola soft scale feeds on leaves and is capable of stressing trees until they eventually die. Many *Pisonia* stands across the Pacific and Indian Oceans have been negatively affected by the urbicola soft scale insect (Handler and others, 2007; Neumann and others, 2014).

It is difficult to determine the provenance of many terrestrial arthropods on oceanic islands. Although Wake surely supported a native community of insects and other arthropods, generally poor knowledge of native home ranges for most species hinders our ability to know which species are native to the atoll. In many cases, it is easier to determine which species are not native than which species are native. Bryan and others (1926) reported that many of the arthropods that they encountered were detected elsewhere in the South Pacific. Even at that early time, it is likely that many species had been transported to Wake by humans. For example, the three species of ants that Bryan and others identified on Wake are known to be tramp species strongly associated with human movement across the Pacific Basin. Although it was beyond the scope of this survey to identify the arthropods associated with each of the many plant species, it is notable that we collected several *Acalles wilkesii* on the endemic cotton (*Gossypium stephensii*). This species also was collected by Bryan and others (1926), and Wake seems to represent the northernmost extent of this Pacific-wide genus of weevils (Zimmerman, 1938). A thorough search of the literature may lead to confident determination of provenance for some species, but that is beyond the scope of our study.

Table C1. List and status of arthropods collected during the 2019 survey of Wake Atoll.

[**Function**: U, unknown; D, detritivore; F, fungivore; Pa, parasite; Pr, predator; S, scavenger; O, omnivore; H, herbivore; B, blood feeder; K, kleptoparasite; PS, parasitoid; Po, pollen feeder. **Status:** U, unknown; A, alien; I, invasive; N, native; NA, not applicable/native species. **Impact type:** U, unknown; HH, human health; S, structural damage; A, agricultural pest; B, biodiversity; FS, food storage pest; NA, not applicable/native species. **Islet detected:** P, Peale; Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet). **Risk assessment:** H, high; M, medium; L, low; NA, not applicable/native species. **Management feasibility:** H, high; L, low; M, medium; NA, not applicable/native species]

Taxonomy					Status and risk				
Order	Family	Scientific name	Common name	Function	Status	Impact type	Islet detected	Risk assessment	Management feasibility
			Acari[1]						
Mesostigmata	Unknown	Mesostigmata 1	Mesostigmatid mite	U	U	U	Wa	L	L
Mesostigmata	Unknown	Mesostigmata 2	Mesostigmatid mite	U	U	U	Wa	L	L
Mesostigmata	Unknown	Mesostigmata 3	Mesostigmatid mite	U	U	U	Wa	L	L
Mesostigmata	Unknown	Mesostigmata 4	Mesostigmatid mite	U	U	U	Wa	L	L
Mesostigmata	Unknown	Mesostigmata 5	Mesostigmatid mite	U	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 1	Moss mite	D/F	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 2	Moss mite	D/F	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 3	Moss mite	D/F	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 4	Moss mite	D/F	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 5	Moss mite	D/F	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 6	Moss mite	D/F	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 7	Moss mite	D/F	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 8	Moss mite	D/F	U	U	Wa	L	L
Oribatida	Unknown	Oribatida 9	Moss mite	D/F	U	U	Wa	L	L
Trombidiformes	Pterygosomatidae	*Geckobia* sp.	Gekko mite	Pa	U	U	Wa	L	L
Unknown	Unknown	Gekko mite 1	Gekko mite	Pa	U	U	Wa	L	L
Unknown	Unknown	Mite 1	Mite	U	U	U	Wa	L	L
			Arachnida						
Araneae	Araneidae	*Neoscona theisi* (Walckenaer, 1841)	Spotted orb-weaver	Pr	A	U	Wa	L	L
Araneae	Clubionidae	*Cheiracanthium* nr. *Mordax* Koch, 1866	Garden sac spider	Pr	A	U	Wa	L	L
Araneae	Corinnidae	Corinnidae sp. 1	Ground sac spider	Pr	U	U	Wi-N	L	L
Araneae	Corinnidae	Corinnidae sp. 2	Ground sac spider	Pr	U	U	Wa	L	L
Araneae	Oecobiidae	*Oecobius* sp.	Disc web spider	Pr	U	U	Wa	L	L
Araneae	Oonopidae	Oonopidae sp.	Goblin spider	Pr	U	U	Wa	L	L
Araneae	Oxyopidae	*Oxyopes* sp.	Lynx spider	Pr	A	U	Wa	L	L
Araneae	Pholcidae	Pholcidae sp.	Cellar spider	Pr	U	U	Wa	L	L
Araneae	Salticidae	*Menemerus bivittatus* (Dufour, 1831)	Gray wall jumper	Pr	U	U	Wa	L	L

Table C1. List and status of arthropods collected during the 2019 survey of Wake Atoll.—Continued

[**Function**: U, unknown; D, detritivore; F, fungivore; Pa, parasite; Pr, predator; S, scavenger; O, omnivore; H, herbivore; B, blood feeder; K, kleptoparasite; PS, parasitoid; Po, pollen feeder. **Status:** U, unknown; A, alien; I, invasive; N, native; NA, not applicable/native species. **Impact type:** U, Unknown; HH, human health; S, structural damage; A, agricultural pest; B, biodiversity; FS, food storage pest; NA, not applicable/native species. **Islet detected:** P, Peale; Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet). **Risk assessment:** H, high; M, medium; L, low; NA, not applicable/native species. **Management feasibility:** H, high; L, low; M, medium; NA, not applicable/native species]

Taxonomy					Status and risk				
Order	Family	Scientific name	Common name	Function	Status	Impact type	Islet detected	Risk assessment	Management feasibility
Arachnida—Continued									
Araneae	Salticidae	*Plexippus paykulli* (Audouin, 1826)	Pantropical jumper	Pr	A	U	Wa	L	L
Araneae	Salticidae	Salticidae sp. 1	Jumping spider	Pr	U	U	Wa	L	L
Araneae	Salticidae	Salticidae sp. 2	Jumping spider	Pr	U	U	Wa	L	L
Araneae	Scytodidae	Scytodidae sp	Spitting spider	Pr	U	U	Wa	L	L
Araneae	Sparassidae	*Heteropoda ventatoria* (Linnaeus, 1767)	Huntsman spider	Pr	A	U	P	L	L
Araneae	Tetragnathidae	Tetragnathidae sp.	Long-jawed spider	Pr	U	U	Wa	L	L
Araneae	Theridiidae	Theridiidae sp.	Tangle-web spider	Pr	U	U	Wa, Wi-N	L	L
Pseudoscorpiones	Unknown	Pseudoscorpiones sp.	Pseudoscorpion	Pr	U	U	P	L	L
Schizomida	Hubbardiidae	Hubbardiidae sp.	Short-tailed whipscorpion	Pr	U	U	Wa	L	L
Scorpiones	Buthidae	*Isometrus maculatus* (DeGeer, 1778)	Lesser brown scorpion	Pr	I	HH	Wa	M	L
Chilopoda									
Geophilomorpha	Geophilidae	Geophilidae sp.	Soil centipede	Pr	U	U	Wa	L	L
Lithobiomorpha	Unknown	Lithobiomorpha sp.	Stone centipede	Pr	U	U	Wa	L	L
Scolopendromorpha	Scolopendridae	Scolopendridae sp.	Tropical centipede	Pr	I	HH	Wa	M	L
Scolopendromorpha	Scolopendridae	*Scolopendra subspinipes* Leach, 1816	Red-headed centipede	Pr	I	HH	Wa	M	L
Diplopoda									
Polydesmida	Paradoxosomatidae	*Orthomorpha coarctata* (Saussure, 1860)	Long-flange millipede	D/S	A	U	Wa	L	L
Polyxenida	Polyxenidae	*Polyxenus* nr. *Fasciculatus* Say, 1821	Polyxenid millipede	D/S	U	U	P, Wa	L	L
Unknown	Unknown	Diplopoda sp.	Millipede	D/S	U	U	Wa	L	L
Collembola[1]									
Entomobryomorpha	Entomobryidae	Entomobryidae 1	Springtail	O	U	U	Wa	L	L
Entomobryomorpha	Entomobryidae	Entomobryidae 2	Springtail	O	U	U	Wa	L	L
Entomobryomorpha	Isotomidae	Isotomidae sp.	Springtail	O	U	U	P, Wa	L	L

Table C1. List and status of arthropods collected during the 2019 survey of Wake Atoll.—Continued

[**Function**: U, unknown; D, detritivore; F, fungivore; Pa, parasite; Pr, predator; S, scavenger; O, omnivore; H, herbivore; B, blood feeder; K, kleptoparasite; PS, parasitoid; Po, pollen feeder. **Status:** U, unknown; A, alien; I, invasive; N, native; NA, not applicable/native species. **Impact type:** U, Unknown; HH, human health; S, structural damage; A, agricultural pest; B, biodiversity; FS, food storage pest; NA, not applicable/native species. **Islet detected:** P, Peale; Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet). **Risk assessment:** H, high; M, medium; L, low; NA, not applicable/native species. **Management feasibility:** H, high; L, low; M, medium; NA, not applicable/native species]

Taxonomy					Status and risk				
Order	**Family**	**Scientific name**	**Common name**	**Function**	**Status**	**Impact type**	**Islet detected**	**Risk assessment**	**Management feasibility**
			Insecta						
Blattodea	Blaberidae	*Pycnoscelus surinamensis* (Linnaeus, 1758)	Surinam cockroach	O	A	U	P	L	L
Blattodea	Blattidae	*Melanozosteria soror* (Brunner von Wattenwyl, 1865)	White-margined cockroach	O	A	U	Wa	L	L
Blattodea	Blattidae	*Periplaneta americana* (Linnaeus, 1758)	American cockroach	O	A	U	Wa	L	L
Blattodea	Ectobiidae	*Balta notulata* (Stål, 1861)	Small-spotted cockroach	O	A	U	P	L	L
Blattodea	Ectobiidae	*Lobopterella dimidiatipes* (Bolivar, 1890)	White-edged cockroach	O	A	U	Wi-S	L	L
Blattodea	Rhinotermitidae	*Coptotermes gestroi* (Wasmann, 1896)	Asian subterranean termite	D	I	S	P, Wa	M	L
Coleoptera	Brentidae	*Cylas formicarius* (Fabricius, 1798)	Sweet potato weevil	H	I	A	P	L-M	L
Coleoptera	Carabidae	Carabidae sp.	Ground beetle	Pr	U	U	Wa	L	L
Coleoptera	Cerambycidae	*Ceresium unicolor* (Fabricius, 1787)	Long-horned beetle	H	U	U	P, Wa	L	L
Coleoptera	Cerambycidae	*Sybra alternans* (Wiedemann, 1825)	Long-horned beetle	H	U	U	P, Wa	L	L
Coleoptera	Chrysomelidae	*Acanthoscelides macrophthalmus* (Schaeffer, 1907)	Seed weevil	H	A	U	P	L	L
Coleoptera	Chrysomelidae	*Chaetocnema confinis* Crotch, 1873	Sweet potato flea beetle	H	A	U	Wi-S	L	L
Coleoptera	Coccinelidae	*Brumoides suturalis* (Fabricius, 1798)	Three-striped lady-beetle	Pr	A	U	Wa	L	L
Coleoptera	Coccinelidae	*Coleophora inaequalis* (Fabricius, 1775)	Ladybird beetle	Pr	A	U	P	L	L
Coleoptera	Coccinelidae	*Nephaspis* nr. *oculatus* (Blatchley, 1917)	Ladybird beetle	Pr	A	U	Wa	L	L
Coleoptera	Coccinelidae	*Nephaspis* sp.	Ladybird beetle	Pr	A	U	P	L	L
Coleoptera	Coccinelidae	*Nephus* sp.	Ladybird beetle	Pr	A	U	Wi-N	L	L

Table C1. List and status of arthropods collected during the 2019 survey of Wake Atoll.—Continued

[**Function**: U, unknown; D, detritivore; F, fungivore; Pa, parasite; Pr, predator; S, scavenger; O, omnivore; H, herbivore; B, blood feeder; K, kleptoparasite; PS, parasitoid; Po, pollen feeder. **Status:** U, unknown; A, alien; I, invasive; N, native; NA, not applicable/native species. **Impact type:** U, Unknown; HH, human health; S, structural damage; A, agricultural pest; B, biodiversity; FS, food storage pest; NA, not applicable/native species. **Islet detected:** P, Peale; Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet). **Risk assessment:** H, high; M, medium; L, low; NA, not applicable/native species. **Management feasibility:** H, high; L, low; M, medium; NA, not applicable/native species]

Taxonomy					Status and risk				
Order	Family	Scientific name	Common name	Function	Status	Impact type	Islet detected	Risk assessment	Management feasibility
Insecta—Continued									
Coleoptera	Coccinelidae	Coccinelidae sp.	Ladybird beetle	Pr	A	U	Wa, Wi-N	L	L
Coleoptera	Curculionidae	*Acalles wilkesii* Perkins, 1926	Wilkes cryptorhynchine weevil	H	U	U	P, Wa, Wi-N	L	L
Coleoptera	Curculionidae	*Dryotribus mimeticus* Horn, 1873	Cossine weevil	H	A	U	Wa	L	L
Coleoptera	Curculionidae	Cossoninae sp.	Cossine weevil	H	U	U	P	L	L
Coleoptera	Curculionidae	*Hypothenemus* sp.	Pygmy wood borer	H	A	U	P	L	L
Coleoptera	Curculionidae	*Myllocerus* sp.	Broad-nosed weevil	H	U	U	Wa	L	L
Coleoptera	Dermestidae	*Dermestes ater* DeGeer, 1774	Black larder beetle	S	I	FS	Wa	L-M	L
Coleoptera	Elateridae	*Conoderus pallipes* (Eschscholtz, 1829)	Click beetle	D	A	U	P, Wa	L	L
Coleoptera	Elateridae	Elateridae sp.	Click beetle	D	U	U	Wa	L	L
Coleoptera	Elateridae	*Lacon modestus* (Boisduval, 1835)	Click beetle	D	U	U	P, Wa	L	L
Coleoptera	Oedemeridae	*Eobia bicolor* (Fairmaire, 1849)	Red-black false blister beetle	H	A	U	Wa	L	L
Coleoptera	Scarabaeidae	*Pleurophorus parvulus* (Chevrolat, 1864)	Small dung beetle	S	A	U	P	L	L
Coleoptera	Scarabaeidae	*Protaetia fusca* (Herbst, 1790)	Mango flower beetle	H	I	A	Wa	L-M	L
Coleoptera	Silvanidae	Silvanidae sp.	Silvan flat bark beetle	D/F	I	FS	P, Wa	L-M	L
Coleoptera	Tenebrionidae	*Gonocephalum adpressiforme* Kaszab, 1951	Darkling beetle	D/H	A	U	Wa	L	L
Coleoptera	Unknown	Coleoptera 1	Unknown	U	U	U	Wa	U	U
Coleoptera	Unknown	Coleoptera 2	Unknown	U	U	U	Wi-N	U	U
Coleoptera	Unknown	Coleoptera 3	Unknown	U	U	U	Wa	U	U
Coleoptera	Unknown	Coleoptera 4	Unknown	U	U	U	Wa	U	U
Dermaptera	Anisolabididae	*Euborellia annulipes* (Lucas, 1847)	Ring-legged earwig	S	A	U	Wa	L	L
Diptera	Agromyzidae	*Liriomyza* nr. *sativae* Blanchard, 1938	Vegetable leaf miner	H	I	A	Wa	L-M	L

Table C1. List and status of arthropods collected during the 2019 survey of Wake Atoll.—Continued

[**Function**: U, unknown; D, detritivore; F, fungivore; Pa, parasite; Pr, predator; S, scavenger; O, omnivore; H, herbivore; B, blood feeder; K, kleptoparasite; PS, parasitoid; Po, pollen feeder. **Status:** U, unknown; A, alien; I, invasive; N, native; NA, not applicable/native species. **Impact type:** U, Unknown; HH, human health; S, structural damage; A, agricultural pest; B, biodiversity; FS, food storage pest; NA, not applicable/native species. **Islet detected:** P, Peale; Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet). **Risk assessment:** H, high; M, medium; L, low; NA, not applicable/native species. **Management feasibility:** H, high; L, low; M, medium; NA, not applicable/native species]

Taxonomy					Status and risk				
Order	Family	Scientific name	Common name	Function	Status	Impact type	Islet detected	Risk assessment	Management feasibility
Insecta—Continued									
Diptera	Anthomyzidae	*Amygdalops nigronotum* Sueyoshi and Rohácek, 2003	Anthomyzid fly	D/S	A	U	P	L	L
Diptera	Calliphoridae	*Calliphora vomitoria* (Linnaeus, 1758)	Blue bottle fly	S	A	U	Wa	L	L
Diptera	Ceratopogonidae	Ceratopogonidae sp.	Biting midge	U	U	U	Wa	L	L
Diptera	Ceratopogonidae	Possibly *Forcipomyia* sp.	Biting midge	U	U	U	Wa	L	L
Diptera	Chironomidae	Chironomidae sp.	Non-biting midge	U	U	U	Wa	L	L
Diptera	Chloropidae	*Cadrema pallida* (Loew, 1866)	Frit fly	S	A	U	Wa	L	L
Diptera	Chloropidae	Possibly *Oscinis* sp.	Frit fly	H	U	U	Wa	L	L
Diptera	Culicidae	*Culex quinquefasciatus* Say, 1823	Southern house mosquito	B	I	HH	Wa	M	M
Diptera	Dolichopodidae	*Chrysosoma globiferum* (Wiedemann, 1830)	Long-legged fly	Pr	A	U	P, Wa, Wi	L	L
Diptera	Dolichopodidae	Sciapodinae sp.	Long-legged fly	Pr	U	U	Wa	L	L
Diptera	Fanniidae	*Fannis scalaris* (Fabricius, 1794)	Latrine fly	D/S	A	U	Wa	L	L
Diptera	Hippoboscidae	*Olfersia* sp.	Louse fly	Pa	N	NA	Wa	NA	NA
Diptera	Hybotidae	*Syneches* sp.	Dance fly	Pr	U	U	Wa	L	L
Diptera	Lauxaniidae	*Homoneura* sp.	Lauxaniid fly	D	U	U	Wa	L	L
Diptera	Phoridae	*Megaselia scalaris* (Loew, 1866)	Laboratory fly	D/O	A	U	Wa	L	L
Diptera	Sarcophagidae	*Sarcophaga peregrina* (Robineau-Desvoidy, 1830)	Flesh fly	D/S	A	U	Wa	L	L
Diptera	Scenopinidae	*Scenopinus adventicius* Hardy, 1960	Window fly	Pr	A	U	Wa	L	L
Diptera	Scenopinidae	*Scenopinus lucidus* Becker, 1902	Window fly	Pr	A	U	Wa	L	L
Diptera	Syrphidae	*Syritta* nr. *orientalis* Macquart, 1842	Oriental hover fly	Pr/H	A	U	Wa	L	L
Diptera	Tachinidae	Tachinidae sp.	Tachinid fly	PS	U	U	Wa	L	L
Diptera	Tephritidae	*Acinia picturata* (Snow, 1894)	Fruit fly	H	A	U	Wa, Wi-S	L	L
Diptera	Tephritidae	*Dioxyna sororcula* (Wiedemann, 1830)	Fruit fly	H	A	U	Wa, Wi-S	L	L
Diptera	Therevidae	*Bugulaverpa rebeccae* Gaimari and Irwin, 2000	Stilleto fly	Pr	U	U	Wa, Wi-N	L	L

Table C1. List and status of arthropods collected during the 2019 survey of Wake Atoll.—Continued

[**Function**: U, unknown; D, detritivore; F, fungivore; Pa, parasite; Pr, predator; S, scavenger; O, omnivore; H, herbivore; B, blood feeder; K, kleptoparasite; PS, parasitoid; Po, pollen feeder. **Status:** U, unknown; A, alien; I, invasive; N, native; NA, not applicable/native species. **Impact type:** U, Unknown; HH, human health; S, structural damage; A, agricultural pest; B, biodiversity; FS, food storage pest; NA, not applicable/native species. **Islet detected:** P, Peale; Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet). **Risk assessment:** H, high; M, medium; L, low; NA, not applicable/native species. **Management feasibility:** H, high; L, low; M, medium; NA, not applicable/native species]

Taxonomy					Status and risk				
Order	Family	Scientific name	Common name	Function	Status	Impact type	Islet detected	Risk assessment	Management feasibility
			Insecta—Continued						
Diptera	Ulidiidae	*Notogramma cimiciforme* Loew, 1868	Picture-wing fly	D	A	U	Wa	L	L
Embioptera	Oligotomidae	*Oligotoma* sp.	Webspinner	D	U	U	Wa, Wi-S	L	L
Hemiptera	Aleyrodidae	Aleyrodidae sp.	Whitefly	H	U	A	Wa	U	L
Hemiptera	Anthocoridae	*Orius persequens* (White, 1877)	Minute pirate bug	Pr/O	U	U	P, Wi-N	L	L
Hemiptera	Cicadellidae	*Circulifer* nr. *tenellus* (Baker, 1896)	Leafhopper	H	U	U	Wi-N	L	L
Hemiptera	Coccidae	*Pulvinaria urbicola* Cockerell, 1893	Urbicola soft scale	H	I	B	Wi-N	M-H	M
Hemiptera	Cydnidae	*Geotomus pygmaeus* (Dallas, 1851)	Pygmy stinkbug	H	A	U	P	L	L
Hemiptera	Geocoridae	*Geocoris* nr. *pallens* Stål, 1854	Western big-eyed bug	Pr/O	A	U	Wi-N	L	L
Hemiptera	Lygaeidae	*Nysius palor* Ashlock, 1863	False chinch bug	H	U	U	P, Wi	L	L
Hemiptera	Miridae	*Opuna sharpianus* (Kirkaldy, 1902)	Leaf bug	H	A	U	Wi-N	L	L
Hemiptera	Pseudcoccidae	Pseudococcidae sp.	Mealy bug	H	U	U	P	L	L
Hemiptera	Psyllidae	Psyllidae sp.	Jumping plant louse	H	U	U	Wa	L	L
Hemiptera	Reduviidae	*Empicoris* sp.	Thread-legged bug	Pr	A	U	Wa	L	L
Hemiptera	Rhyparochromidae	*Pachybrachius* nr. *pacificus* (Stål, 1874)	Seed bug	H	U	U	P, Wa	L	L
Hymenoptera	Ampulicidae	*Ampulex compressa* (Fabricius, 1871)	Emerald cockroach wasp	Pr	A	U	Wa	L	L
Hymenoptera	Apidae	*Ceratina dentipes* Friese, 1914	Small carpenter bee	Po	A	U	Wa, Wi-S	L	L
Hymenoptera	Apidae	*Xylocopa sonorina* Smith, 1874	Large carpenter bee	Po	A	U	Wa, Wi-N	L	L
Hymenoptera	Bethylidae	*Epyris* sp.	Bethylid wasp	PS	U	U	Wa	L	L
Hymenoptera	Chalcidae	*Psilochalcis* nr. *hespenheidei* (Boucek, 1984)	Chalcid wasp	PS	U	U	Wa	L	L
Hymenoptera	Chrysididae	*Trichrysis lusca* (Fabricius, 1804)	Cuckoo wasp	K	U	U	Wa	L	L
Hymenoptera	Crabronidae	Possibly *Liris* sp.	Digger wasp	Pr	U	U	Wa	L	L
Hymenoptera	Crabronidae	*Pison* nr. *hospes* Smith, 1879	Digger wasp	Pr	U	U	Wi-S	L	L
Hymenoptera	Eulophidae	Tetrastichinae sp.	Eulophid wasp	PS	U	U	Wa	L	L
Hymenoptera	Evaniidae	*Evania appendigaster* (Linnaeus, 1758)	Ensign wasp	PS	A	U	Wa	L	L
Hymenoptera	Formicidae	*Anochetus* sp.	Trap jaw ant	Pr	A	U	P, Wa	L	L

Table C1. List and status of arthropods collected during the 2019 survey of Wake Atoll.—Continued

[**Function**: U, unknown; D, detritivore; F, fungivore; Pa, parasite; Pr, predator; S, scavenger; O, omnivore; H, herbivore; B, blood feeder; K, kleptoparasite; PS, parasitoid; Po, pollen feeder. **Status:** U, unknown; A, alien; I, invasive; N, native; NA, not applicable/native species. **Impact type:** U, Unknown; HH, human health; S, structural damage; A, agricultural pest; B, biodiversity; FS, food storage pest; NA, not applicable/native species. **Islet detected:** P, Peale; Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet). **Risk assessment:** H, high; M, medium; L, low; NA, not applicable/native species. **Management feasibility:** H, high; L, low; M, medium; NA, not applicable/native species]

Taxonomy					Status and risk				
Order	Family	Scientific name	Common name	Function	Status	Impact type	Islet detected	Risk assessment	Management feasibility
Insecta—Continued									
Hymenoptera	Formicidae	*Anoplolepis gracilipes* (Smith, 1857)	Yellow crazy ant	S/Pr	I	B	P, Wa, Wi-S	H	M
Hymenoptera	Formicidae	*Camponotus variegatus* (Smith, 1858)	Carpenter ant	S/O	A	U	Wa	L	L
Hymenoptera	Formicidae	*Monomorium floricola* (Jerdon, 1851)	Monomorium ant	S/Pr	I	B	Wa	L-M	L
Hymenoptera	Formicidae	*Monomorium liliuokalanii* Forel, 1899	Monomorium ant	S/Pr	I	B	Wa	L-M	L
Hymenoptera	Formicidae	*Monomorium* sp.	Monomorium ant	S/Pr	I	B	Wa	L-M	L
Hymenoptera	Formicidae	*Nylanderia bourbonica* (Forel, 1886)	Robust crazy ant	S/Pr	I	B	P, Wa, Wi-N	L-M	L
Hymenoptera	Formicidae	*Paratrechina longicornis* (Latreille, 1802)	Longhorn crazy ant	S/Pr	I	B	Wa, Wi-N	M	L
Hymenoptera	Formicidae	*Pheidole megacephala* (Fabricius, 1793)	Big-headed ant	S/Pr	I	B	Wa	M	M
Hymenoptera	Formicidae	*Pheidole* nr. *moerens* Wheeler, 1908	Big-headed ant	S/Pr	I	B	Wa	M	M
Hymenoptera	Formicidae	*Pheidole* sp.	Big-headed ant	S/Pr	I	B	P, Wa	M	M
Hymenoptera	Formicidae	*Solenopsis geminata* (Fabricius, 1804)	Tropical fire ant	S/Pr	I	HH	Wa	M	M
Hymenoptera	Formicidae	*Tapinoma melanocephalum* (Fabricius, 1793)	Ghost ant	S/Pr	I	B	P, Wa, Wi	L-M	L
Hymenoptera	Formicidae	*Tetramorium* nr. *simillimum* (Smith, 1851)	Tetramorium ant	S/Pr	I	B	P, Wa	L-M	L-M
Hymenoptera	Formicidae	*Tetramorium* sp.	Tetramorium ant	S/Pr	I	B	Wa	L-M	L-M
Hymenoptera	Formicidae	*Trichomyrmex destructor* (Jerdon, 1851)	Singapore ant	S/Pr	I	B	P, Wa, Wi-N	M	L
Hymenoptera	Formicidae	Ponerinae sp.	Ponerine ant	S/Pr	A	U	Wa	L	L
Hymenoptera	Megachilidae	Megachile sp.	Leafcutter bee	Po	U	U	Wa	L	L
Hymenoptera	Scelionidae	*Anteromorpha* sp.	Scelionid wasp	PS	U	U	Wa	L	L
Hymenoptera	Scelionidae	*Baryconus* sp.	Scelionid wasp	PS	U	U	Wa	L	L
Hymenoptera	Scelionidae	*Idris* sp.	Scelionid wasp	PS	U	U	Wa	L	L
Hymenoptera	Sclerogibbidae	*Sclerogibba* sp.	Sclerogibbid wasp	PS	U	U	Wa	L	L

Table C1. List and status of arthropods collected during the 2019 survey of Wake Atoll.—Continued

[**Function**: U, unknown; D, detritivore; F, fungivore; Pa, parasite; Pr, predator; S, scavenger; O, omnivore; H, herbivore; B, blood feeder; K, kleptoparasite; PS, parasitoid; Po, pollen feeder. **Status:** U, unknown; A, alien; I, invasive; N, native; NA, not applicable/native species. **Impact type:** U, Unknown; HH, human health; S, structural damage; A, agricultural pest; B, biodiversity; FS, food storage pest; NA, not applicable/native species. **Islet detected:** P, Peale; Wa, Wake; Wi-N, Wilkes (north islet); Wi-S, Wilkes (south islet). **Risk assessment:** H, high; M, medium; L, low; NA, not applicable/native species. **Management feasibility:** H, high; L, low; M, medium; NA, not applicable/native species]

Taxonomy					Status and risk				
Order	Family	Scientific name	Common name	Function	Status	Impact type	Islet detected	Risk assessment	Management feasibility
Insecta—Continued									
Hymenoptera	Vespidae	*Ropalidia marginata* (Lepeletier, 1836)	Paper wasp	Pr	I	B/HH	P, Wa, Wi-N	M	L-M
Lepidoptera	Arctiidae	*Utetheisa pulchelloides* Hampson, 1907	Heliotrope moth	H	U	U	P, Wa, Wi	L	L
Lepidoptera	Autostichidae	*Stoeberhinus testaceus* Butler, 1881	Potato moth	H	A	U	Wa	L	L
Lepidoptera	Geometridae	Geometridae sp.	Geometer moth	H	U	U	Wa	L	L
Lepidoptera	Noctuidae	Noctuidae sp.	Owlet moth	H	U	U	Wa	L	L
Lepidoptera	Sphingidae	*Agrius convolvuli* (Linnaeus, 1758)	Pink-spotted hawk-moth	H	U	U	P	L	L
Lepidoptera	Unknown	Lepidoptera sp.	Moth	H	U	U	Wa	L	L
Mantodea	Mantidae	*Hierodula patellifera* Serville, 1839	Giant asian mantis	Pr	A	U	Wa	L	L
Odonata	Libellulidae	*Pantala flavescens* (Fabricius, 1798)	Globe skimmer	Pr	U	U	Wa, Wi-N	L	L
Orthoptera	Acrididae	*Oedaleus* nr. *abruptus* (Thunberg, 1815)	Short-horned grasshopper	H	A	U	P, Wa	L	L
Orthoptera	Mogoplistidae	Mogoplistinae sp.	Scaly cricket	O/S	U	U	Wa	L	L
Orthoptera	Mogoplistidae	*Ornebius* sp.	Scaly cricket	O/S	U	U	Wa	L	L
Orthoptera	Tettigoniidae	*Phaneroptera furcifera* Stål, 1874	Philippine katydid	H	A	U	Wa	L	L
Orthoptera	Tettigoniidae	Tettigonidae sp.	Katydid	H	U	U	Wa	L	L
Psocoptera	Unknown	Psocoptera sp. 1	Barklouse	D/S	U	U	Wa	L	L
Psocoptera	Unknown	Psocoptera sp. 2	Barklouse	D/S	U	U	Wa	L	L
Thysanoptera	Phlaeothripidae	Phlaeothripidae sp.	Tube-bearing thrip	F/H	U	U	P	L	L
Zygentoma	Lepismatidae	Zygentoma sp.	Silverfish	D/S	U	U	Wa	L	L
Malacostraca									
Isopoda	Armadillidiidae	Armadillidae sp.	Pill bug	D	U	U	Wa, Wi-S	L	L
Isopoda	Porcellionidae	Porcellionidae sp.	Pill bug	D	U	U	Wa	L	L

[1]The more recognizable subclasses Acari (Class=Arachnida) and Collembola (Class=Entognatha) are provided for convenience.

Table C2. List of arthropod species collected at Wake Atoll prior to 2019.

[This list was compiled from various sources, including unpublished data. Full citations for published documents can be found in chapter C, section "References Cited"]

Order	Family	Species	Source[2]	Collected during 2019 survey?
		Acari[1]		
Ixodida	Argasidae	*Ornithodoros* nr. *capensis* Neumann, 1901	Hebshi and others, 2011	No
Mesostigmata	Laelapidae	*Laelaps nuttalli* Hirst, 1916	Reeves and others, 2012	No
Oribatida	Galumnidae	*Zetes bryani* Jacot, 1934	Jacot, 1934	Possibly; similar to Oribatida 1
Oribatida	Neoliodidae	*Udetaliodes hawaiiensis wakensis* Jacot, 1929	Jacot, 1929	Possibly; similar to Oribatida 9
Oribatida	Oribotritiidae	*Indotritia bryani* (Jacot, 1929)	Jacot, 1928	Possibly; similar to Oribatida 5 and 6
Trombidiformes	Myobiidae	*Radfordia ensifera* (Poppe, 1896)	Reeves and others, 2012	No
		Chilopoda		
Geophilomorpha	Oryidae	*Orphnaeus brevilabiatus* Newport, 1845	Bryan and others, 1926	No
		Diplopoda		
Polyxendia	Polyxenidae	*Polyxenus* sp.	Hebshi and others, 2011	Possibly
		Insecta		
Blattodea	Undetermined	Unidentified species	Bryan and others, 1926	Possibly
Coleoptera	Anthribidae	Undetermined species	Bryan and others, 1926	No
Coleoptera	Bostrichidae	*Amphicerus cornutus* (Pallus, 1772)	Hebshi and others, 2011	No
Coleoptera	Curculionidae	*Dryotribus mimeticus* Horn, 1873	Bryan and others, 1926	Yes
Coleoptera	Curculionidae	*Microcryptorhynchus wilkesii* (Perkins, 1926)[3]	Bryan and others, 1926	Yes
Coleoptera	Curculionidae	*Rhyncogonus fallax* Perkins, 1926	Bryan and others, 1926	No
Coleoptera	Curculionidae	*Sphaerorhinus pallescens* Perkins, 1926	Bryan and others, 1926	No
Coleoptera	Curculionidae	*Sphaerorhinus sordidus* Perkins, 1926	Bryan and others, 1926	No
Coleoptera	Dermestidae	*Dermestes ater* DeGeer, 1774	Hebshi and others, 2011	Yes
Coleoptera	Elateridae	*Agriotes* sp.	Hebshi and others, 2011	No
Coleoptera	Elateridae	*Conoderus pallipes* (Eschscholtz, 1829)	Van Zwaluwenburg, 1948	Yes
Coleoptera	Elateridae	*Megapenthes brunniventris* (Canadeze, 1892)	Hebshi and others, 2011	No
Coleoptera	Scarabaeidae	*Protaetia fusca* (Herbst, 1790)	Krell and Breidenbaugh, 2016	Yes
Dermaptera	Labiduridae	*Anisolabis maritima* (Bonelli, 1832)	Bryan and others, 1926	No
Diptera	Agromyzidae	Undetermined Milichiinae	Bryan and others, 1926	No
Diptera	Asilidae	Undetermined species	Bryan and others, 1926	No

Table C2. List of arthropod species collected at Wake Atoll prior to 2019.—Continued

[This list was compiled from various sources, including unpublished data. Full citations for published documents can be found in chapter C, section "References Cited"]

Order	Family	Species	Source[2]	Collected during 2019 survey?
		Insecta—Continued		
Diptera	Calliphoridae	*Chrysomyia megacephala* (Fabricius, 1794)	Bryan, 1948	No
Diptera	Calliphoridae	*Lucilia sericata* (Meigen, 1826)	Bryan and others, 1926	No
Diptera	Canacidae	*Tethina insularis* Aldrich, 1831	Aldrich, 1931	No
Diptera	Chironomidae	Undetermined species	Bryan and others, 1926	Possibly
Diptera	Culcidae	*Aedes aegypti* (Linnaeus, 1762)	Rosen and others, 1948	No
Diptera	Culcidae	*Aedes* sp.	Bryan, 1959	No
Diptera	Culcidae	*Culex quinquesfasciatus* Say, 1823	Reeves, 1953	Yes
Diptera	Dolichopodidae	*Paraphrosylus* sp.	Bryan and others, 1926	No
Diptera	Ephydridae	*Canaceoides nudata* (Cresson, 1926)[4]	Bryan and others, 1926	No
Diptera	Ephydridae	*Hecamede* sp.	Bryan and others, 1926	No
Diptera	Hippoboscidae	*Olfersia aenescens* Thomson, 1869	Hebshi and others, 2011	Possibly; needs confirmation
Diptera	Hippoboscidae	*Olfersia spinifera* (Leach, 1817)	Bryan and others, 1926	Possibly; needs confirmation
Diptera	Muscidae	*Musca domestica* Linnaeus, 1758	Bryan, 1948	No
Diptera	Muscidae	*Synthesiomyia nudiseta* (Wulp, 1883)	Bryan and others, 1926	No
Diptera	Oscinidae	*Hippelatus nigricornis* var. *flavus* Thomson, 1869	Bryan and others, 1926	No
Diptera	Sapromyzidae	*Sapromyza* sp.	Bryan and others, 1926	No
Diptera	Syrphidae	*Ischiodon scutellaris* (Fabricius, 1805)	Hull, 1937	No
Diptera	Ulidiidae	*Notogramma cimiciforme* Lowe, 1868	Hebshi and others, 2011	Possibly
Embioptera	Oligotomidae	*Oligotoma saundersii* (Westwood, 1837)	Hebshi and others, 2011	Possibly
Hemiptera	Aleyrodidae	Aleyrodid	Bryan and others, 1926	Possibly
Hemiptera	Aphididae	*Aphis medicaginis* Koch, 1854	Bryan and others, 1926	No
Hemiptera	Cicadellidae	Jassid 1	Bryan and others, 1926	Possibly
Hemiptera	Cicadellidae	Jassid 2	Bryan and others, 1926	No
Hemiptera	Lygaeidae	*Nysius picipes* Usinger, 1937	Usinger, 1937	No
Hemiptera	Lygaeidae	*Nysius* sp.	Bryan and others, 1926	Possibly same as *N. palor*
Hemiptera	Miridae	*Opuna hawaiiensis* (Kikraldy, 1902)	Bryan and others, 1926	Yes (=*O. sharpianus*)
Hemiptera	Nabidae	*Nabis capsiformis* Germar, 1838	Gross, 1963	No

Table C2. List of arthropod species collected at Wake Atoll prior to 2019.—Continued

[This list was compiled from various sources, including unpublished data. Full citations for published documents can be found in chapter C, section "References Cited"]

Order	Family	Species	Source[2]	Collected during 2019 survey?
		Insecta—Continued		
Hemiptera	Nabidae	*Reduviolus kahavalu* (Kirkaldy, 1907)	Bryan and others, 1926	No
Hemiptera	Pentatomidae	*Oechalia consocialis* (Boisduval, 1835)	Usinger, 1941	No
Hymenoptera	Apidae	*Xylocopa sonorina* Smith, 1874	CEMML, unpub. data, 2017	Yes
Hymenoptera	Braconidaae	*Chelonus* sp.	Bryan and others, 1926	No
Hymenoptera	Eupelmidae	*Eupelmus pacificus* Timberlake, 1926	Bryan and others, 1926	No
Hymenoptera	Formicidae	*Anoplolepis gracilipes* (Smith, 1857)	Hebshi and others, 2011	Yes
Hymenoptera	Formicidae	*Monomorium floricola* (Jerdon, 1851)	Bryan and others, 1926	Yes
Hymenoptera	Formicidae	*Monomorium pharaonis* (Linnaeus, 1758)	Bryan and others, 1926	No
Hymenoptera	Formicidae	*Nylanderia bourbonica* (Forel, 1886)[5]	Bryan and others, 1926	Yes
Hymenoptera	Sphecidae	*Prionyx* nr. *parkeri* Bohart and Menke, 1963	Hebshi and others, 2011	No
Hymenoptera	Sphecidae	*Sceliphron* sp.	Gilardi, Island Conservation, unpub. data, 2014	No
Hymenoptera	Trichogrammatidae	*Aphelinoidea oceanica* Timberlake, 1926	Bryan and others, 1926	No
Hymenoptera	Vespidae	*Ropalidia marginata* (Lepeletier, 1836)	CEMML, unpub. data, 2017	Yes
Lepidoptera	Arctiidae	*Utetheisa pulchelloides* Hampson, 1907	Bryan and others, 1926	Yes
Lepidoptera	Cygnodiidae	*Petrochroa dimorpha* Busck, 1914	Bryan and others, 1926	No
Lepidoptera	Erebidae	*Achaea janata* (Linnaeus, 1758)[6]	Bryan and others, 1926	No
Lepidoptera	Nymphalidae	*Hypolimnas bolina* (Linnaeus, 1758)	Bryan and others, 1926	No
Lepidoptera	Plutellidae	*Plutella maculipennis* (Curtis, 1832)	Bryan and others, 1926	No
Lepidoptera	Sphingidae	*Agrius convolvuli* (Linnaeus, 1758)[7]	Bryan and others, 1926	Yes
Odonata	Aeshnidae	*Anax guttatus* (Burmeister, 1839)	Lieftinck, 1962	No
Odonata	Libellulidae	*Pantala flavescens* (Fabricius, 1798)	CEMML, unpub. data, 2017	Yes
Orthoptera	Blaberidae	*Pycnoscelus surinamensis* (Linnaeus, 1758)	Bryan and others, 1926	Yes
Orthoptera	Blattidae	*Melanozosteria soror* (Brunner von Wattenwyl, 1865)[8]	Bryan and others, 1926	Yes
Orthoptera	Gryllidae	*Gryllodes sigillatus* (Walker, 1869)	Hebshi and others, 2011	No
Orthoptera	Gryllidae	*Trigonidium flavipes* (Saussure, 1878)[9]	Bryan and others, 1926	No
Orthoptera	Gryllidae	*Ornebius* sp.	Hebshi and others, 2011	Possibly
Phthiraptera	Hoplopleuridae	*Hoplopleura pacifica* Ewing, 1924	Reeves and others, 2012	No

Table C2. List of arthropod species collected at Wake Atoll prior to 2019.—Continued

[This list was compiled from various sources, including unpublished data. Full citations for published documents can be found in chapter C, section "References Cited"]

Order	Family	Species	Source[2]	Collected during 2019 survey?
		Insecta—Continued		
Psocoptera	Undetermined	Psocids	Bryan and others, 1926	Possibly
Siphonaptera	Pulicidae	*Xenopsylla cheopis* (Rothschild, 1903)	Chilson, 1953	No
Zygentoma	Undetermined	Undetermined species	Bryan and others, 1926	Possibly

[1]The more recognizable subclass Acari (Class=Arachnida) is provided for convenience.

[2]First record of collection on Wake Atoll.

[3]Reported as *Acalles wilkesii* Perkins, 1926 by Bryan and others, 1926.

[4]Reported as *Canace nudata* Cresson, 1926 by Bryan and others, 1926.

[5]Reported as *Prenolepis bourbonica hawaiiensis* Forel, 1886 by Bryan and others, 1926.

[6]Reported as *Achaea melicerta* (Drury, 1773) by Bryan and others, 1926.

[7]Reported as *Herse convolvuli* (Linnaeus, 1758) by Bryan and others, 1926.

[8]Reported as *Cutilia soror* (Brunner von Wattenwyl, 1865) by Bryan and others, 1926.

[9]Reported as *Litogryllus flavipes* (Saussure, 1878) by Bryan and others, 1926.

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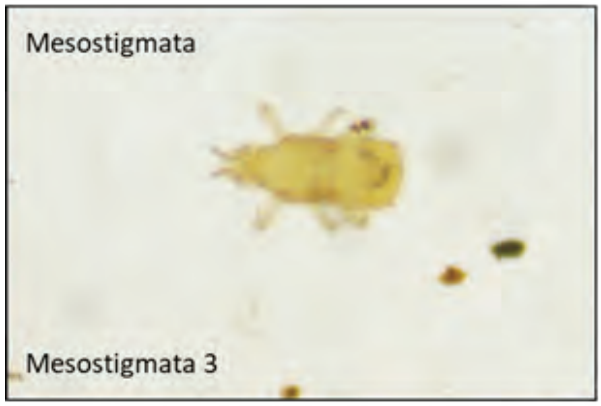
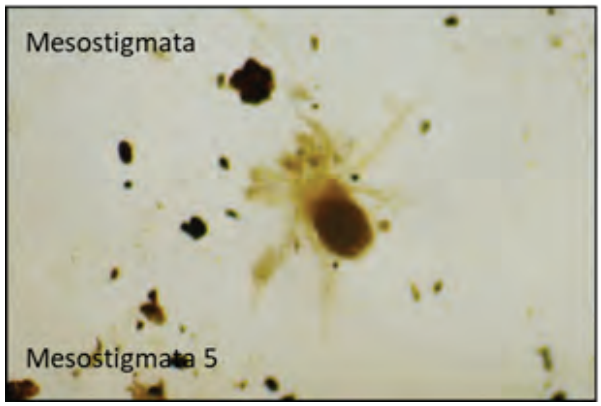
Appendix C1. Arthropod Field Guide to Wake Atoll

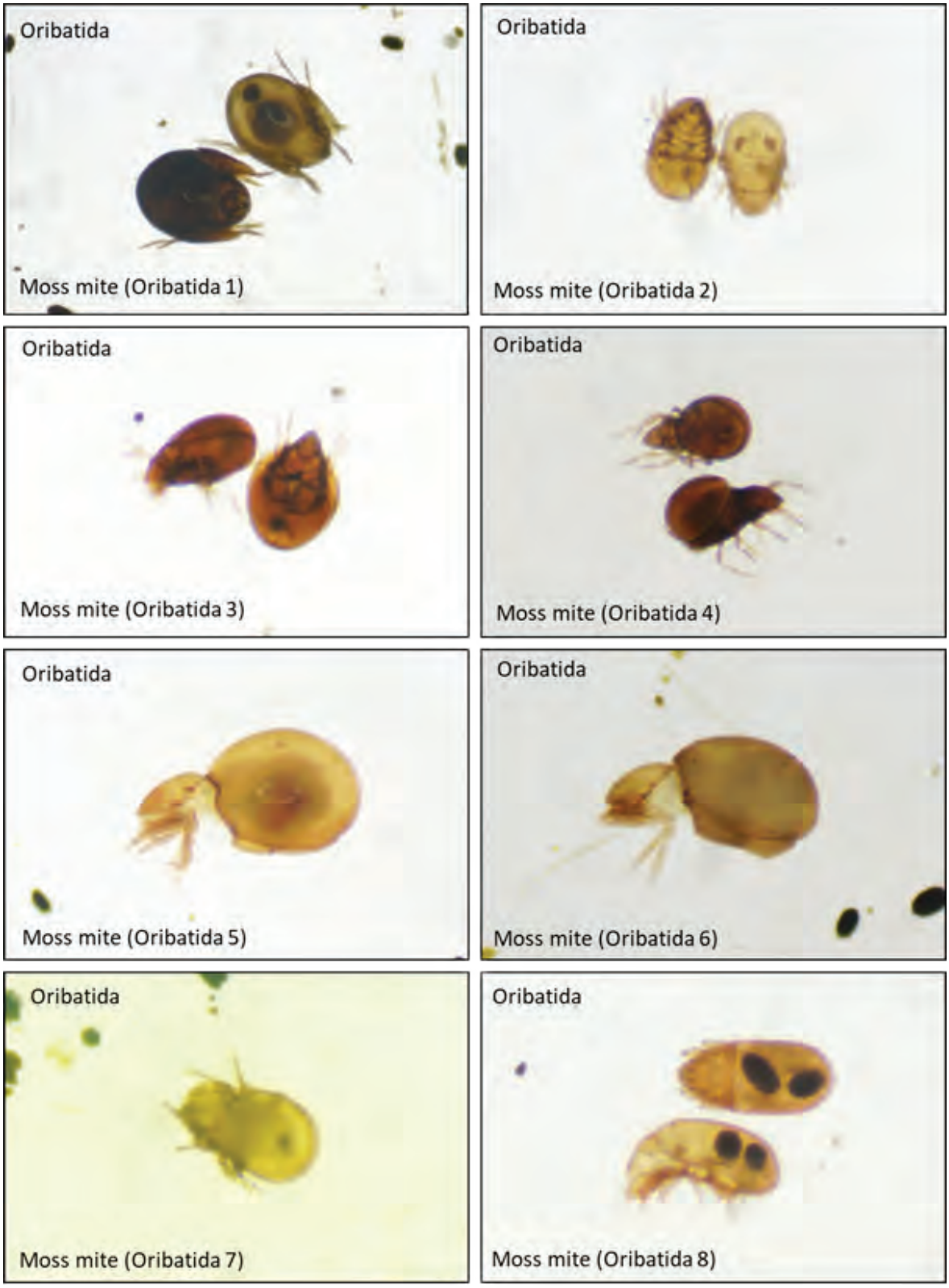
Photograph and descriptive summary of native and introduced arthropods that have been recorded on Wake Atoll. (All photographs by R. Peck, Hawai‘i Cooperative Studies Unit, University of Hawai‘i at Hilo).

Mites (Acari: Mesostigmata) from Wake Atoll

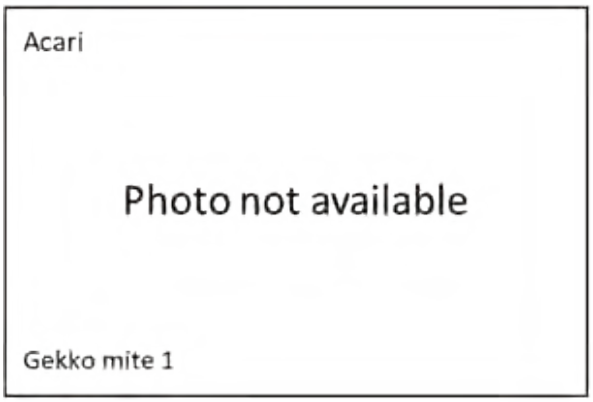




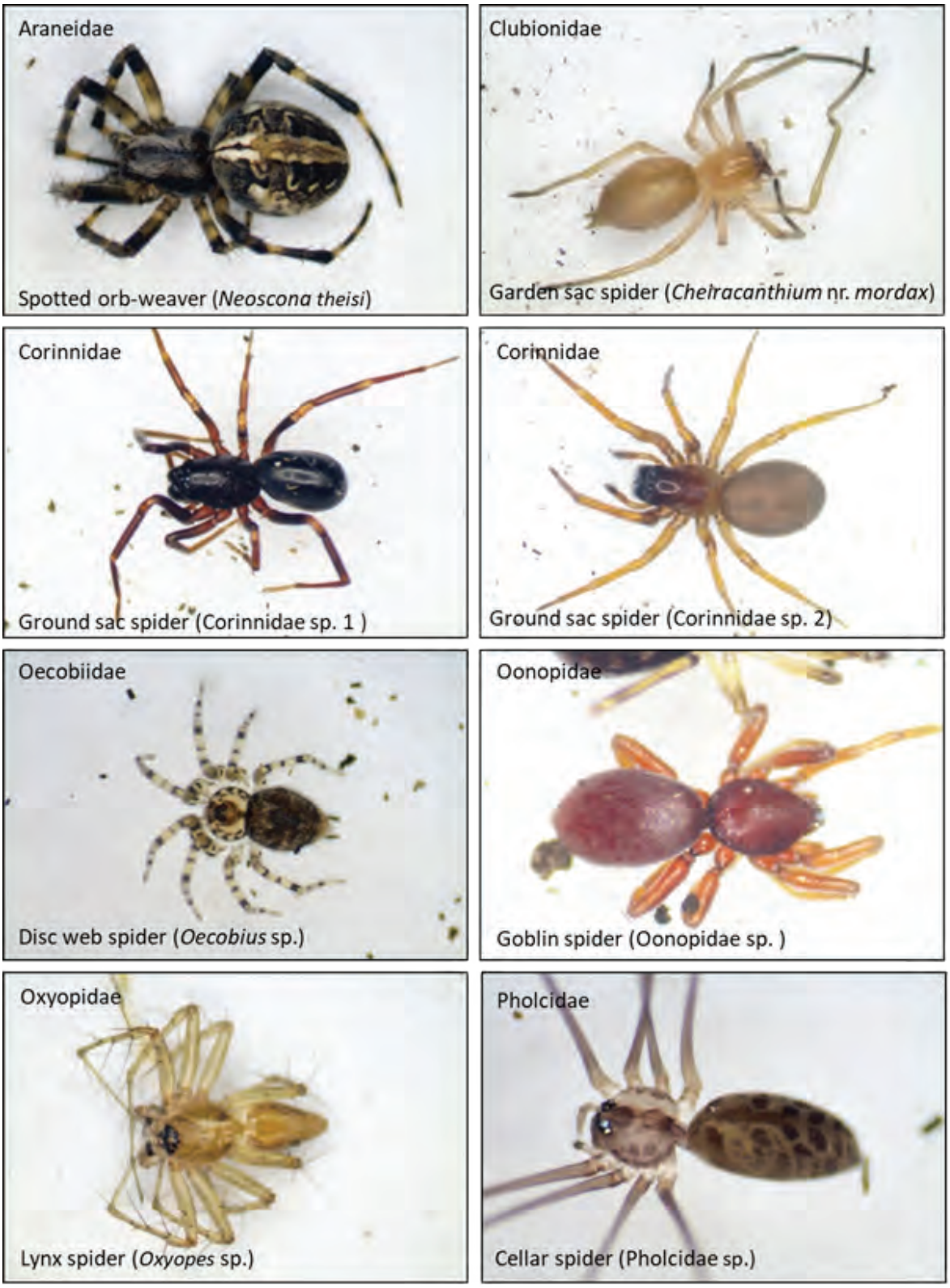
Moss Mites (Acari: Oribatida) from Wake Atoll



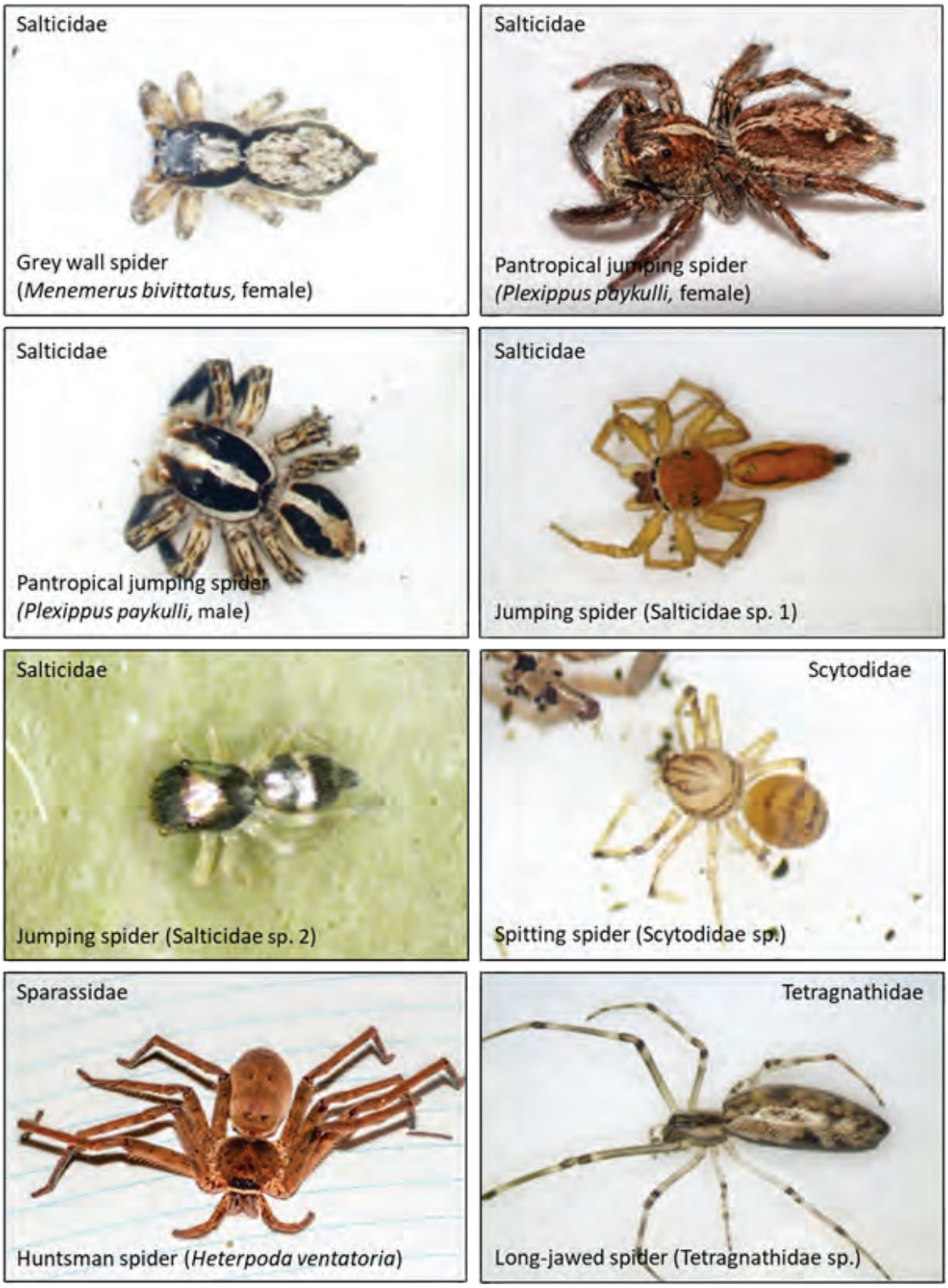
Moss Mites (Acari: Oribatida) from Wake Atoll—Continued



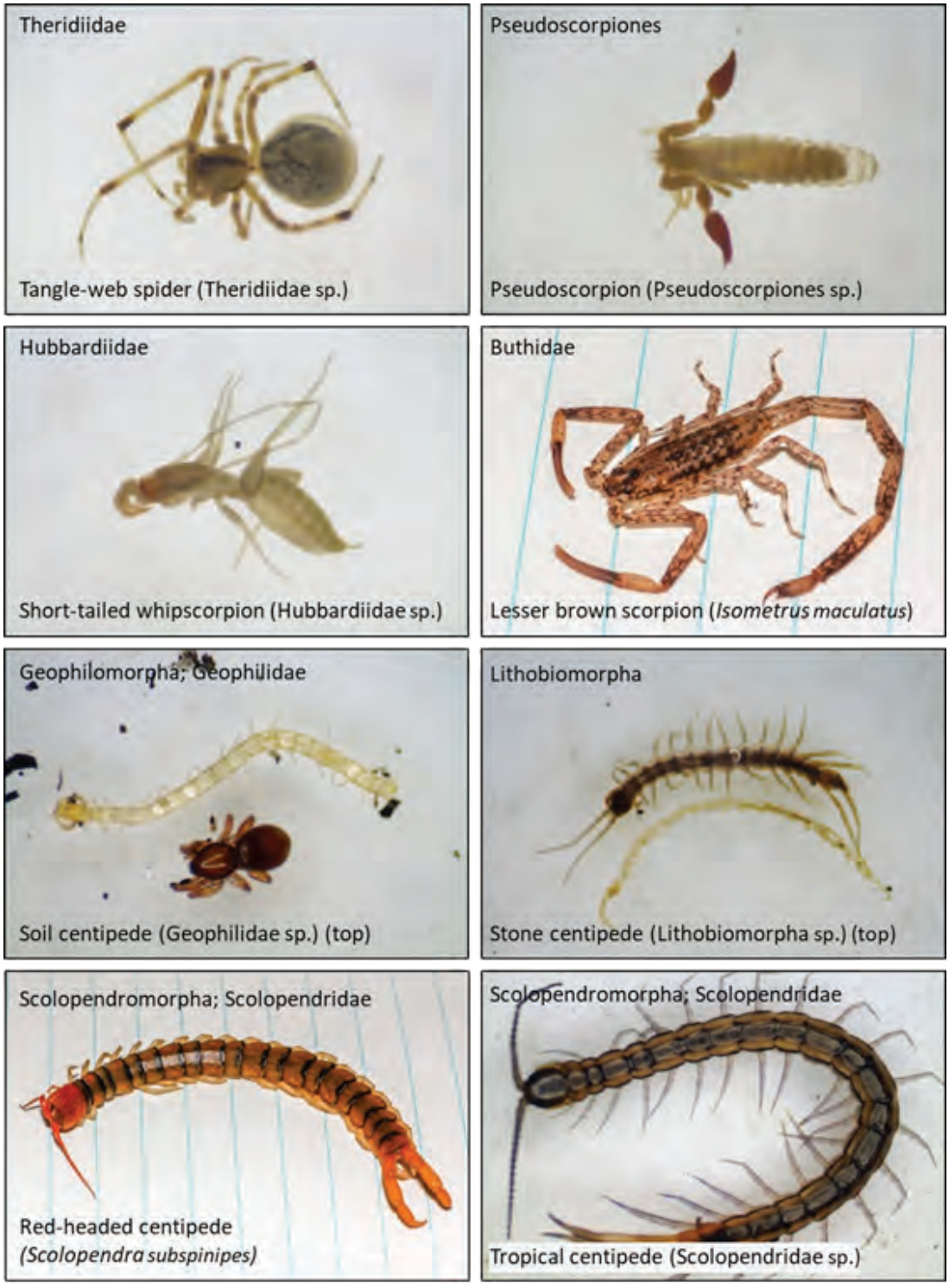
Spiders (Arachnida: Araneae) from Wake Atoll



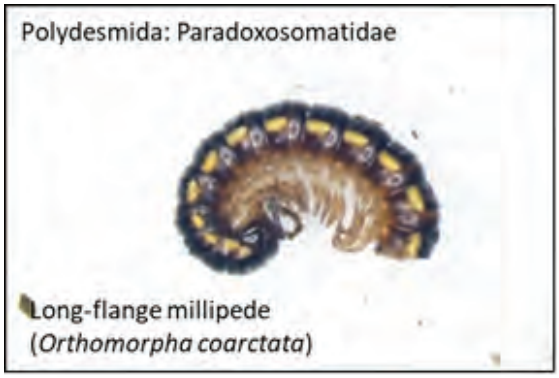
Spiders (Arachnida: Araneae) from Wake Atoll—Continued



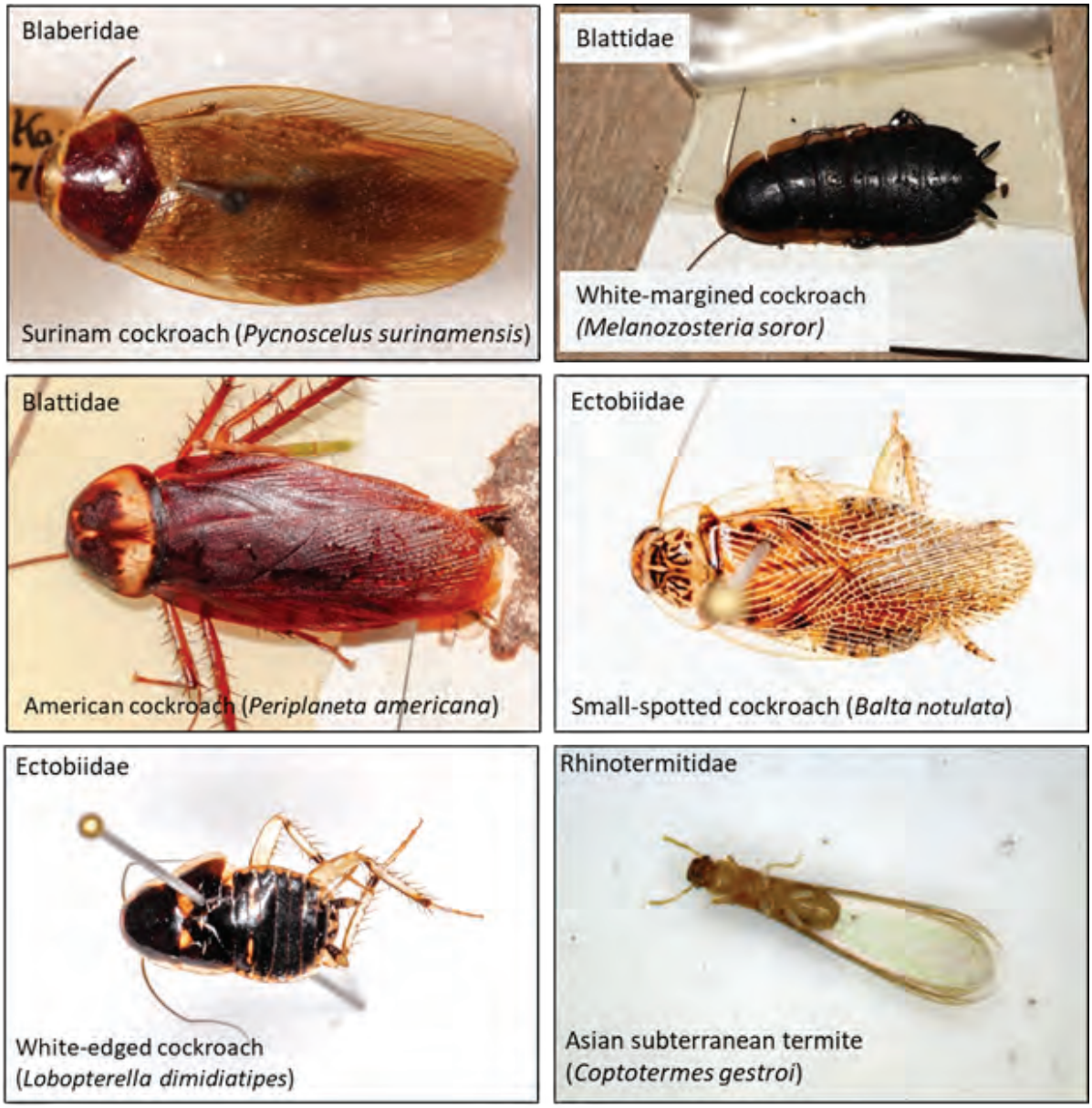
Spiders (Arachnida: Araneae), Pseudoscorpion (Arachnida; Pseudoscorpiones), Short-Tailed Whipscorpion (Arachnida; Schizomida), Scorpion (Arachnida; Scorpiones), and Centipedes (Chilopoda; Geophilomorpha, Lithobiomorpha, and Scolopendromorpha) from Wake Atoll



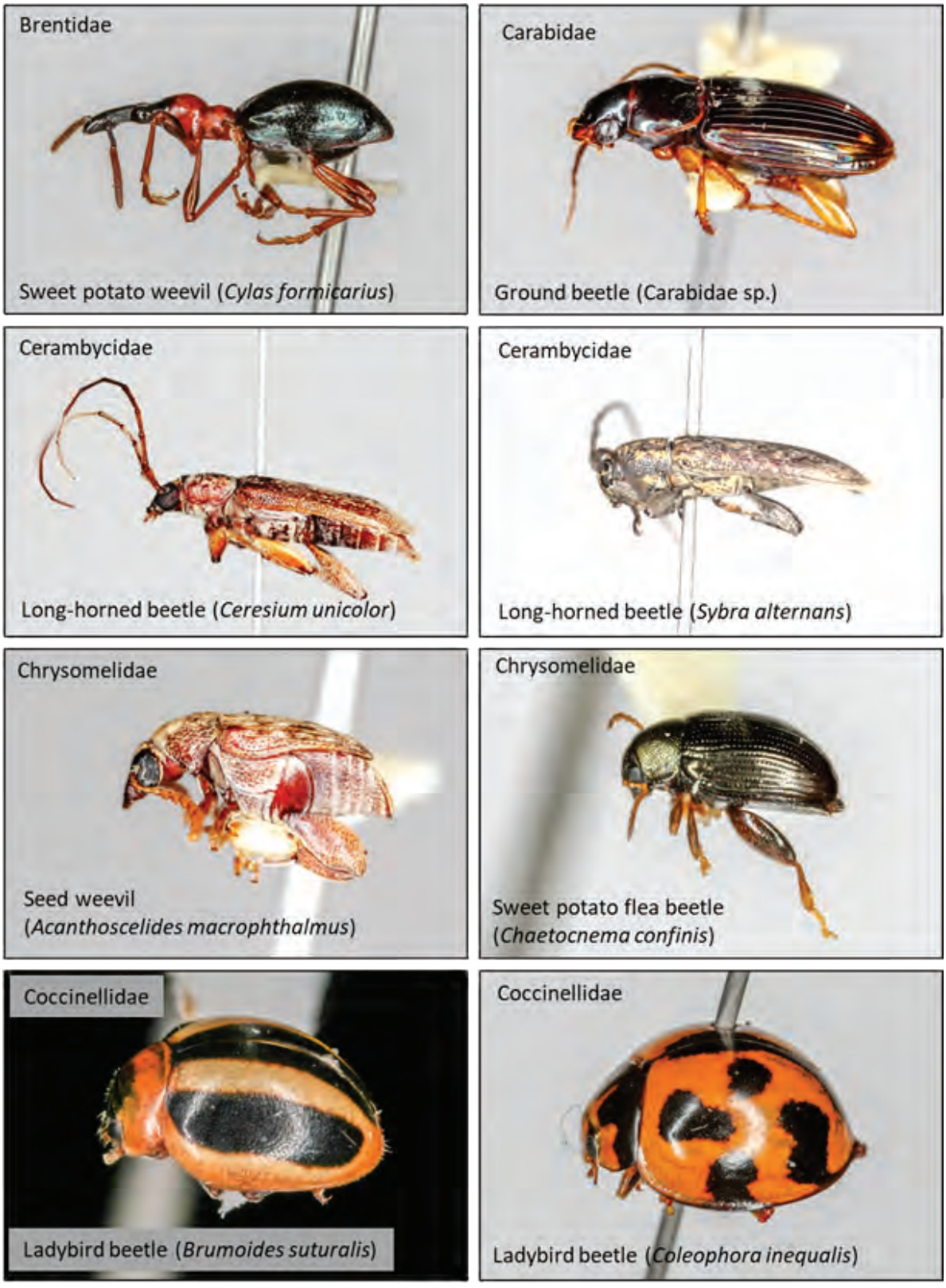
Millipedes (Diplopoda), Including Flat-Backed Millipedes (Polydesmida) and Bristly Millipedes (Polyxenida), and Collembola (Entognatha, Including Entomobryidae and Isotomidae) from Wake Atoll



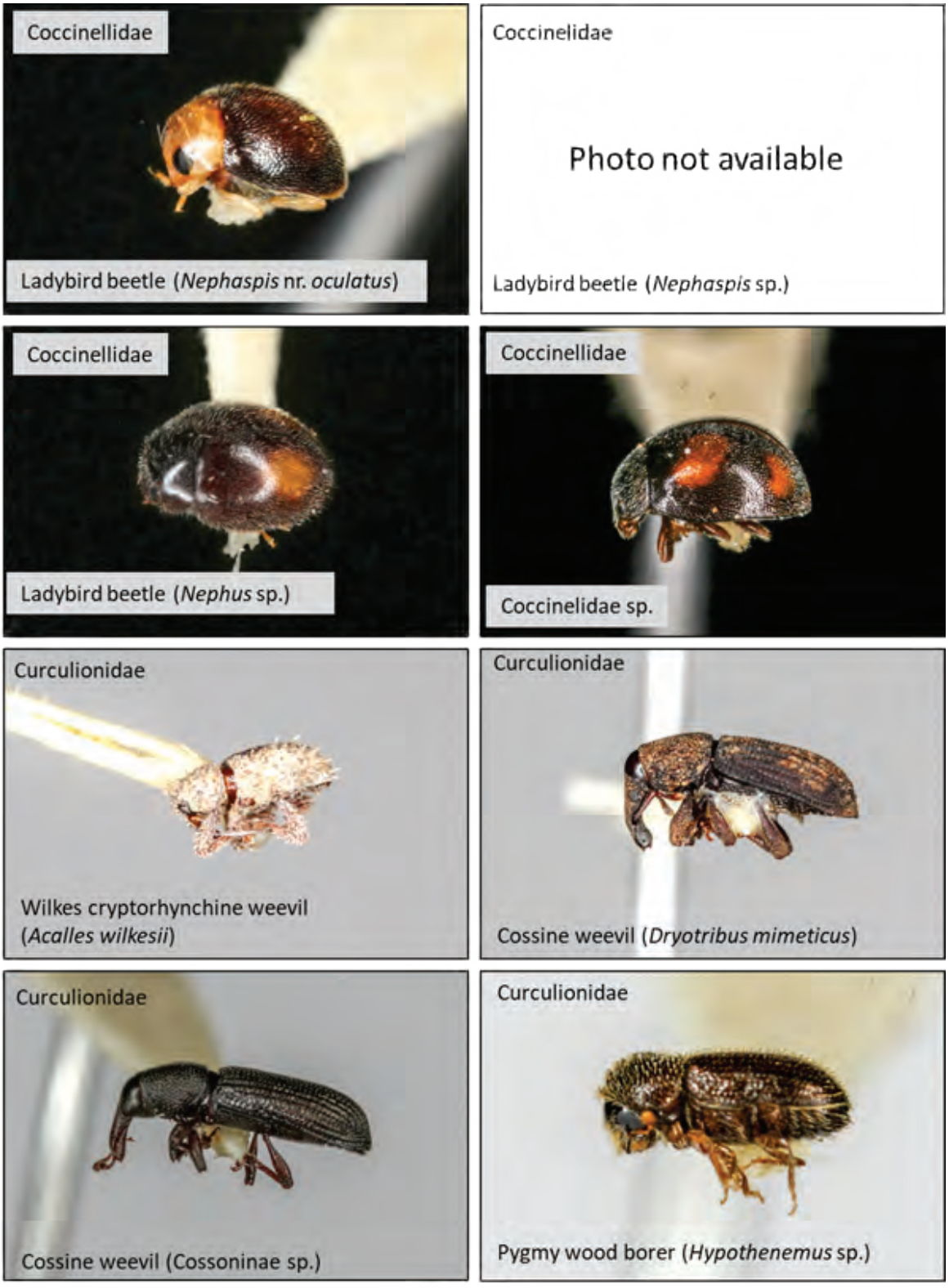
Cockroaches and Termites (Insecta: Blattodea) from Wake Atoll



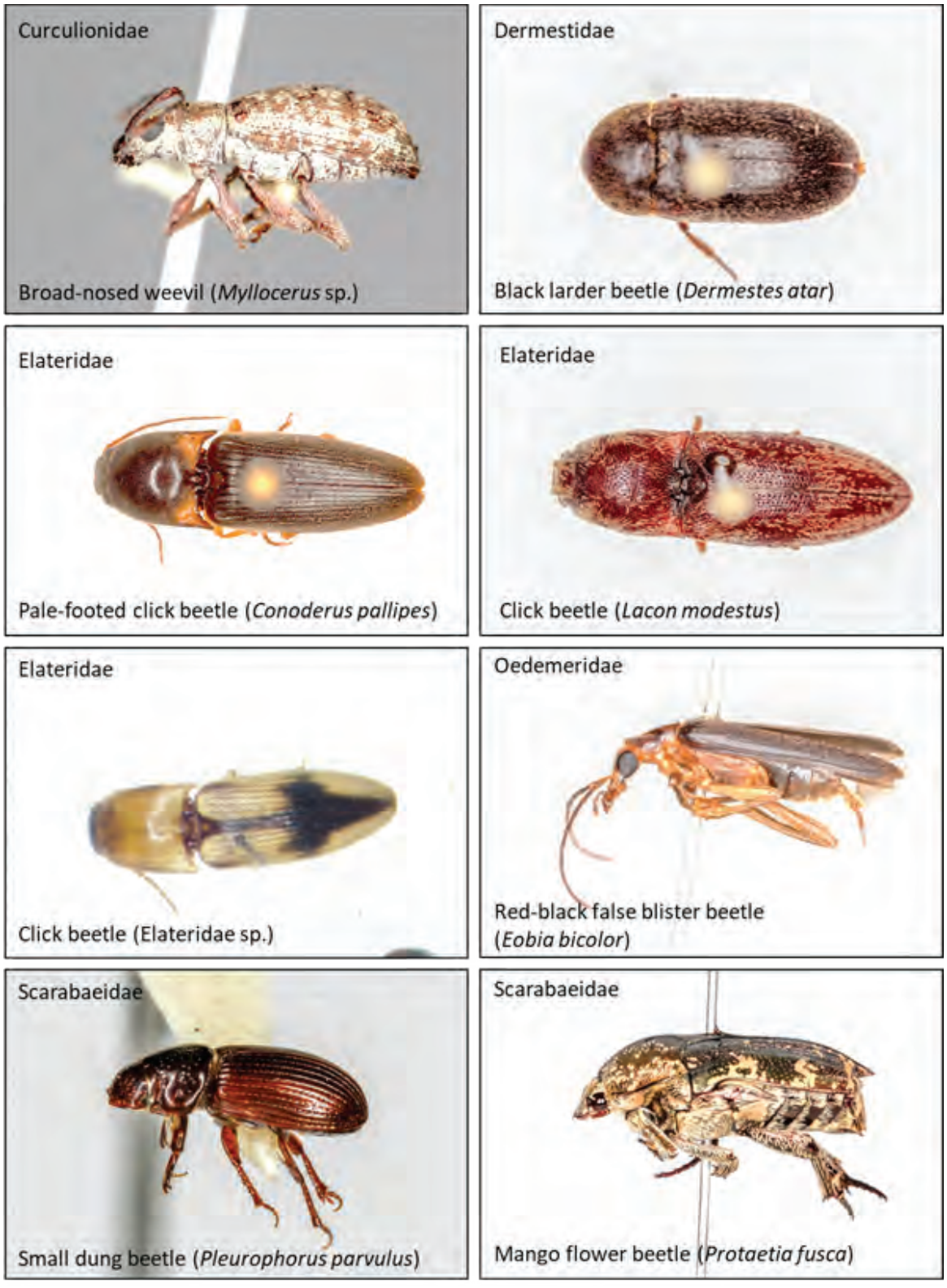
Beetles (Insecta: Coleoptera) from Wake Atoll



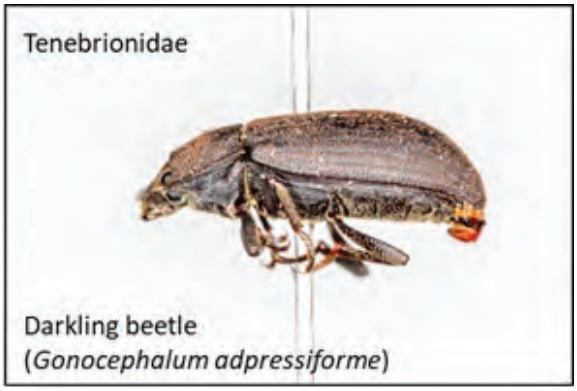
Beetles (Insecta: Coleoptera) from Wake Atoll—Continued

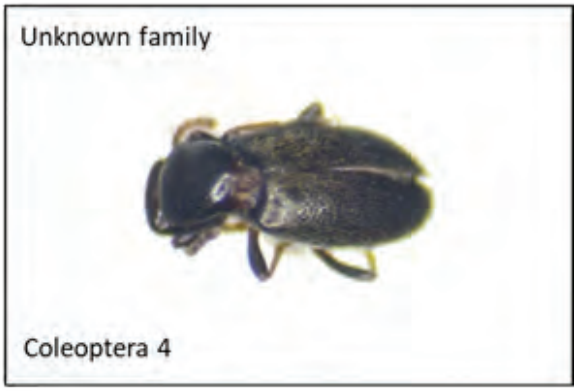


Beetles (Insecta: Coleoptera) from Wake Atoll—Continued

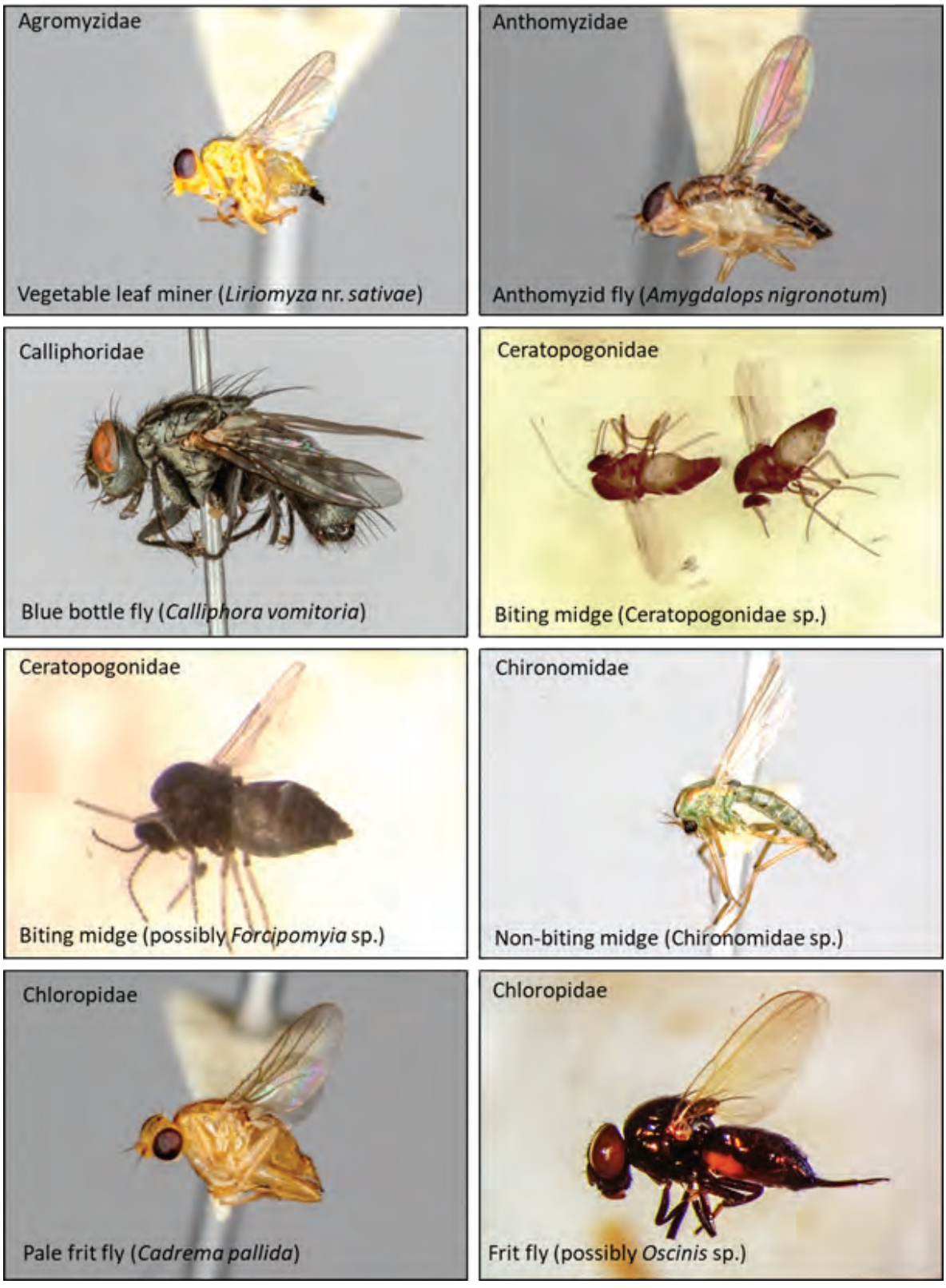


Beetles (Insecta: Coleoptera) and Earwig (Insecta: Dermaptera) from Wake Atoll—Continued

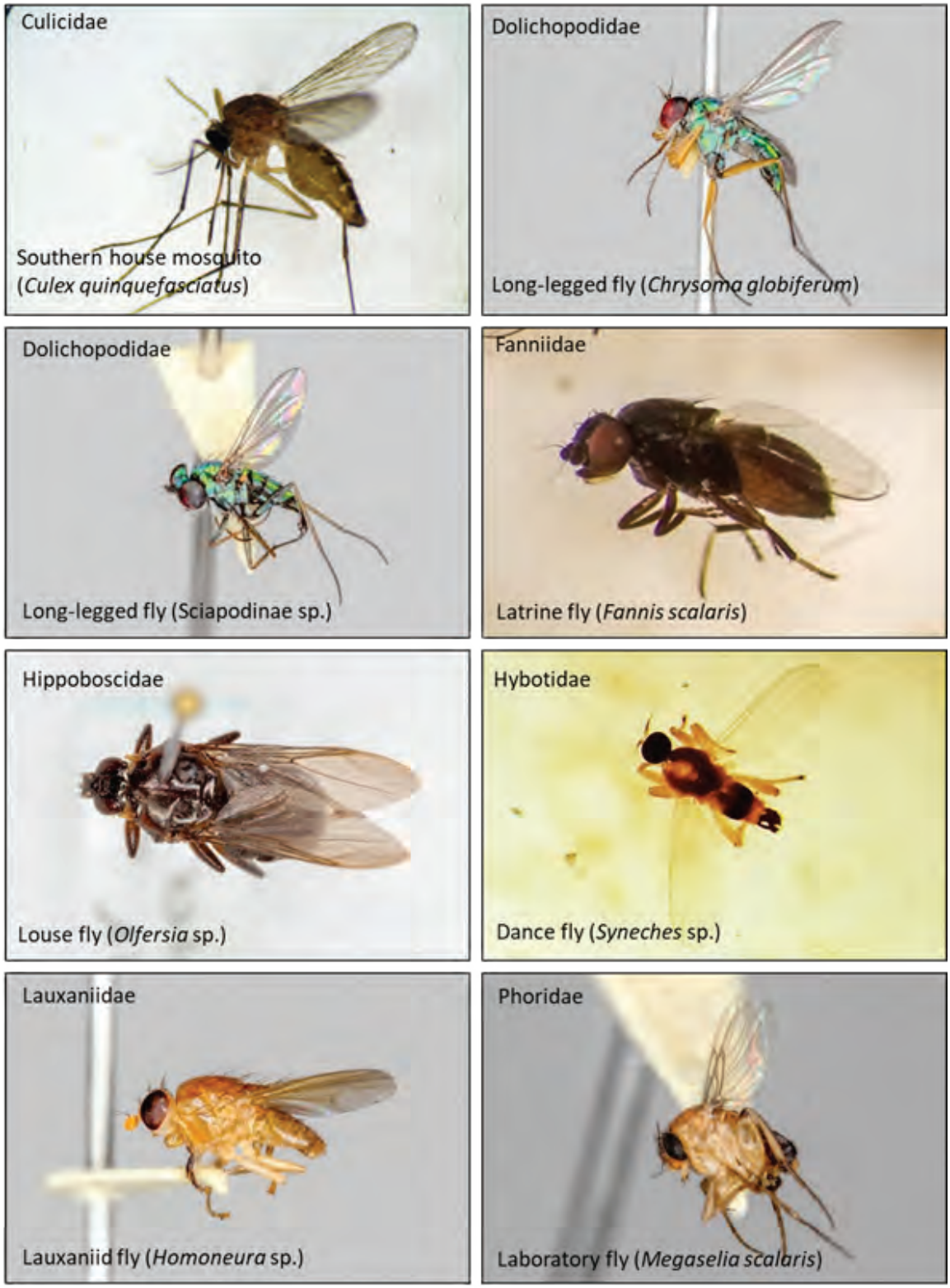




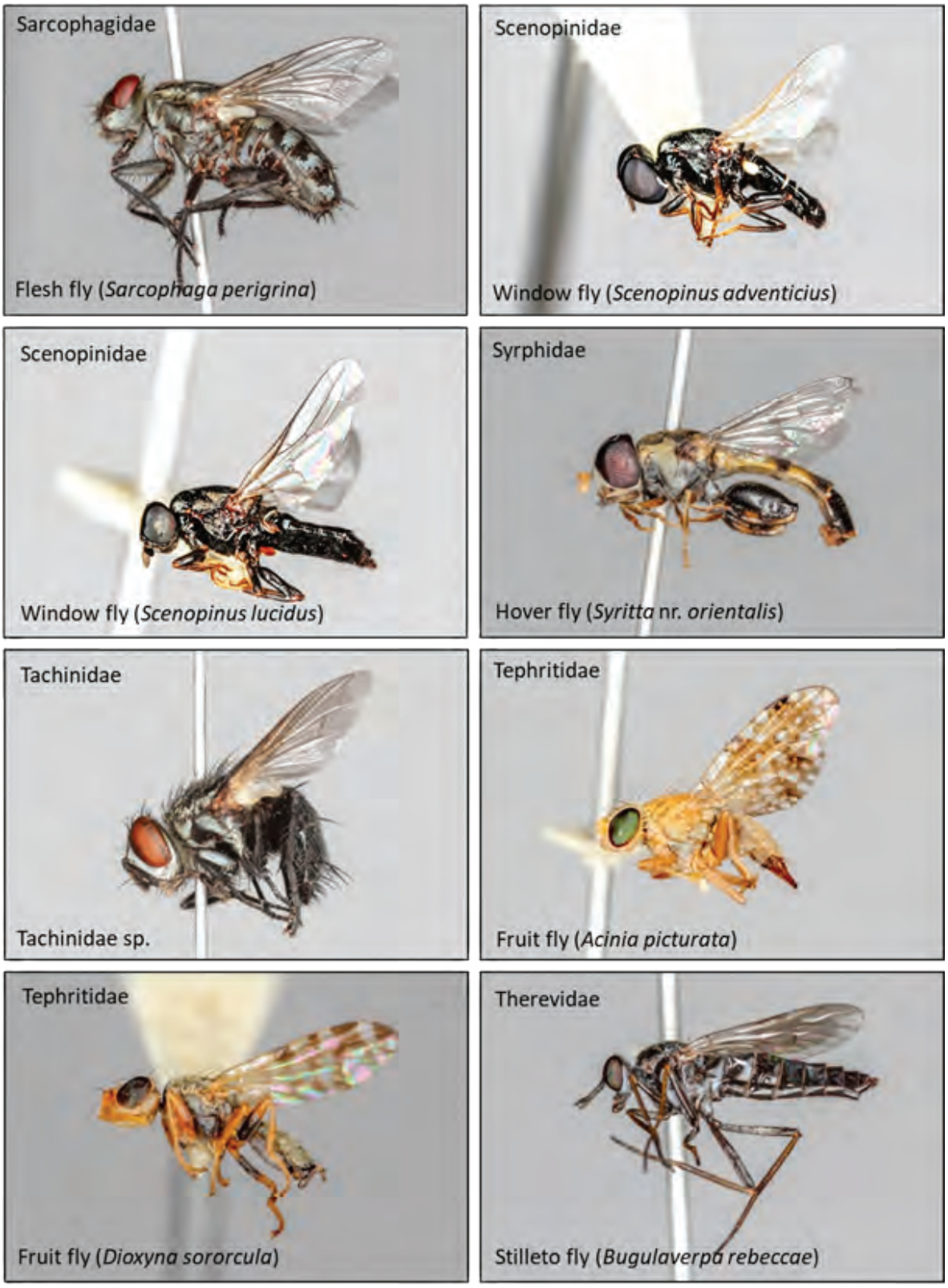
Flies (Insecta: Diptera) from Wake Atoll



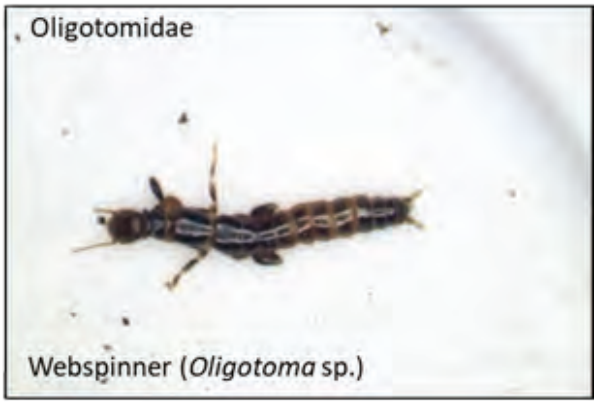
Flies (Insecta: Diptera) from Wake Atoll—Continued



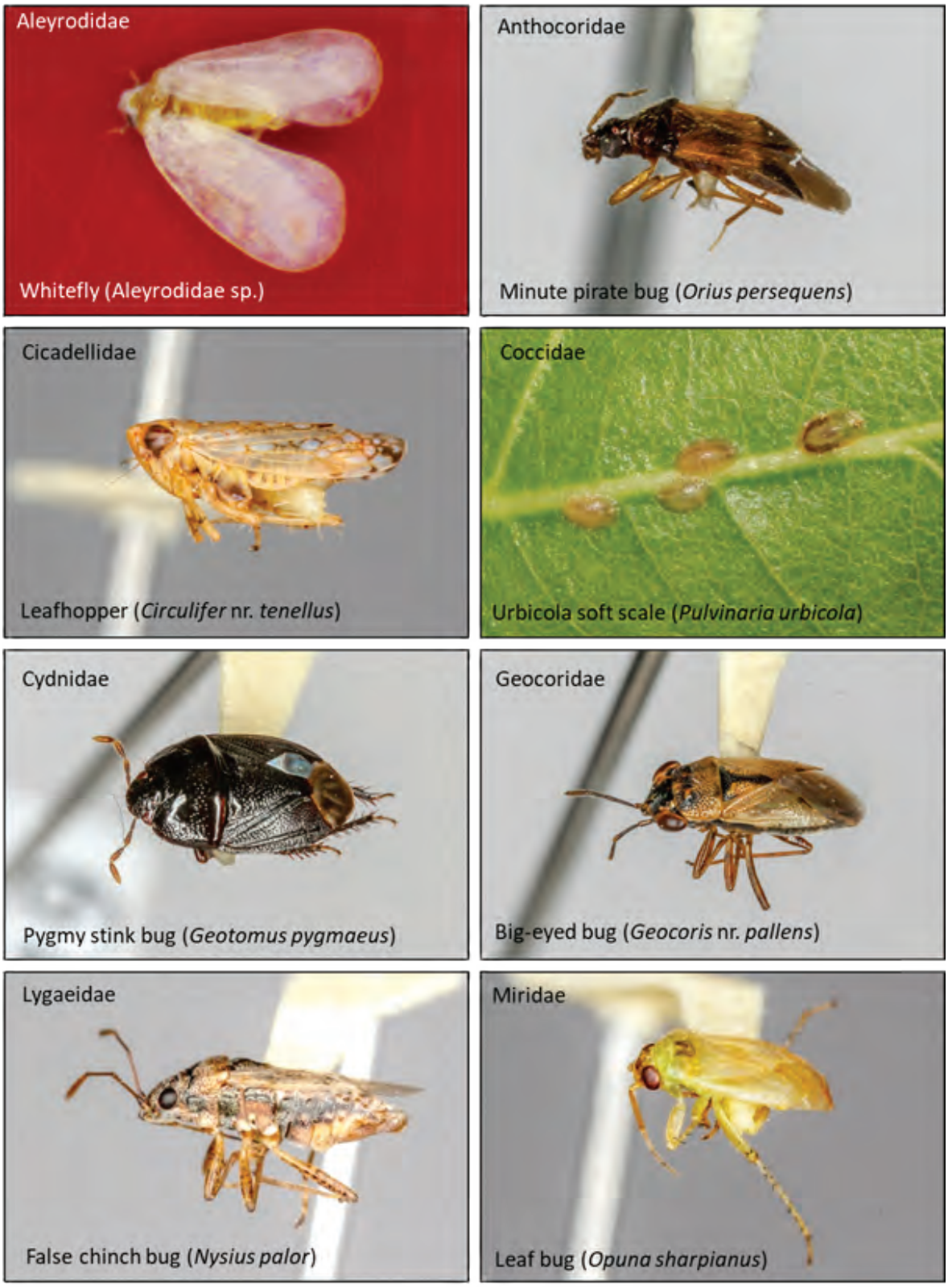
Flies (Insecta: Diptera) from Wake Atoll—Continued



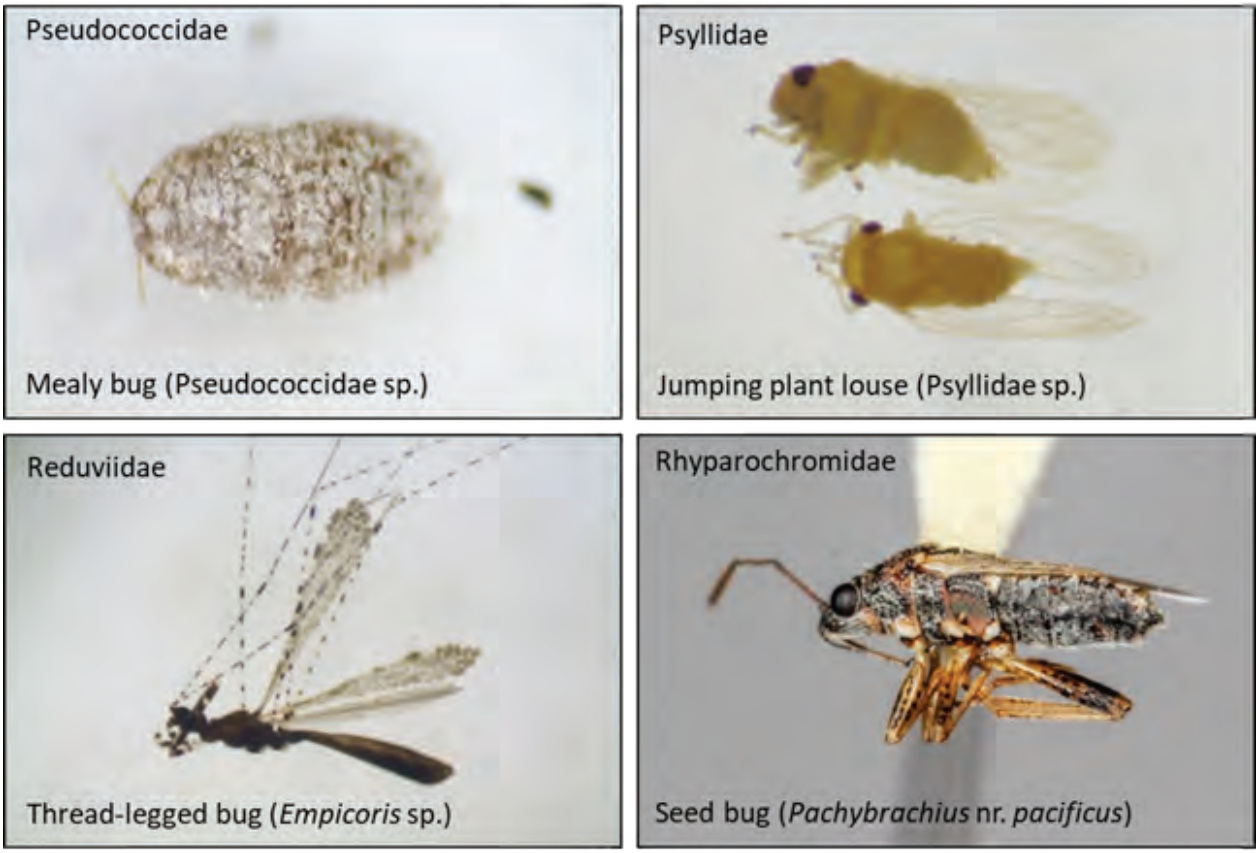
Flies (Insecta: Diptera, Ulidiidae) and Webspinner (Insecta: Embioptera, Oligotomidae) from Wake Atoll—Continued



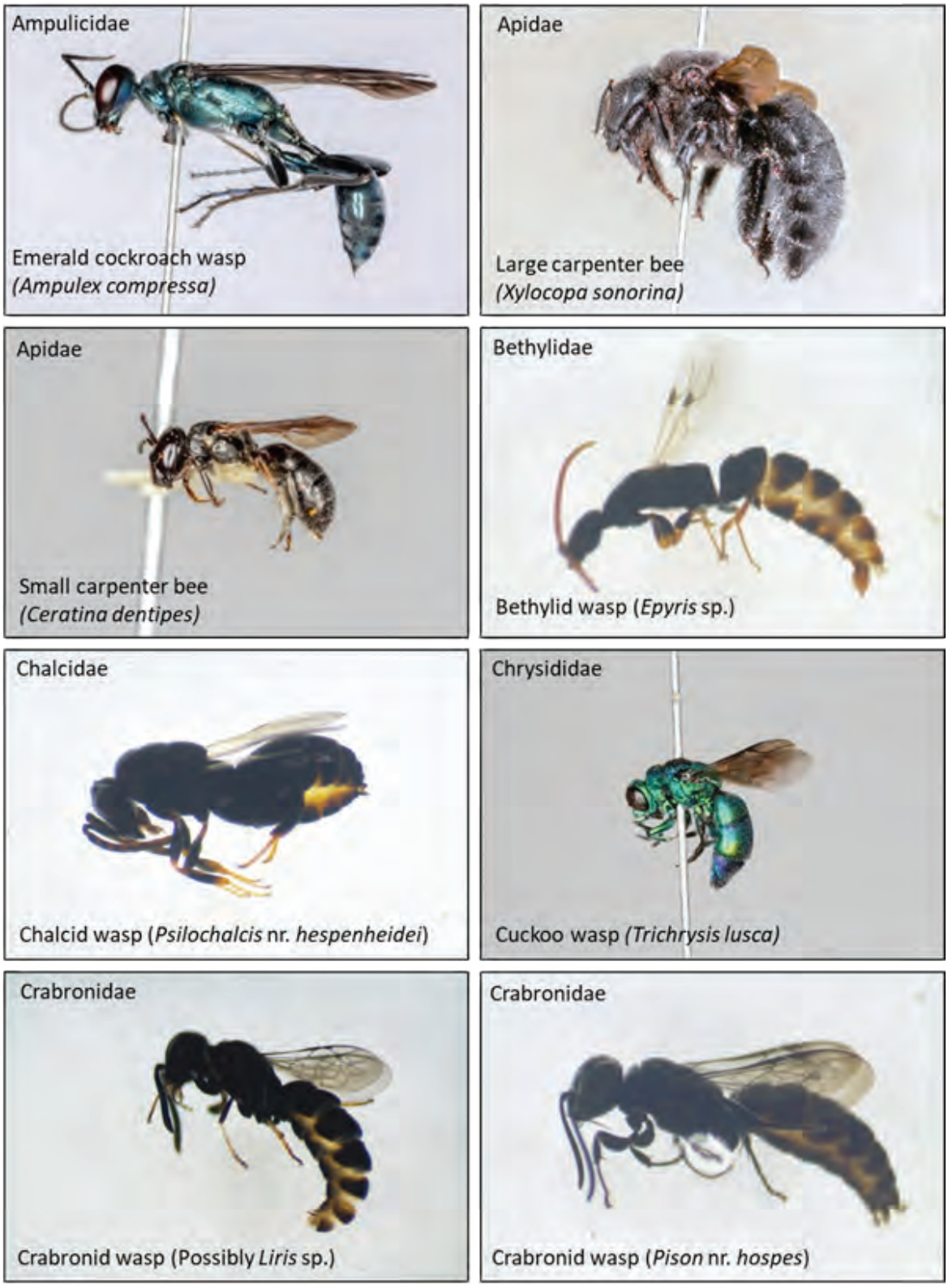
Hemiptera (Insecta: Hemiptera) from Wake Atoll



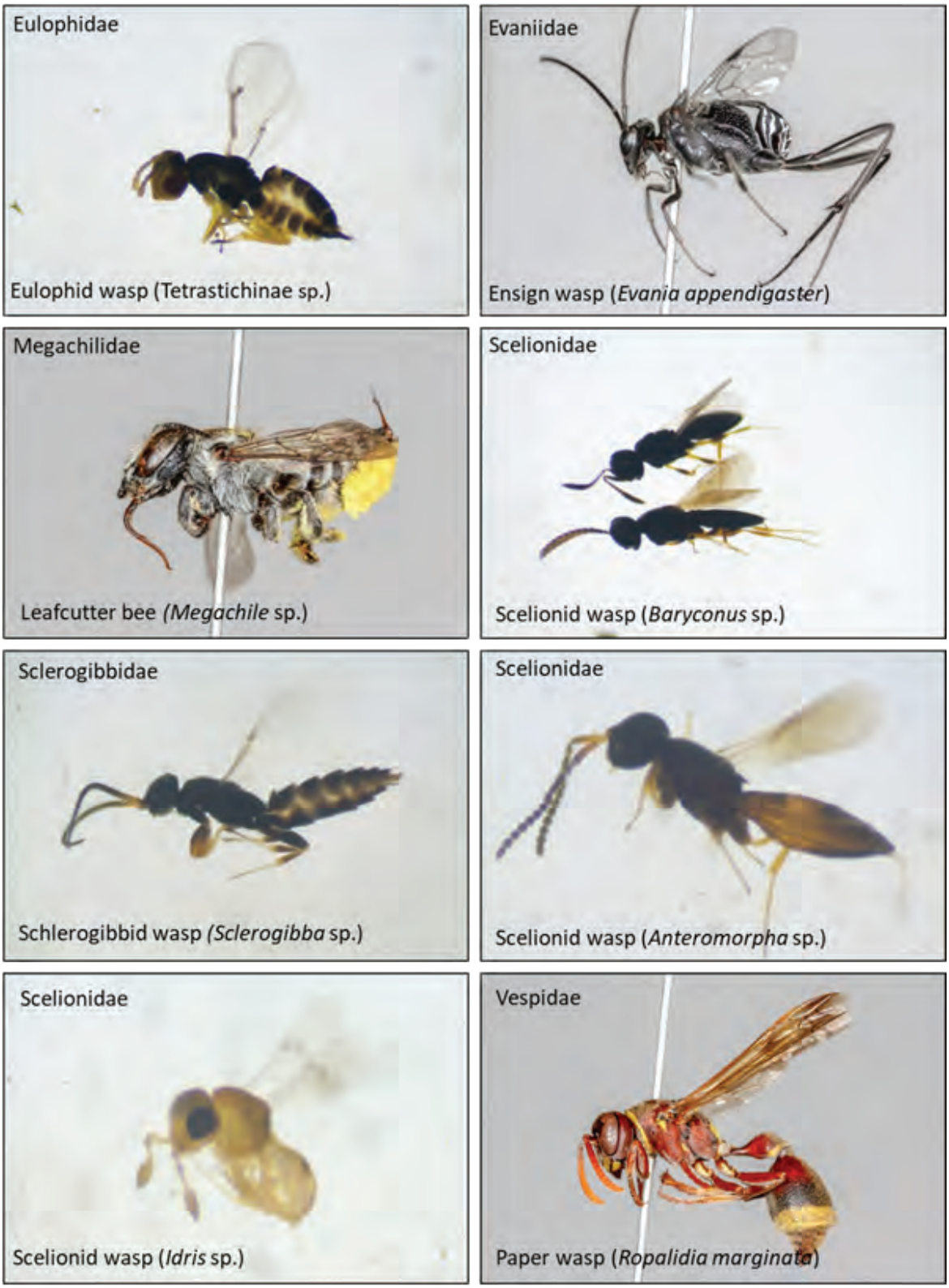
Hemiptera (Insecta: Hemiptera) from Wake Atoll—Continued



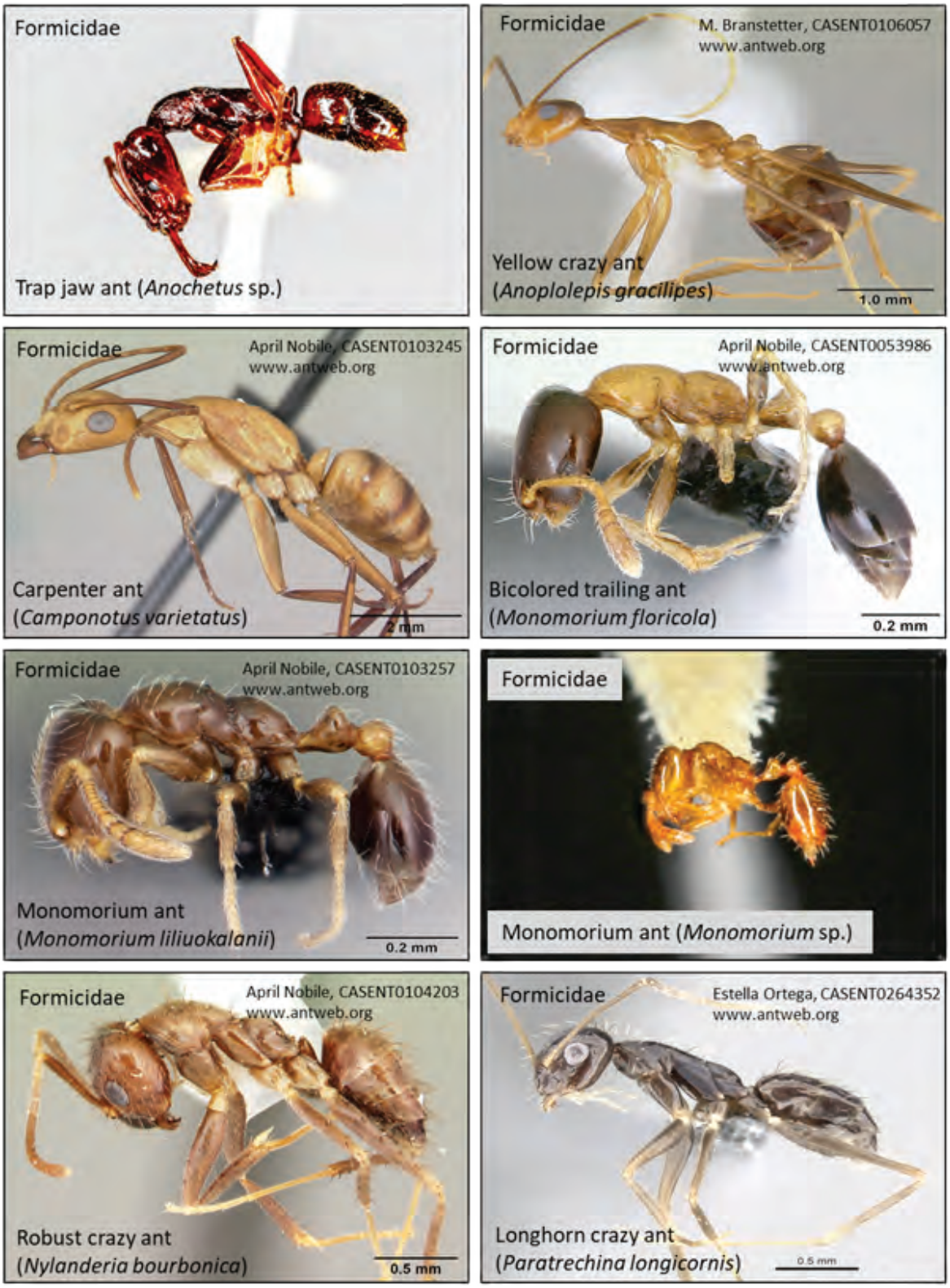
Wasps and Bees (Insecta: Hymenoptera) from Wake Atoll



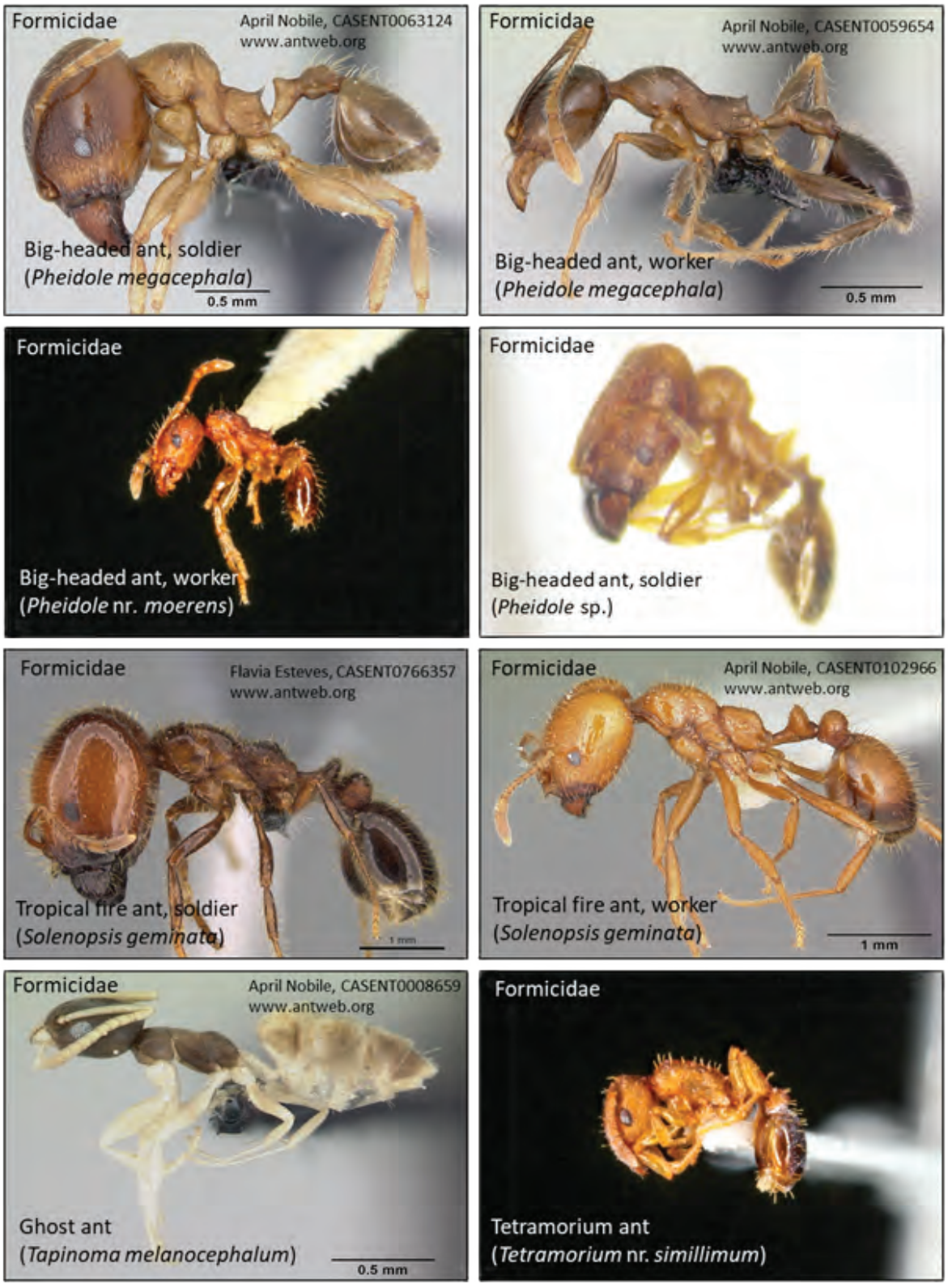
Wasps and Bees (Insecta: Hymenoptera) from Wake Atoll—Continued



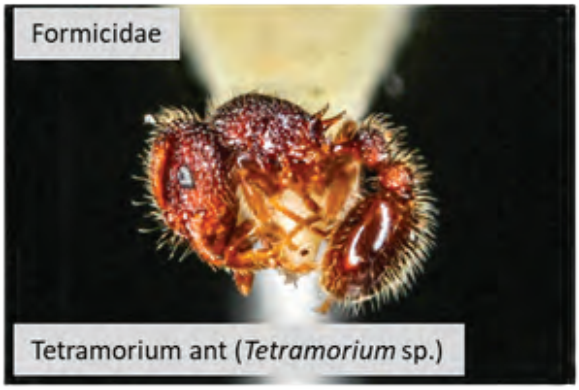
Ants (Insecta: Hymenoptera) from Wake Atoll



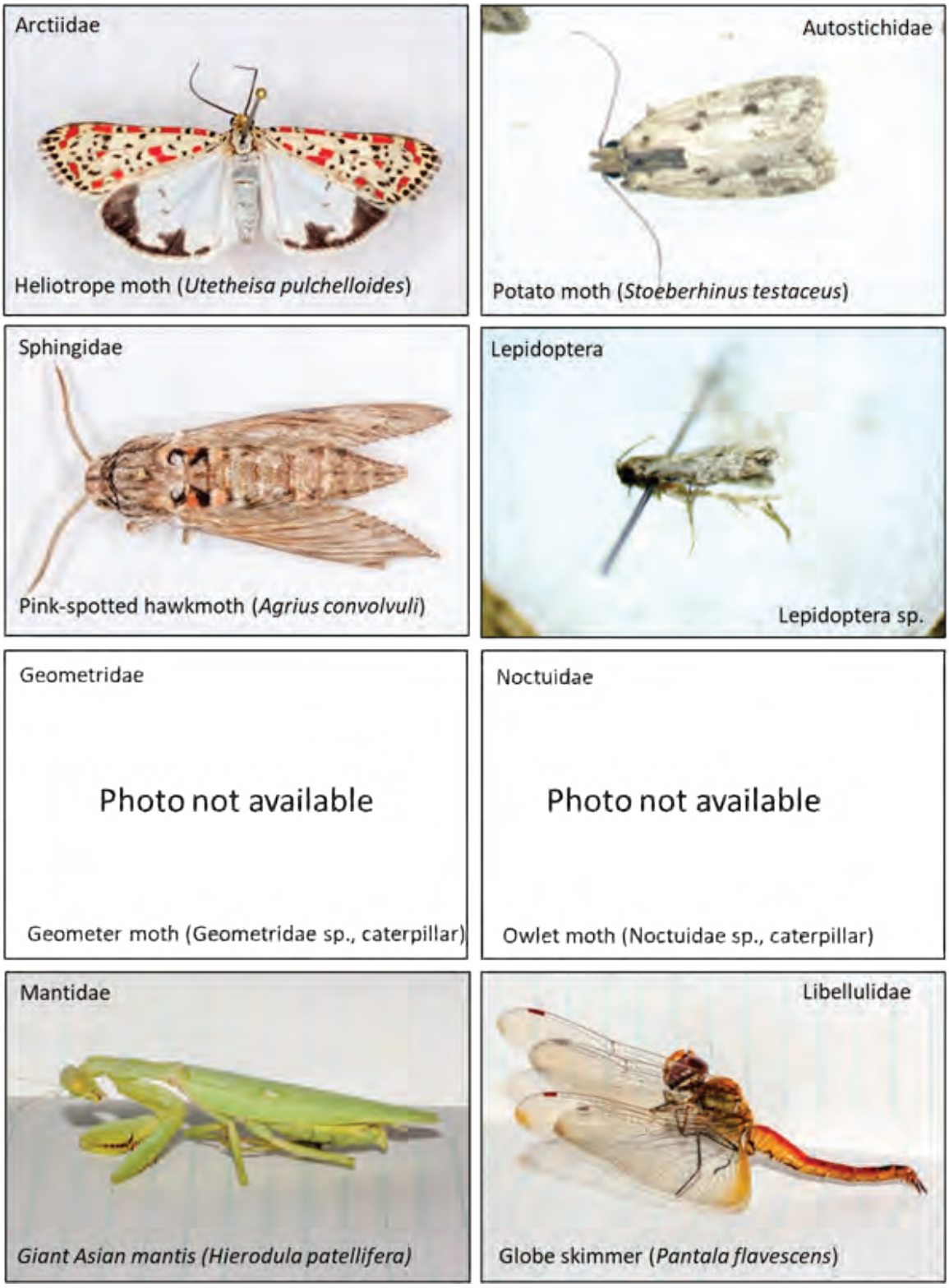
Ants (Insecta: Hymenoptera) from Wake Atoll—Continued



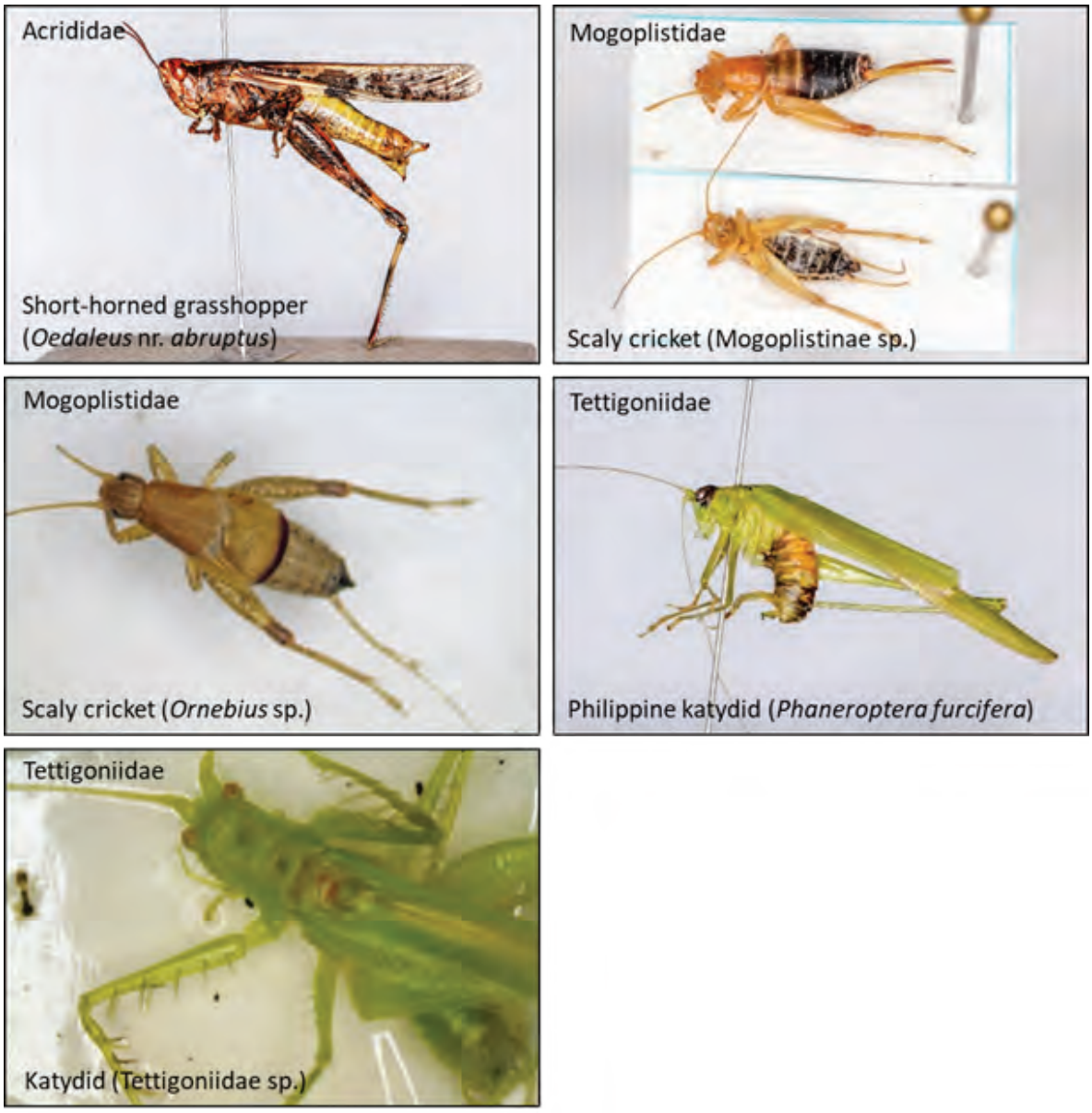
Ants (Insecta: Hymenoptera) from Wake Atoll—Continued



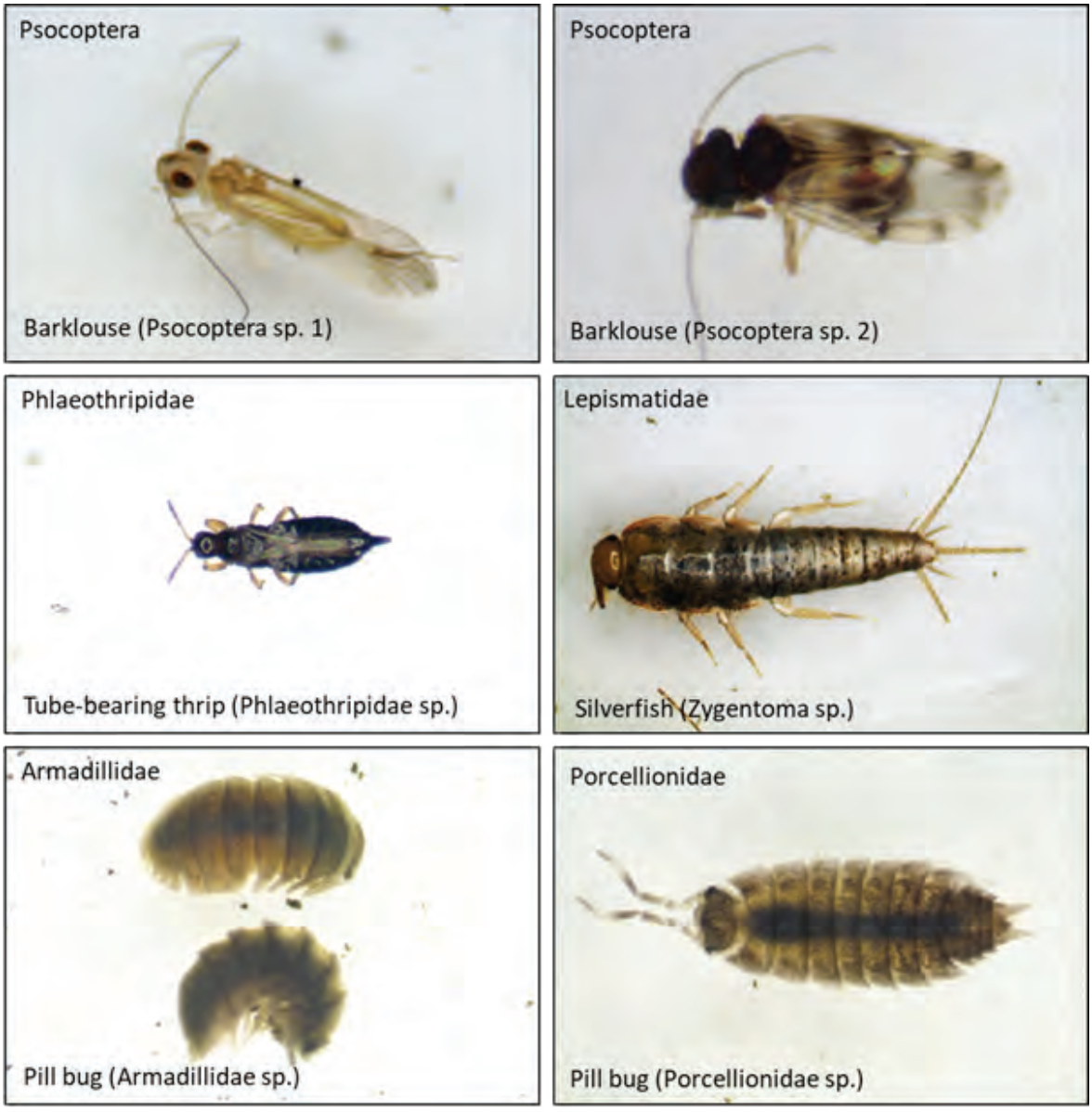
Moths (Insecta: Lepidoptera), Mantis (Insecta: Mantoidea), Dragonfly (Insecta: Odonata) from Wake Atoll



Crickets and Katydids (Insecta: Orthoptera) from Wake Atoll



Booklice (Insecta: Psocoptera), Thrips (Insecta: Thysanoptera), Pill bugs (Malacostraca: Isopoda) from Wake Atoll



Chapter D. Wake Atoll 2019 Terrestrial Reptile Species Survey Report and Field Guide

By Stacie A. Hathaway, Adam R. Backlin, Cynthia J. Hitchcock, and Robert N. Fisher

D. Introduction

Historically, amphibians have not been reported, but reptiles have been observed at Wake during various expeditions, and voucher specimens have been deposited in museum collections since 1871. These collections and observations have been largely opportunistic and referenced in various published and unpublished literature (for example, Bryan, 1949; Bryan, 1959; Ineich and Zug, 1991; Crombie and Pregill, 1999; Ogden Environmental and Energy Services, Co., Inc., unpub. data, 1999; U.S. Air Force, unpub. data, 2017). Typical of small, remote, islands and atolls, the terrestrial reptile community has been presumed to consist of very few species. Before this study, the Wake terrestrial reptile community had never been formally surveyed. It is important to fill in knowledge gaps regarding the biodiversity at Wake and to establish a current (2019) baseline for evaluating change over time. This effort is essential in understanding the processes that give rise to Wake's biodiversity and the status of processes that may threaten species. Nonnative herpetofauna (amphibians and reptiles) may pose a threat directly or indirectly to other taxa, natural biological processes, or even human infrastructure, and therefore, knowing their source and distribution is critical for making management decisions. These surveys serve as a basis for examining the status and distribution of reptile species known from Wake historically and can be used as a general assessment of the success of recent (2012) biosecurity measures in preventing new species arrivals and in identifying improvements to consider for the protocols currently (2019) in place.

In spring 2019 (between May 24 and June 7), we surveyed during a 2-week field visit as one component of a larger project to update and assess the status of terrestrial plant, arthropod, and reptile communities on Wake. Rapid assessment surveys for reptiles were done with several objectives: (1) compile an updated species list to determine presence, and to the extent possible, the status and distribution of historically known species; (2) determine the presence of any new potentially invasive reptile species and any other invasive species with known or presumed effects on reptiles or other taxa native to Wake, with an emphasis on the yellow crazy ant (YCA) *Anoplolepis gracilipes*; (3) create a Wake reptile photograph identification guide; and (4) use these data to inform biosecurity and integrated pest management plans for Wake (Hathaway and others, 2022).

D. Methods

We compiled Wake Atoll-specific data from museums, as well as from published and unpublished literature, and interviewed people with local knowledge to summarize the status and distribution of reptiles known historically to exist on the atoll.

As an initial step in an effort to inform the creation of long-term management strategies for invasive and other pest species at Wake, we carried out a small-scale internal preliminary risk analysis of species detected on Wake (Hathaway and others, 2022). We assessed introduced species as a potential threat to natural resources or base operations (for example, human health and the overall installation mission) on Wake if they were established and invasive elsewhere. Risk ranges were categorized from high to low based on published risk assessments or observations elsewhere while also considering conditions on Wake. We reviewed a variety of published sources, such as the Invasive Species Specialist Group (ISSG) Global Invasive Species Database (GISD; International Union for Conservation of Nature, 2019) to assess risk and management feasibility. Management feasibility, the likelihood of successful eradication or control, was categorized from very low to very high, with consideration given to several criteria, such as potential for effectiveness, practicality, cost, potential negative effects from control or eradication, and likelihood of reinvasion. The feasibility of controlling a species varies depending on the actual distribution of the species and the availability of effective control tools or protocols. We include the status and preliminary risk results for species detected on Wake in table D1 and for species included in the "Field Guide" section of this chapter.

We completed reptile surveys broadly across Wake, including all three islets. Wake, Wilkes, and Peale Islets have been separated into a series of habitat management units (HMUs) delineated to assist in the creation of natural resources management actions and approaches (U.S. Air Force, unpub. data, 2017). We used the HMUs to reference specific focus areas we considered most likely to be vulnerable to invasive species incursions (for example, the marina and associated areas within HMU-11, areas with concentrated human populated buildings, such as in HMU-58, and cargo-container unloading and storage areas within HMU-65; appendix D1, fig. D1.1).

Field Surveys

Herpetofauna surveys included three types of sampling to collect the most data on a suite of species with differing habits in a short amount of time. These methods were sticky glue-board trap transects, daytime visual encounter surveys (VES), and nighttime VES in dry weather conditions. Trap transects were composed of a series of individual glue boards measuring 19 centimeters (cm) by about 14 cm (fig. D1). These glue boards are the type used to ensnare rodents and insects and can passively capture lizards as they walk over the adhesive surface (for example, Trapper Max Free Mouse Glue Traps). Ensnared individuals were removed by applying cooking oil (for example, palm or vegetable), which degrades the adhesive from the parts of the body in contact with the board. All survey methods were employed on each of the three islets (Wake, Peale, and Wilkes).

Glue-board trap transects ranged from 0.25 to 1 kilometer (km) long, and trap stations were set 5–100 meters (m) apart and were not restricted to individual habitat types. Each station consisted of up to three glue boards, with one board placed on the ground at each station, and if there is a log, we place a trap on a log, and if there is a tree, we place a trap on a tree 1 m off the ground. This configuration was intended to capture lizard species with different behavioral tendencies. We recorded latitude and longitude coordinates of each trap station. Initially, glue boards were checked frequently to determine how long they could be left out, which was determined by shade available, heat, which effects duration of "stickiness," and captures of or disturbance by non-target species. Glue boards on transects were left out up to 24 hours, conditions permitting. Reptiles were identified to species, removed and, depending on number of captures, up to 20 individuals of each species were weighed and measured (ventrally from tip of nose to cloaca; snout to vent length). Up to 10 of each species per transect were collected as voucher specimens following the general protocol by McDiarmid (1994). After euthanizing, weighing, and measuring, we removed a tissue sample for deoxyribonucleic acid (DNA), and the specimen was pickled in a 10-percent buffered formalin solution. As many lizards as possible were tail clipped for DNA. All tissue samples for DNA were stored in 95-percent ethanol. Multiple transects were run on Wake, Peale, and Wilkes Islets.

Daytime and nighttime visual encounter surveys were done (mostly) by walking slowly through the different habitat types following the glue-board transects, although some surveys were longer than those transects, and additional searches were made around buildings. We scanned ahead, on the ground and in trees, while occasionally disarticulating fallen logs, peeling bark off trees, looking in root systems, going through litter, and turning over logs and rocks. Each lizard seen was counted and identified to species if possible. We attempted to hand-capture animals when possible and when necessary for identification. Habitat information was also noted. Daytime and nighttime surveys were done during non-rain events. Due to time constraints, daytime visual encounter surveys were generally concentrated on searches for novel species—any species not detected on glue boards or during nighttime visual encounter surveys. This process included any potential incidental observations of nonnative taxa, particularly amphibians or arthropods.

Glue boards also provided a method for detecting arthropods. We focused on documenting the distribution of the invasive YCA because of its adverse ecological effects on other Pacific Islands. This species has been introduced into numerous tropical and subtropical islands, including those in the Caribbean, the Indian Ocean (Seychelles, Madagascar, Mauritius, Réunion, the Cocos Islands, and the Christmas Islands), and in the Pacific (New Caledonia, Hawai`i, French Polynesia, Okinawa, Vanuatu, Micronesia, and the Galapagos archipelago; McGlynn, 1999; Holway and others, 2002; Wetterer, 2005). When collecting traps, we examined them for any arthropods we had not seen on previously collected traps and kept those traps for our arthropod expert (Robert Peck) for identification (see chapter C "Wake Atoll 2019 Arthropod Species Survey Report and Field Guide") to supplement his surveys. We also hand-collected a few macro-invertebrates.

Figure D1. Example of a sticky glue board attached to a tree. (Photograph by A.R. Backlin, U.S. Geological Survey, 2019).

D. Results

Historical Records

Our initial review of museum records indicated eight terrestrial reptile species had been collected from Wake, with the first reptile record, the Oceania snake-eyed skink (*Cryptoblepharus poecilopleurus*), collected in 1871 (fig. D2; table D1). We identified at least two misidentifications in the records. We verified eight species deposited in museums: the Oceania snake-eyed skink, azure-tailed skink (*Emoia cyanura*), dark-bellied copper-striped skink (*Emoia impar*), mourning gecko (*Lepidodactylus lugubris*), common house gecko (*Hemidactylus frenatus*), stump-toed gecko (*Gehyra insulensis*), Brahminy blindsnake, (*Ramphotyphlops braminus*), and the gopher snake (*Pituophis catenifer*; figs. D2–D11; table D1).

There was a misidentification in the museum records, which included four specimens identified as the metallic skink (*Lygosoma metallicum*). Upon review of the specimens, we realized they were Oceania snake-eyed skinks (fig. D11). Bryan (1959) reported that a brown tree snake (*Boiga irregularis*) was collected at Wake in 1948, and that finding has been circulating in the literature since then. The specimen identification was verified and had been updated in the museum records as a gopher snake in 1987; however, it continued to be referenced in the literature as the brown tree snake. We procured photographs of the specimen and include it here for species verification (fig. D10).

While reviewing unpublished literature, we found reference to an additional nonnative species mentioned for Wake. A worker at Wake, possibly a member of the TEC Inc. staff, reported seeing a green anole (*Anolis carolinensis*) during a 2008 site visit to Wake (U.S. Air Force, unpub. data, 2017). Additional information was not provided, and other documentation supporting this observation was not located.

Figure D2. Oceania snake-eyed skink (*Cryptoblepharus poecilopleurus*) from Wake Atoll. (Photographs by A.R. Backlin, U.S. Geological Survey, 2019).

Figure D3. Azure-tailed skink (*Emoia cyanura*) from Wake Atoll. (Photograph by A.R. Backlin, U.S. Geological Survey, 2019).

Figure D4. Azure-tailed skink (*Emoia cyanura*), melanistic phenotype from Wake Atoll. (Photograph by A.R. Backlin, U.S. Geological Survey, 2019).

Figure D5. Dark-bellied copper-striped skink (*Emoia impar;* photograph by C.W. Brown, U.S. Geological Survey, 2006).

Figure D6. Mourning gecko (*Lepidodactylus lugubris*) from Wake Atoll. (Photograph by A.R. Backlin, U.S. Geological Survey, 2019).

Figure D7. Common house gecko (*Hemidactylus frenatus*) from Wake Atoll. (Photograph by A.R. Backlin, U.S. Geological Survey, 2019).

Figure D8. Pacific stump-toed gecko (*Gehyra insulensis*). (Photograph by A.R. Backlin, U.S. Geological Survey, 2009).

Figure D9. Brahminy blindsnake (*Ramphotyphlops braminus*) from Wake Atoll. (Photograph by J. Gilardi, Island Conservation, 2017).

Figure D10. Gopher snake (*Pituophis catenifer*) specimen from Wake Atoll in1948 (previously identified as a brown tree snake [*Boiga irregularis*]). (Photograph by B.P. Bishop Museum, 2019).

Figure D11. Oceania snake-eyed skink (*Cryptoblepharus poecilopleurus*) specimen from Wake Atoll identified in the museum record as a metallic skink (*Lygosoma metallicum*). (Photographs by Brigham Young University Life Science Museum, 2019).

Field Surveys

We captured 206 lizards, detecting 4 of the 8 verified species of reptiles previously recorded at Wake on glue-board traps set across the 3 islets (178 trap stations with 458 total glue boards; table D2). We were able to place at least 1 glue-board trap station within 27 of the 65 habitat mapping units delineated for natural resource management of Wake (table D2; appendix D1, fig. D1.1). These sites represented most of the dominant types of habitat present. Most glue boards were open for some period during daytime and nighttime hours for roughly equivalent durations (ranged from 100 to 591 minutes open in daylight and 80 to 300 minutes at night). Because of time, logistics, and safety, some transects were only open during the daytime (that is, Peale Coast) or nighttime (that is, Peale North and the mowed area of the Bird Sanctuary). One trap station was not re-opened at night due to proximity to wedge-tailed shearwaters. Table D2 provides information about the HMUs surveyed, number of transects and traps, and species captured for each islet. We detected YCAs on glue boards broadly across the atoll on parts of all three islets; YCAs were not detected on Wilkes North, which complemented what was detected during arthropod surveys (see chapter C; table D2; appendix D1, figs. D1.2, D1.3). A variety of arthropods were given to the arthropod expert (R. Peck) for identification and for including in the results of the arthropod surveys (chapter C). We also observed high numbers of the Pacific rat (*Rattus exulans*) throughout Wake Islet and Wilkes Islet; Pacific rats were not detected on Peale. We did not detect any amphibians.

We detected 417 lizards across all nighttime visual encounter surveys. Of these lizards, 76 percent were common house gecko detections compared to 23 percent mourning geckos, and 1 percent azure-tailed skinks (table D3). During daytime visual encounter surveys, we did not encounter any species that had not been recorded on glue boards or during nighttime visual encounter surveys. However, we did encounter and capture three additional Oceania snake-eyed skinks in a new location, near the visitor lodging in HMU 58 the day before leaving Wake.

We collected 62 individuals for museum vouchers and an additional 61 tail tips across the 4 species encountered (table D4; appendix D2, table D2.1). A single melanistic azure-tailed skink species was detected on Wake Islet, and all four species were collected on each of the three islets although not on every transect (table D2; appendix D1, figs. D1.2, D1.4–D1.7). Based on our surveys, the Oceania snake-eyed skink, azure-tailed skink, mourning gecko, and common house gecko can be considered established and generally widespread (appendix D1, figs. D1.2, D1.4–D1.7; table D2).

Summary of Reptile Species

For additional description, see the "Field Guide to the Herpetofauna of Wake Atoll" section (appendix D3); locations of reptile detections are noted in appendix D1).

Skinks

The Oceania snake-eyed skink (*Cryptoblepharus poecilopleurus*; tables D1, D2, D4; fig. D2; appendices D1 [figs. D1.2, D1.4] and D3) is native to Wake. There were relatively low detections of this species, with eight (4 percent) captures on less than 2 percent of the glue boards across three transects and five (19 percent) of the HMUs surveyed. The Oceania snake-eyed skink was captured on all three islets, mostly on stations in open vegetation nearest the coast. This species was originally collected as a single record in 1871 and was collected from all three islets in 1923.

The azure-tailed skinks (*Emoia cyanura*; tables D1–D4; figs. D3, D4; appendices D1 [figs. D1.2, D1.5], D3) may be native to Wake or could have been accidentally introduced before World War II (WWII). The first records of this species were from the Tanager Expedition in 1923. Azure-tailed skinks were the most detected and widespread species captured using glue boards. The azure-tailed skink was detected with 74 percent of all captures on 21 percent of all glue boards across 11 transects and 20 (74 percent) of the HMUs surveyed. This species was detected almost equally on boards, the ground, and on logs in almost every habitat type. We detected a single capture of a melanistic azure-tailed skink on a glue board (table D2; fig. D4) on a log under *Terminalia catappa*. This detection was in open native vegetation along a road in HMU 27. This record is the first of a melanistic azure-tailed skink at Wake. Melanism can be common in some far eastern populations of this species, such as Clipperton Atoll, and these can be difficult to identify from melanistic dark-bellied copper-striped skinks (Bruna and others, 1996a, 1996b). This species is known to tolerate even extreme disturbance (Bruna and others, 1996a).

The dark-bellied copper-striped skink (*Emoia impar*; table D1; fig. D5; appendix D3) may be native to Wake or could have been accidentally introduced before WWII. The only record of this species is a single individual collected as part of the Tanager Expedition in 1923. We did not detect this species during our survey.

Geckos

The mourning gecko (*Lepidodactylus lugubris*; tables D1–D4; fig. D6; appendices D1 [figs. D1.2, D1.6] and D3) is considered native to Wake and was first recorded on Peale Islet by the Tanager Expedition in 1923. Mourning geckos accounted for 7 percent of all lizard captures on glue boards. We detected mourning geckos on 63 percent of our nighttime searches. There were about equivalent numbers of common house geckos and mourning geckos on 4 of the 10 surveys, during which both species were detected; otherwise, there were considerably higher numbers of common house geckos on all other surveys (table D3). We consider mourning geckos native because the presumptive area of origin for this hybrid parthenogenic species is the southern Marshall Islands at or near Arno Atoll (Radtkey and others, 1995). Mourning geckos have clearly spread with humans more recently, and Ineich (1999) reported high clone turnover in some places due to the movement of people and equipment during WWII. For Wake, this species could have arrived on its own with early Micronesians and Europeans. Mourning geckos have probably arrived several times and could have experienced this clonal turnover. Because we cannot resolve this question, we conservatively consider mourning geckos are native.

The common house gecko (*Hemidactylus frenatus*; tables D1–D4; fig. D7; appendices D1 [figs. D1.2, D1.7] and D3) is not native to Wake and is considered invasive. The common house gecko was the second most detected species on glue boards, with 32 (16 percent) captures on 9 percent of all glue boards across 8 transects and 13 (48 percent) of the HMUs surveyed. We detected common house geckos on 100 percent of our nighttime visual encounter surveys (table D3). We detected common house geckos in great abundance on lighted and dark structures, rock walls, and on vegetation, including *Heliotropium* and *Casuarina*. Common house geckos seemed especially numerous on the dead or dying trees with peeling bark. We detected one common house gecko in the *Lepturus* field on Peale Islet. Common house geckos were first collected at Wake in 1957.

The Pacific stump-toed gecko (*Gehyra insulensis*; table D1; fig. D8; appendix D3) is considered a pre-WWII invasive species to Wake and was first recorded by the Tanager Expedition in 1923. The Pacific stump-toed gecko is considered a relatively recent invader in the Pacific during the last few hundred years because of European traders (Fisher, 1997). This species has been seen to decline over time in places that are invaded by the common house gecko, and we did not detect it on Wake during our survey.

Snakes

Brahminy blindsnakes (*Ramphotyphlops braminus*; table D1; fig. D9; appendix D3) are not native to Wake. We did not see any Brahminy blindsnakes during these surveys; however, we received photograph documentation of this species on Peale Islet in 2017 from John Gilardi of Island Conservation (fig. D9). The original museum record had been collected on Wake Islet in 1998. The Brahminy blindsnake is potentially localized on Wake and Peale; however, this cryptic fossorial species is mostly nocturnal and generally detected by moving soil, leaf litter, rocks and debris, or occasionally on the surface during rains. The species resembles an earthworm, so it is often overlooked.

Invertebrates

We detected YCAs on 137 of 458 (or 30 percent) of all glue boards and YCA detections on 98 percent of the glue boards used on Peale (table D2). We did not find any YCAs at the Bird Sanctuary (HMUs 1–3) on Wilkes. We also observed another invertebrate species of concern, the Asian forest centipede (*Scolopendra subspinipes*), on Peale.

D. Discussion

This work is the first formal reptile survey at Wake and compiles what is known regarding historic and current (2019) status and distribution, providing information that can be used to modify and create more management measures as well as evaluate their current (2019) and future success. As expected, and typical of remote, isolated, small islands and atolls, the Wake terrestrial reptile species community consists of very few species. During these surveys, we detected three species presumed to be native, two skinks and one gecko, as well as one nonnative gecko species. It is important that we detected the Oceania snake-eyed skink for which there had been previous concern regarding its possible extirpation. Given that recent reviews of the genus (Horner, 2007; Blom and others, 2019) continue to reveal previously undescribed species, future genetic and morphologic analyses of the specimens from Wake could show it to be endemic. Besides Wake, the closest location where this species is known is Bokak Atoll in the Marshall Islands (Buden and others, 2020). The Oceania snake-eyed skink is absent from the rest of the Marshall Islands and all the other Caroline Islands (Crombie and Pregill, 1999; Buden and Taboroši, 2015). The other two skinks (the azure-tailed and dark-bellied copper-striped skink) may be native or could have arrived unintentionally as a result of human movement. The previous map of these two *Emoia* species for the Pacific indicated that only the azure-tailed was recorded on Wake, and it missed the early dark-bellied copper-striped skink record (Ineich and Zug, 1991). We detected 1 melanistic azure-tailed skink out of 206 captures using glue boards. This finding indicates the phenotype is present but rare (Bruna and others, 1996b). We cannot know how this information compares to past numbers or if this phenotype is changing frequencies within Wake, limiting our ability to interpret these results. We did not detect any Pacific stump-toed geckos. This species more than likely

arrived unintentionally with humans, which is common for this species (Fisher, 1997). The last vouchered specimen was deposited in 1953, and the last verbally reported observation (no photograph or other voucher of any kind) of the Pacific stump-tailed gecko was in 1998. It is possible that this species is still present on Wake in very low numbers; however, it may have been extirpated. The distribution of Pacific stump-tailed geckos in Hawai`i has been presumed to be reduced by the spread of the common house gecko, and it is now rare (McKeown, 1996).

We did not encounter any reptile species not historically recorded at Wake. Although short in duration, the formal nature of our surveys gives us confidence the past record is accurate as to the minimum species present. With regards to the dark-bellied copper-striped skink, which was only recorded in 1923, it is possible that this species is either very rare or secretive and was missed, or it could have been extirpated. There is some likelihood of extirpation given that Pacific rats (*Rattus exulans*) were reported to be abundant as early as 1568 (Bryan, 1959; Werstein, 1964;), yet the first known reptile voucher was not collected until 1871. The Pacific rat is thought to be mainly vegetarian; however, their diet can expand to include more animal prey, especially when vegetation fails to produce enough food, such as during severe weather events (Mosby and others, 1973). This finding indicates the rats may have indirect and direct effects on reptiles, at least temporarily (as long as they are present). Hoare and others (2007) reported empirical evidence that Pacific rats ecologically displaced Duvaucel's gecko, reducing capture and recruitment rates in the presence of rats. Towns and others (2007) identified recruitment of tuataras on three islands 4–5 years after eradication of Pacific rats compared to a fourth island that lacked recruitment where rats remained. Towns and others (2007) also saw a large and highly significant increase of body condition (mass) in some cases in the adult tuataras on the three islands where rats had been removed. Fisher and others (2019) reported evidence of recruitment in Pacific iguanas after the eradication of Pacific rats on an island in Fiji. There was no evidence of recruitment in the 14 years prior to their removal. Although tuataras are a distinct lineage and not lizards, their similarities support the documented iguana response to rats. There is likely a negative interaction with rats and resiliency to rebound with rat removal. In New Caledonia, Thibault and others (2017) detected remains of several skink and gecko species in Pacific and black rat guts, further contributing to the base of knowledge regarding rat predation on lizards.

Thought to be introduced in the 1970s, the Asian house rat (*Rattus tanezumi*) was confirmed to be present at Wake (Siers and others, 2015) but has since been eradicated (Griffiths and others, 2014). Both the Pacific and Asian house rats were confirmed to be eradicated from Peale Islet in 2012. We would expect that any rare reptile species historically present and still persisting at very low levels on Peale would have potentially rebounded and been detected during our surveys.

We did, however, find YCAs, which are an additional likely threat to reptiles at Wake. Yellow crazy ants are widely distributed across Peale and are well known for their effects on many taxa, and reptiles are no exception (O'Dowd and others, 2003; Fisher and Ineich, 2012; Smith and others, 2012; Hoffmann and others, 2014). The history of the YCA and its distribution on Wake is not well known. We did not detect any YCAs on the transect at the north end of Peale, which may be a refuge from YCA; however, this was a short transect set out for about 80 minutes. More searching would be needed to map YCA extent. Although studies elsewhere indicate it is likely, we do not currently (2019) have direct evidence that YCAs are negatively affecting reptile populations at Wake.

Because this was the first systematic survey for reptiles, there was little previous distribution data for this taxonomic group. The 2019 field surveys were an initial assessment of species distributions as well as a general representation of relative abundance. All four species detected were on each islet (appendix D1, figs. D1.4–D1.7) and varied in relative abundance (tables D2, D3). Although we do not know the historical distribution of reptile species on Wake, the current (2019) work indicates that it has not changed considerably from the historical record, with two exceptions: (1) the stump-toed gecko has not been vouchered since 1953, with only one report of a sighting more than two decades ago and (2) the dark-bellied copper-striped skink was recorded in 1923, identified in 1990 by Ivan Ineich, but then not included in the map presented in Ineich and Zug (1991). This species has not been documented again on Wake. The common house geckos and azure-tailed skinks have likely become more widespread and abundant given continued habitat disturbance with storms and new construction during the last several decades. Our surveys indicate that despite extreme and continual modifications to the landscape at Wake and the presence of invasive species known to affect reptiles, the reptile community continues to persist. Time constraints prohibited more exhaustive searching; however, additional adventive and invasive reptile and amphibian species have presumably not recently (in the last several decades) arrived to Wake and become established, with the exception of the blindsnake. Due to time constraints, some HMUs were surveyed less thoroughly than others or not at all. However, the data presented here can serve as a general baseline for future monitoring and management decision making for addressing ecosystem health and in relation to carrying out the installation mission.

Table D1. Summary and status (including risk and management feasibility based on preliminary risk assessment) of reptile species and dates recorded on Wake Atoll in museum records (with corrected species identifications), reports, and other opportunistic observations, and during U.S. Geological Survey (USGS) reptile surveys in 2019.[—Left]

[**Status**: A-I, alien invasive; Nat, native; E*, possibly endemic; A, alien; A-N, alien naturalized. **Wake risk:** H, high; NA, not applicable/native species; L, low; M, medium. **Management feasibility**: L, low; NA, not applicable/native species; VL, very low; M, medium. **Other abbreviations**: —, not applicable; U, no further locality information beyond Wake Island/Atoll; W, Wake Islet; WI, Wilkes Islet; P, Peale Islet. Note that this table should be read left-to-right across both pages]

Scientific name actual species identification	Species identification as listed in museum database or report	Common name	Status	Wake risk	Management feasibility	Species records Year collected or recorded (collector)					
						1871 (A. Owston)	1923 (Tanager expedition)	1948 (C.M. Holmes)	1950 (D.D. Davis and R.F. Inger)	1952 (Unknown)	1953 (C. R. Joyce)
Anolis carolinensis Voigt in Cuvier and Voigt	*Anolis carolinensis* Voigt in Cuvier and Voigt (verbal record,[1] U.S. Air Force, unpub. data, 2017)	Green Anole	A-I	H	L	—	—	—	—	—	—
Cryptoblepharus poecilopleurus (Wiegmann, 1836)	*Cryptoblepharus poecilopleurus* (Wiegmann, 1836)	Oceania snake-eyed skink	Nat/E*	NA	NA	U	W, WI, P	—	—	—	—
Cryptoblepharus poecilopleurus (Wiegmann, 1836)	*Cryptoblepharus boutonii* (Desjardin, 1831)[2]	Oceania snake-eyed skink	—	—	—	—	—	—	—	—	—
Cryptoblepharus poecilopleurus (Wiegmann, 1836)	*Lygosoma metallicum* (O'Shaughnessy, 1874)[3] (metallic skink)	Oceania snake-eyed skink	—	—	—	—	—	—	—	—	—
Emoia cyanura (Lesson, 1830)	*Emoia cyanura* (Lesson, 1830)	Azure-tailed skink	Nat/A-N	NA/L	NA/L	—	WI, P	—	U	U	—
Emoia impar (Werner, 1898)	*Emoia impar* (Werner, 1898)	Dark-bellied copper-striped skink	Nat/A-N	NA/L	NA/L	—	U	—	—	—	—
Gehyra insulensis (Girard, 1857)	*Gehyra mutilata* (Wiegmann, 1834)	Pacific stump-toed gecko	A-I	M	L	—	WI	—	—	—	—
Hemidactylus frenatus (Schlegel, 1836)	*Hemidactylus frenatus* (Schlegel, 1836)	Common house gecko	A-I	H	VL	—	—	—	—	—	U
Lepidodactylus lugubris (Duméril and Bibron, 1836)	*Lepidodactylus lugubris* (Duméril and Bibron, 1836)	Mourning gecko	Nat	NA	NA	—	P	—	—	—	—
Ramphotyphlops braminus (Daudin, 1803)	*Ramphotyphlops braminus* (Daudin, 1803; Photograph documentation only)	Brahminy blindsnake	A-I	L	L	—	—	—	—	—	—
Pituophis catenifer (Blainville, 1835)	*Pituophis melanoleucus*[5] (Blainville, 1835). Updated from *Boiga irregularis* (brown tree snake; Bechstein, 1802) in 1987	Gopher snake	A	L	M	—	—	U	—	—	—

[1]Reported observation, no voucher documentation (for example, specimen, photograph) available for verifying species identification.

[2]Synonym for *Cryptoblepharus poecilopleurus.*

[3]Synonym for *Lamphropholis delicata.*

[4]Documented by photograph.

[5]Synonym for *Pituophis catenifer.*

Table D1. Summary and status (including risk and management feasibility based on preliminary risk assessment) of reptile species and dates recorded on Wake Atoll in museum records (with corrected species identifications), reports, and other opportunistic observations, and during U.S. Geological Survey (USGS) reptile surveys in 2019.[—Right]

[**Status**: A-I, alien invasive; Nat, native; E*, possibly endemic; A, alien; A-N, alien naturalized. **Wake risk:** H, high; NA, not applicable/native species; L, low; M, medium. **Management feasibility**: L, low; NA, not applicable/native species; VL, very low; M, medium. **Other abbreviations**: —, not applicable; U, no further locality information beyond Wake Island/Atoll; W, Wake Islet; WI, Wilkes Islet; P, Peale Islet. Note that this table should be read left-to-right across both pages]

Scientific name actual species identification	Species records Year collected or recorded (collector)													
	1957 (F. Krauss)	1959 (Y. Oshiro)	1961 (Unknown)	1963 (Unknown)	1964 (D. Johnston)	1966 (Unknown)	1968 (R.W. Schreiber via R.W. McDiarmid)	1969 (D.M. Allred)	1996 (T. Sutterfield)	1998 (E.T. Ricketts)	1998 (Ogden Environmental and Energy Services, Co., Inc., unpub. data, 1999)	2008 (Unknown)	2017 (J. Gilardi)	2019 (USGS)
Anolis carolinensis Voigt in Cuvier and Voigt	—	—	—	—	—	—	—	—	—	—	—	U[1]	—	—
Cryptoblepharus poecilopleurus (Wiegmann, 1836)	—	—	—	WI	U	U	—	—	W	—	—	—	—	W, WI, P
Cryptoblepharus poecilopleurus (Wiegmann, 1836)	—	—	—	—	—	—	WI	—	—	—	—	—	—	—
Cryptoblepharus poecilopleurus (Wiegmann, 1836)	—	—	—	—	—	—	—	U	—	—	—	—	—	—
Emoia cyanura (Lesson, 1830)	—	—	—	—	—	—	WI	—	—	—	—	—	—	W, WI, P
Emoia impar (Werner, 1898)	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gehyra insulensis (Girard, 1857)	—	—	—	—	—	—	—	—	—	—	WI[1]	—	—	—
Hemidactylus frenatus (Schlegel, 1836)	U	U	P	—	U	—	—	—	W	—	—	—	—	W, WI, P
Lepidodactylus lugubris (Duméril and Bibron, 1836)	U	—	—	—	U	U	WI	U	—	—	—	—	—	W, WI, P
Ramphotyphlops braminus (Daudin, 1803)	—	—	—	—	—	—	—	—	—	W	—	—	P[4]	—
Pituophis catenifer (Blainville, 1835)	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table D2. Sticky glue board transect summary for U.S. Geological Survey reptile surveys at Wake Atoll in 2019.

[**Trap type**: T, tree; L, log; G, ground. **Species codes**: CRPO, *Cryptoblepharus poecilopleurus* (Oceania snake-eyed skink); EMCY; *Emoia cyanura* (azure-tailed skink); EMCY*, melanistic azure-tailed skink; HEFR, *Hemidactylus frenatus* (common house gecko); LELU, *Lepidodactylus lugubris* (mourning gecko). **Abbreviations**: mm/dd/yyyy, month/day/year; No., number; HMU, habitat management unit; YCA, yellow crazy ant; —, not applicable; MDA, Missile Defense Agency]

Date surveyed (mm/dd/yyyy)	Total no. trap stations	No. glue boards	Transect no.	Transect name	HMU	No. trap stations	No. glue boards				Count of species captured					No. traps occupied
							T	L	G	Total	CRPO	EMCY	EMCY*	HEFR	LELU	YCA
Peale Islet																
05/29/2019	16	51	1	Peale Road	60	11	11	11	11	33	—	23	—	—	2	25
05/29/2019	—	—	—	Peale Road	61	5	5	5	5	15	—	8	—	—	—	4
05/29/2019	—	—	—	Peale Road	62	1	1	1	1	3	—	2	—	—	—	2
05/29/2019	6	18	2	Peale North	63	6	5	5	8	18	—	—	—	1	1	—
05/29/2019	18	30	3	Peale Coast (East)	64	18	6	6	18	30	2	6	—	—	—	9
All HMUs						41	28	28	43	99	2	39	0	1	3	40
Wake Islet																
06/03/2019	20	59	4	Marina	10	1	1	1	1	3	—	—	—	—	—	—
06/03/2019	—	—	—	Marina	11	19	18	19	19	56	—	23	—	4	1	1
06/03/2019	22	66	5	MDA area	16	3	3	3	3	9	—	4	—	1	1	4
06/03/2019	—	—	—	MDA area	24	3	3	3	3	9	—	5	—	5	1	6
06/03/2019	—	—	—	MDA area	25	6	6	6	6	18	—	—	—	2	—	9
06/03/2019	—	—	—	MDA area	26	4	4	4	4	12	—	3	—	—	—	11
06/03/2019	—	—	—	MDA area	27	6	6	6	6	18	—	5	1	4	—	18
06/01/2019	13	39	6	Lumber storage area	31	1	1	1	1	3	1	—	—	—	—	—
06/01/2019	—	—	—	Lumber storage area	36	3	3	3	3	9	1	—	—	1	—	1
06/01/2019	—	—	—	Lumber storage area	37	9	9	9	9	27	3	9	—	3	—	13
05/31/2019	3	9	7	Industrial vegetation area	39	1	1	1	1	3	—	—	—	—	—	—
05/31/2019	—	—	—	Industrial vegetation area	40	2	2	2	2	6	—	2	—	—	—	—
05/25/2019	6	19	8	North Wake	57	6	6	6	7	19	—	2	—	4	3	2
06/04/2019	10	30	9	Gardens	58	10	10	10	10	30	—	7	—	2	—	10
05/31/2019	11	21	10	Supply building area	65	11	7	3	11	21	—	9	—	—	—	—
All HMUs						85	80	77	86	243	5	69	1	26	6	75
Wilkes Islet																
05/26/2019	39	77	11	Bird Sanctuary/ Wilkes North	1	12	4	4	4	12	—	2	—	2	1	—
05/26/2019	—	—	—	Bird Sanctuary/ Wilkes North	1	8	—	—	8	8	—	—	—	—	—	—

Table D2. Sticky glue board transect summary for U.S. Geological Survey reptile surveys at Wake Atoll in 2019.—Continued

[**Trap type**: T, tree; L, log; G, ground. **Species codes**: CRPO, *Cryptoblepharus poecilopleurus* (Oceania snake-eyed skink); EMCY; *Emoia cyanura* (azure-tailed skink); EMCY*, melanistic azure-tailed skink; HEFR, *Hemidactylus frenatus* (common house gecko); LELU, *Lepidodactylus lugubris* (mourning gecko). **Abbreviations**: mm/dd/yyyy, month/day/year; No., number; HMU, habitat management unit; YCA, yellow crazy ant; —, not applicable; MDA, Missile Defense Agency]

Date surveyed (mm/dd/yyyy)	Total no. trap stations	No. glue boards	Transect no.	Transect name	HMU	No. trap stations	No. glue boards				Count of species captured					No. traps occupied
							T	L	G	Total	CRPO	EMCY	EMCY*	HEFR	LELU	YCA
Wilkes Islet—Continued																
05/26/2019	—	—	—	Bird Sanctuary/ Wilkes North	2	11	11	11	11	33	—	13	—	—	1	—
05/26/2019	—	—	—	Bird Sanctuary/ Wilkes North	3	8	8	8	8	24	—	15	—	1	1	—
05/28/2019	13	39	12	Wilkes South	4	10	9	9	12	30	—	7	—	—	—	22
05/28/2019	—	—	—	Wilkes South	6	1	1	1	1	3	—	—	—	—	1	—
05/28/2019	—	—	—	Wilkes South	8	1	1	1	1	3	—	3	—	2	—	—
05/28/2019	—	—	—	Wilkes South	9	1	1	1	1	3	1	3	—	—	1	—
All HMUs						52	35	35	46	116	1	43	0	5	5	22
Grand total						**178**	**143**	**140**	**175**	**458**	**8**	**151**	**1**	**32**	**14**	**137**

Table D3. Summary of U.S. Geological Survey nighttime visual encounter surveys for reptiles at Wake Atoll in 2019.

[**Species codes**: EMCY, *Emoia cyanura* (azure-tailed skink); HEFR, *Hemidactylus frenatus* (common house gecko); LELU, *Lepidodactylus lugubris* (mourning gecko). **Abbreviations**: mm/dd/yyyy, month/day/year; MDA, Missile Defense Agency]

Date surveyed	Transect	Species detections		
		EMCY	HEFR	LELU
	Peale Islet			
05/30/2019	Peale bridge to middle	—	3	1
05/29/2019	Peale south interior	1	18	17
05/30/2019	Peale middle to north end	2	6	6
Totals		3	27	24
	Wake Islet			
05/25/2019	Building 116 area	—	12	14
06/04/2019	Gardens	—	41	12
05/31/2019	Lumber storage area	—	45	—
05/31/2019	Supply building area	—	24	—
05/31/2019	Containers west of supply building area	—	6	—
05/31/2019	Industrial vegetation area	1	11	10
06/01/2019	Marina	—	75	25
06/03/2019	MDA	—	20	7
06/03/2019	Aircraft revetment	—	10	2
Totals		1	244	70
	Wilkes Islet			
5/28/2019	Wilkes South opposite marina	—	33	2
5/28/2019	Wilkes South lighted building	—	7	—
5/28/2019	Wilkes South north end	—	1	—
5/26/2019	Bird Sanctuary	—	5	—
Totals		**0**	**46**	**2**

Table D4. Summary of reptile specimens collected at Wake Atoll during U.S. Geological Survey surveys in 2019.

[**Species codes**: CRPO, *Cryptoblepharus poecilopleurus* (Oceania snake-eyed skink); EMCY, *Emoia cyanura* (azure-tailed skink); HEFR, *Hemidactylus frenatus* (common house gecko); LELU, *Lepidodactylus lugubris* (mourning gecko)]

Species	Specimen type		Total
	Body	Tail	
CRPO	11	1	12
EMCY	20	39	59
HEFR	21	7	28
LELU	10	14	24
Totals	**62**	**61**	**123**

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Appendix D1. U.S. Geological Survey 2019 Reptile Survey Locations and Results

Figure D1.1. Locations of glue-board stations used during U.S. Geological Survey reptile surveys at Wake in 2019. (U.S. Air Force, WorldView 3 image taken October 2015).

Figure D1.2. Reptile and yellow crazy ant (YCA) detections on glue-board surveys done by the U.S. Geological Survey at Wake in 2019. (U.S. Air Force, WorldView 3 image taken October 2015).

Figure D1.3. Yellow crazy ant (YCA) detection locations on reptile glue-board surveys and arthropod surveys done by the U.S. Geological Survey at Wake in 2019. (U.S. Air Force, WorldView 3 image taken October 2015).

Figure D1.4. Oceania snake-eyed skink (*Cryptoblepharus poecilopleurus*) detection locations on glue-board surveys done by the U.S. Geological Survey at Wake in 2019. (U.S. Air Force, WorldView 3 image taken October 2015).

Figure D1.5. Azure-tailed skink (*Emoia cyanura*) detection locations on glue-board surveys done by the U.S. Geological Survey at Wake in 2019. (U.S. Air Force, WorldView 3 image taken October 2015).

Figure D1.6. Mourning gecko (*Lepidodactylus lugubris*) detection locations on glue-board surveys done by the U.S. Geological Survey at Wake in 2019. (U.S. Air Force, WorldView 3 image taken October 2015).

Figure D1.7. House gecko (*Hemidactylus frenatus*) detection locations on glue-board surveys done by the U.S. Geological Survey at Wake in 2019. (U.S. Air Force, WorldView 3 image taken October 2015).

Appendix D2. Reptile Specimens Collected by U.S. Geological Survey at Wake Atoll in 2019

Table D2.1. List of reptile specimens collected during reptile surveys done by U.S. Geological Survey at Wake Atoll in 2019.

[All specimens have accompanying tissue samples for future DNA studies. **Observers:** SAH, SA Hathaway; ARB, AR Backlin; JCM, JC Molden. **Species codes:** CRPO, *Cryptoblepharus poecilopleurus* (Oceania snake-eyed skink); EMCY, *Emoia cyanura* (azure-tailed skink); HEFR, *Hemidactylus frenatus* (common house gecko); LELU, *Lepidodactylus lugubris* (mourning gecko). **Abbreviations:** no., number; mm/dd/yyyy, month/day/year; NVES, night visual encounter survey]

Date (mm/dd/yyyy)	Observers	Survey type	Species	RNF no./ Specimen label code	Tissue
			Peale Islet		
05/29/2019	SAH, ARB	Glue board	CRPO	11884	Body
05/29/2019	SAH, ARB	Glue board	CRPO	11885	Body
05/16/2018	SAH, JCM	Glue board	EMCY	11891	Body
05/16/2018	SAH, JCM	Glue board	EMCY	11892	Body
05/16/2018	SAH, JCM	Glue board	EMCY	11893	Body
05/16/2018	SAH, JCM	Glue board	EMCY	11894	Body
05/16/2018	SAH, JCM	Glue board	EMCY	11895	Body
05/16/2018	SAH, JCM	Glue board	EMCY	11896	Body
05/16/2018	SAH, JCM	Glue board	EMCY	11897	Body
05/16/2018	SAH, JCM	Glue board	EMCY	11898	Body
05/29/2019	SAH, ARB	Glue board	EMCY	P1A EMCY	Tail
05/29/2019	SAH, ARB	Glue board	EMCY	P2A EMCY	Tail
05/29/2019	SAH, ARB	Glue board	EMCY	P4A EMCY	Tail
05/29/2019	SAH, ARB	Glue board	EMCY	P13A EMCY A	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI6G	Tail
05/29/2019	SAH, ARB	NVES	HEFR	11878	Body
05/29/2019	SAH, ARB	NVES	HEFR	11879	Body
05/29/2019	SAH, ARB	NVES	HEFR	PNVES1STRT HEFR A	Tail
05/29/2019	SAH, ARB	NVES	HEFR	PNVES1STRT HEFR B	Tail
05/29/2019	SAH, ARB	Glue board	LELU	P10 LELU	Tail
05/29/2019	SAH, ARB	Glue board	LELU	P11 LELU	Tail
05/29/2019	SAH, ARB	NVES	LELU	PNVES1STRT LELU A	Tail
05/29/2019	SAH, ARB	NVES	LELU	PNVES1STRT LELU B	Tail
05/29/2019	SAH, ARB	NVES	LELU	PNVES1STRT LELU C	Tail
05/29/2019	SAH, ARB	NVES	LELU	PNVES1STRT LELU D	Tail
			Wake Islet		
05/31/2019	SAH, ARB	Glue board	CRPO	11883	Body
05/31/2019	SAH, ARB	Glue board	CRPO	11882	Body
06/01/2019	SAH, ARB	Glue board	CRPO	11889	Body
06/01/2019	SAH, ARB	Glue board	CRPO	11888	Body
06/01/2019	SAH, ARB	Glue board	CRPO	11887	Body
06/07/2019	SAH, ARB	Incidental	CRPO	11899	Body
06/07/2019	SAH, ARB	Incidental	CRPO	11900	Body
06/07/2019	SAH, ARB	Incidental	CRPO	11901	Body
06/07/2019	SAH, ARB	Incidental	CRPO	CRPO near dorms building 116	Tail
05/25/2019	SAH, ARB	Glue board	EMCY	11858	Body

Table D2.1. List of reptile specimens collected during reptile surveys done by U.S. Geological Survey at Wake Atoll in 2019.—Continued

[All specimens have accompanying tissue samples for future DNA studies. **Observers:** SAH, SA Hathaway; ARB, AR Backlin; JCM, JC Molden. **Species codes:** CRPO, *Cryptoblepharus poecilopleurus* (Oceania snake-eyed skink); EMCY, *Emoia cyanura* (azure-tailed skink); HEFR, *Hemidactylus frenatus* (common house gecko); LELU, *Lepidodactylus lugubris* (mourning gecko). **Abbreviations:** no., number; mm/dd/yyyy, month/day/year; NVES, night visual encounter survey]

Date (mm/dd/yyyy)	Observers	Survey type	Species	RNF no./ Specimen label code	Tissue
Wake Islet—Continued					
05/25/2019	SAH, ARB	Glue board	EMCY	11862	Body
06/03/2019	SAH, ARB	Glue board	EMCY	11890	Body
05/31/2019	SAH, ARB	Glue board	EMCY	WS3G EMCY A	Tail
05/31/2019	SAH, ARB	Glue board	EMCY	WS4G EMCY	Tail
05/31/2019	SAH, ARB	Glue board	EMCY	WS6G EMCY	Tail
05/31/2019	SAH, ARB	Glue board	EMCY	WS7G EMCY	Tail
05/31/2019	SAH, ARB	Glue board	EMCY	WC2 EMCY A	Tail
05/31/2019	SAH, ARB	Glue board	EMCY	WC2 EMCY B	Tail
05/25/2019	SAH, ARB	Incidental	EMCY	Mess Hall	Tail
05/25/2019	SAH, ARB	Glue board	HEFR	11860	Body
05/25/2019	SAH, ARB	Glue board	HEFR	11851	Body
05/25/2019	SAH, ARB	Glue board	HEFR	11852	Body
05/25/2019	SAH, ARB	Glue board	HEFR	11861	Body
06/03/2019	SAH, ARB	Incidental	HEFR	11886	Body
05/25/2019	SAH, ARB	NVES	HEFR	11840	Body
05/25/2019	SAH, ARB	NVES	HEFR	11841	Body
05/25/2019	SAH, ARB	NVES	HEFR	11842	Body
05/25/2019	SAH, ARB	NVES	HEFR	11843	Body
05/25/2019	SAH, ARB	NVES	HEFR	11844	Body
05/31/2019	SAH, ARB	Glue board	HEFR	WL6L HEFR	Tail
05/25/2019	SAH, ARB	NVES	HEFR	WN1VESBag2 HEFR A	Tail
05/25/2019	SAH, ARB	NVES	HEFR	WN1VESBag2 HEFR B	Tail
05/25/2019	SAH, ARB	NVES	HEFR	WN1VESBag2 HEFR C	Tail
05/25/2019	SAH, ARB	Glue board	LELU	11859	Body
05/25/2019	SAH, ARB	Glue board	LELU	11857	Body
05/25/2019	SAH, ARB	NVES	LELU	11874	Body
05/25/2019	SAH, ARB	NVES	LELU	11875	Body
05/25/2019	SAH, ARB	NVES	LELU	11876	Body
05/25/2019	SAH, ARB	NVES	LELU	11877	Body
05/25/2019	SAH, ARB	NVES	LELU	WN1VESBag2 LELU A	Tail
05/25/2019	SAH, ARB	NVES	LELU	WN1VESBag2 LELU B	Tail
05/25/2019	SAH, ARB	NVES	LELU	WN1VESBag2 LELU C	Tail
05/25/2019	SAH, ARB	NVES	LELU	WN1VESBag2 LELU D	Tail
05/25/2019	SAH, ARB	NVES	LELU	WN1VESBag2 LELU E	Tail
05/28/2019	SAH, ARB	NVES	LELU	WIN2VES LELU A	Tail
05/28/2019	SAH, ARB	NVES	LELU	WIN2VES LELU B	Tail

Table D2.1. List of reptile specimens collected during reptile surveys done by U.S. Geological Survey at Wake Atoll in 2019.—Continued

[All specimens have accompanying tissue samples for future DNA studies. **Observers:** SAH, SA Hathaway; ARB, AR Backlin; JCM, JC Molden. **Species codes:** CRPO, *Cryptoblepharus poecilopleurus* (Oceania snake-eyed skink); EMCY, *Emoia cyanura* (azure-tailed skink); HEFR, *Hemidactylus frenatus* (common house gecko); LELU, *Lepidodactylus lugubris* (mourning gecko). **Abbreviations:** no., number; mm/dd/yyyy, month/day/year; NVES, night visual encounter survey]

Date (mm/dd/yyyy)	Observers	Survey type	Species	RNF no./ Specimen label code	Tissue
			Wilkes Islet		
05/28/2019	SAH, ARB	Glue board	CRPO	11873	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11855	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11864	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11865	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11866	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11867	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11870	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11871	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11872	Body
05/26/2019	SAH, ARB	Glue board	EMCY	11856	Body
05/26/2019	SAH, ARB	Glue board	EMCY	WI1 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI6 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI7 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI8 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI9G EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI11G	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI13 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI13 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI13 EMCY B	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI19 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI20 EMCY A	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI20 EMCY B	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI21 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI21 EMCY	Tail
05/26/2019	SAH, ARB	Glue board	EMCY	WI23 EMCY	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI32 EMCY A	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI32 EMCY B	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI32G	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI33 EMCY	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI33 EMCY	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI37 EMCY	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI37 EMCY A	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI37 EMCY B	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI37 EMCY A	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI37 EMCY B	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI39 EMCY A	Tail
05/28/2019	SAH, ARB	Glue board	EMCY	WI39 EMCY B	Tail
05/26/2019	SAH, ARB	Glue board	HEFR	11853	Body

Table D2.1. List of reptile specimens collected during reptile surveys done by U.S. Geological Survey at Wake Atoll in 2019.—Continued

[All specimens have accompanying tissue samples for future DNA studies. **Observers:** SAH, SA Hathaway; ARB, AR Backlin; JCM, JC Molden. **Species codes:** CRPO, *Cryptoblepharus poecilopleurus* (Oceania snake-eyed skink); EMCY, *Emoia cyanura* (azure-tailed skink); HEFR, *Hemidactylus frenatus* (common house gecko); LELU, *Lepidodactylus lugubris* (mourning gecko). **Abbreviations:** no., number; mm/dd/yyyy, month/day/year; NVES, night visual encounter survey]

Date (mm/dd/yyyy)	Observers	Survey type	Species	RNF no./ Specimen label code	Tissue
Wilkes Islet—Continued					
05/26/2019	SAH, ARB	Glue board	HEFR	11850	Body
05/26/2019	SAH, ARB	Glue board	HEFR	11868	Body
05/28/2019	SAH, ARB	Glue board	HEFR	11880	Body
05/25/2019	SAH, ARB	NVES	HEFR	11845	Body
05/25/2019	SAH, ARB	NVES	HEFR	11846	Body
05/25/2019	SAH, ARB	NVES	HEFR	11847	Body
05/25/2019	SAH, ARB	NVES	HEFR	11848	Body
05/25/2019	SAH, ARB	NVES	HEFR	11849	Body
05/28/2019	SAH, ARB	Glue board	HEFR	WI33T HEFR	Tail
05/26/2019	SAH, ARB	Glue board	LELU	11863	Body
05/26/2019	SAH, ARB	Glue board	LELU	11854	Body
05/26/2019	SAH, ARB	Glue board	LELU	11869	Body
05/28/2019	SAH, ARB	Glue board	LELU	11881	Body
05/28/2019	SAH, ARB	Glue board	LELU	WI34T	Tail

Appendix D3. Field Guide to the Herpetofuana of Wake Atoll

Photographs and descriptive summaries of native and introduced reptile species that have been recorded on Wake Atoll and amphibian and reptile species that have higher potential to arrive.

About this Guide

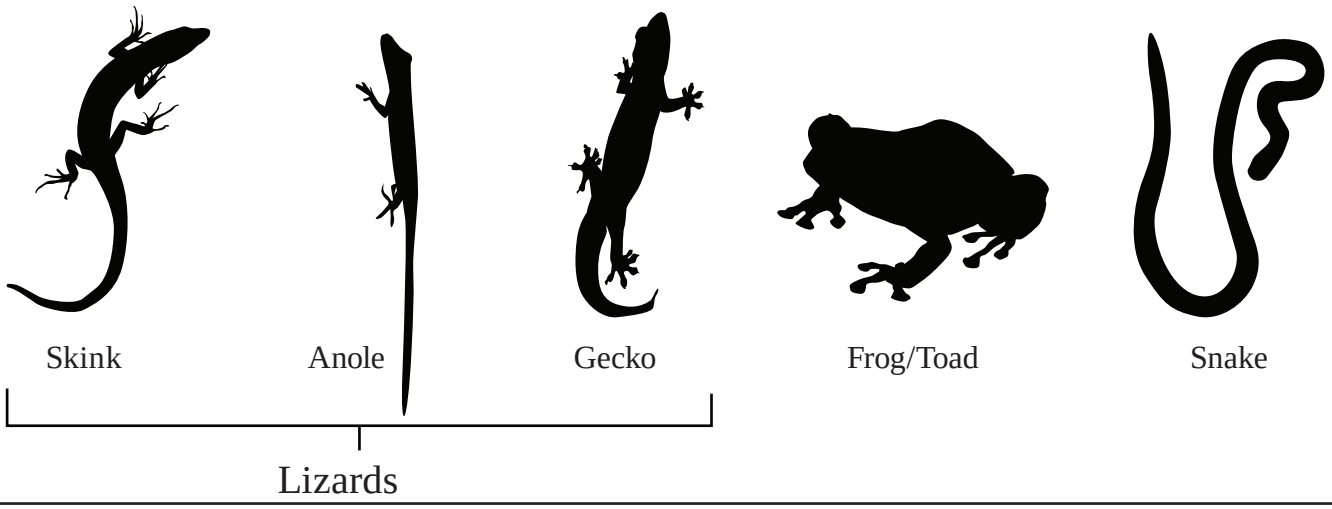
We attempted to make this guide simple and easy to use. We include basic information on the species recorded (here this means a physical voucher, such as a specimen or photograph) and a short list of "horizon" species we consider to be the most likely reptile species ("on the horizon") to arrive at Wake Atoll (hereafter referred to generally as "Wake"). As such, species could be observed at Wake that are not included in this guide. Identification to species level often requires close up details of the animal. As a result, it is ideal to capture, contain, or at minimum photograph an animal if there is question of identification.

We included a quick reference guide, beginning with the species that have been recorded at Wake, with a recent (1923 to 2019) physical voucher (specimen or photograph) followed by species that have the highest likelihood of arriving unintentionally through human movement. This guide includes abbreviated information regarding the status for Wake, that is to say, whether they are considered to be native, endemic, adventive or invasive, or no record; their four-letter species code (the first two letters of their genus combined with the first two letters of their specific epithet) for ease of reference; their size, as indicated by the range of adult snout vent length (SVL); and the time they are most active (day or night). More information regarding status is provided in the "Species Accounts for Taxa Recorded at Wake Atoll" section.

Photographs for the "Quick Reference Guide" section were provided by A.R. Backlin, C.W. Brown, R.N. Fisher, S. Fisher, S.A. Hathaway, and J.Q. Richmond, U.S. Geological Survey. Graphics and illustrations were created by C.J. Hitchcock, U.S. Geological Survey.

Information for Reference

General Shapes:



Definitions

Dorsal	upper side or "back" region of an individual
Ventral	underside or "belly" region of an individual
Lateral	along the sides of the body of an individual
SVL	snout vent length; the distance between the tip of the snout and the cloaca (opening on underside near base of tail) of an individual
Lamellae	thin plates or scales on underside of toes of lizards
Adventive	a species persisting outside its native range after arrival by human activity directly or indirectly, intentionally, or accidentally
Invasive	adventive but has the potential to become a problem economically or ecologically at the site locally
Endemic	a species that exists only at the site locality
Native	a species that naturally inhabits the site locality

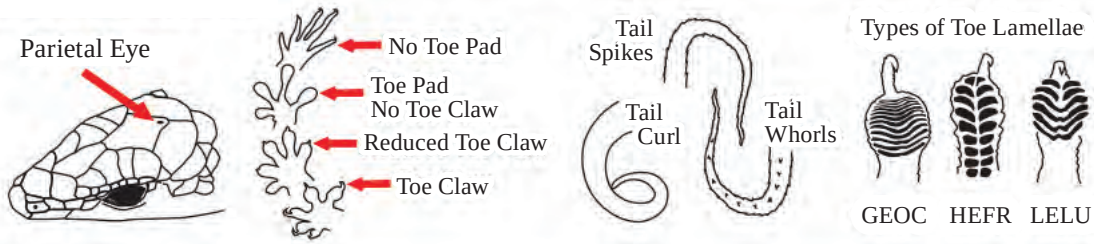
Risk Assessment

Low (Risk)	likely not to be an economic or ecological problem
Medium (Risk)	could pose a moderate economic or ecological problem
High (Risk)	Likely to pose an economic or ecological problem

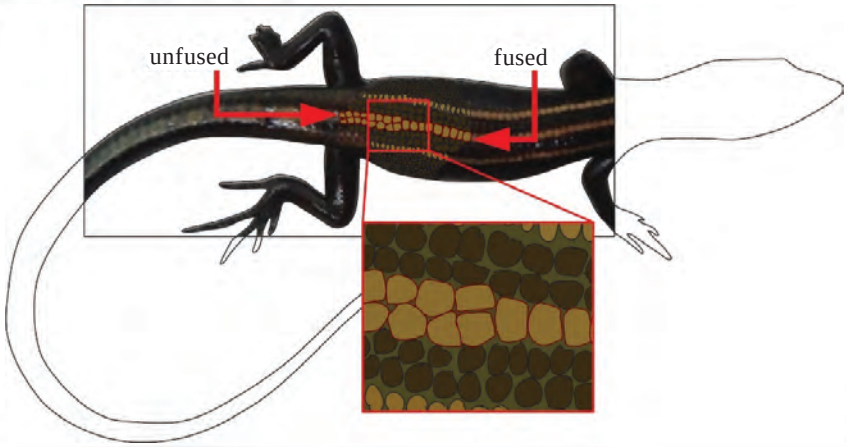
Management Feasibility

Very low (Feasibility)	highly unlikely to be effectively eradicated or controlled
Low (Feasibility)	unlikely to be effectively eradicated or controlled
Medium (Feasibility)	moderate likelihood to be effectively eradicated or controlled
High (Feasibility)	likely to be effectively eradicated or controlled

Diagnostic Characters:



Example of fused and unfused scales:

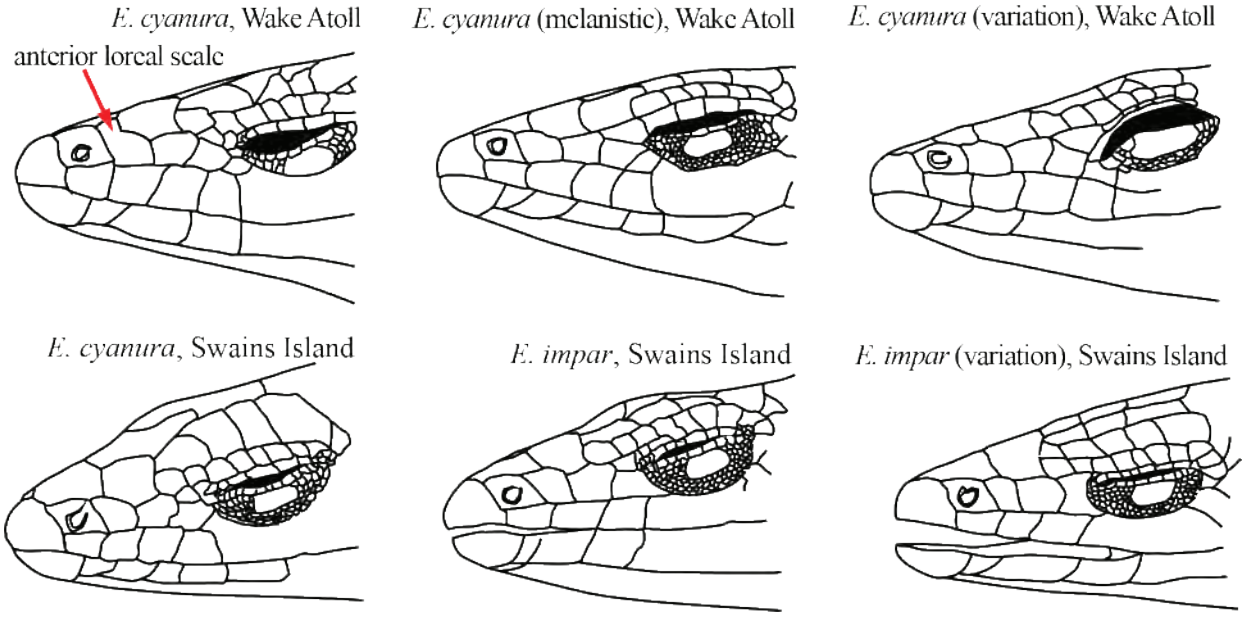


Graphics and illustrations were created by C.J. Hitchcock, U.S. Geological Survey.

Anterior Loreal Guide

The two skinks *Emoia cyanura* and *Emoia impar* can be difficult to tell apart, so we highlight specific distinguishing characters. Typically, although not always, *E. cyanura* has a visible parietal eye, which *E. impar* lacks. *Emoia impar* generally has one or more points with paired dorsal scale fusion along the midline where it has its central stripe, and *E. cyanura* does not have this feature. *Emoia cyanura* has a white underside, and *E. impar* has a grey/dusky belly. The last main character that separates the two species is the anterior loreal scale. Because we did not capture any *E. impar* during our survey, and there is only one museum specimen of the species at the Bernice Pauahi Bishop Museum from the Tanager Expedition, we do not know the variance in the shape of this scale in Wake across both species. This difference is subtle; it requires the capturing of the animal and close examination with a strong hand lens or microscope while measuring with calipers to distinguish. This practice is not practical for most rapid field assessments. Typically, *E. cyanura* has an anterior loreal scale that is "wider than tall," and *E. impar* has an anterior loreal scale that is "taller than wide." When we looked at the scales for the *E. cyanura* on Wake, we did not find them to be typical, so we have included a diagram to reduce confusion. In the three examples from Wake shown on the figure, the anterior loreal scales are not longer than tall but are convex posteriorly. This shape makes using the loreal scale as a character difficult. We also illustrate one *E. cyanura* and two *E. impar* from Swains Atoll for comparison. These illustrations show that the *E. cyanura* from Swains Atoll has a similar anterior loreal scale to specimens from Wake, but the difference in shape for *E. cyanura* is striking compared to *E. impar* in which the anterior loreal scale is more angular and "taller than wide." The one museum specimen of *E. impar* from Wake has a scale that is similar to the *E. impar* from Swains Atoll, and thus, we accept that identification. Although we did not detect *E. impar* at Wake, the previous identification indicates that continuing the search is reasonable.

Anterior loreal scale illustrations:



Graphics and illustrations were created by C.J. Hitchcock, U.S. Geological Survey.

Components of Species Accounts:

Photograph by A.R. Backlin, U.S. Geological Survey

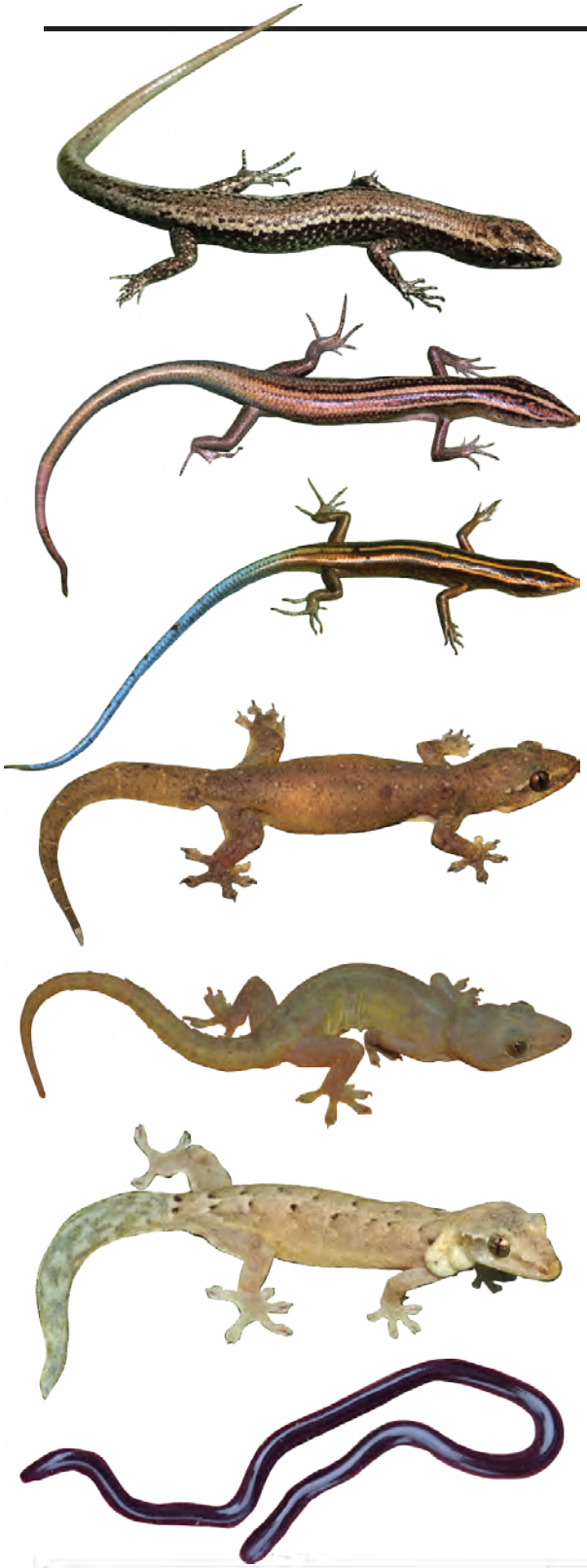
Description: A general description and photographs of species' characteristics to help in identification. We point out species that are often difficult to distinguish from each other and highlight features to assist with correctly identifying them. Note: Lizards can regrow their tails when lost to predators or injury. References to tail descriptions in this guide assume that it is the original tail, not one that has regenerated (see example of regrown tail in the photograph shown).

Habitat: A general description of what types of habitats a species is likely to prefer and in which habitats they are likely to be detected.

Historical Status and Distribution: Refers to when a species was first documented and possibly last seen at Wake, on which islets (if known), whether a species is considered native, endemic, adventive, or invasive, and remarks about its relative abundance.

Risk Assessment: We carried out a preliminary risk assessment for individual taxa (plants, arthropods, and reptiles) to rank species established at Wake according to their invasive effect (known or potential) and management feasibility for prioritizing integrated pest management at Wake (Hathaway and others, 2022). Species' invasive effect was ranked high, medium, or low based on published risk assessments, when available, or based on effects of similar species.

We include a datasheet at the back of this guide (Supplemental D.1) for reporting any potential observations of species not known to be native or already established on Wake.



Quick Reference Guide

SPECIES RECORDED

Cryptoblepharus poecilopleurus
Oceania Snake-eyed Skink
Status: native or endemic
4-Letter Code: CRPO
SVL: 37-51 mm (1.5-2 inches)
DAY

Emoia cyanura
Azure-tailed Skink
Status: adventive or native
4-Letter Code: EMCY
SVL: 39-56 mm (1.5-2.2 inches)
DAY

Emoia impar
Dark-bellied Copper-striped Skink
Status: adventive or native
4-Letter Code: EMIM
SVL: 40-47 mm (1.5-1.85 inches)
DAY

Gehyra insulensis
Pacific Stump-toed Gecko
Status: adventive
4-Letter Code: GEIN
SVL: 36-50 mm (1.4-2 inches)
NIGHT

Hemidactylus frenatus
Common House Gecko
Status: invasive
4-Letter Code: HEFR
SVL: 42-60 mm (1.6-2.4 inches)
NIGHT

Lepidodactylus lugubris
Mourning Gecko
Status: native
4-Letter Code: LELU
SVL: 33-49 mm (1.3-2 inches)
NIGHT

Ramphotyphlops braminus
Brahminy Blindsnake
Status: adventive
4-Letter Code: RABR
SVL: 98-170 mm (3.9-6.7 inches)
NIGHT

Photographs for the "Quick Reference Guide" section were provided by A.R. Backlin, C.W. Brown, R.N. Fisher, S. Fisher, S.A. Hathaway, and J.Q. Richmond, U.S. Geological Survey. Graphics and illustrations were created by C.J. Hitchcock, U.S. Geological Survey.

Quick Reference Guide

SPECIES WHICH MAY ARRIVE

Rhinella marina
Cane Toad
Status: no record
4-Letter Code: RHMA
SVL: 80-238 mm (3.1-9.25 inches)
NIGHT

Eleutherodactylus coqui
Coqui Frog
Status: no record
4-Letter Code: ELCO
SVL: 35-60 mm (1.4-2.4 inches)
NIGHT

Lampropholis delicata
Metallic Skink
Status: no record
4-Letter Code: LADE
SVL: 30-45 mm (1.2-1.8 inches)
DAY

Lipinia noctua
Moth Skink
Status: no record
4-Letter Code: LINO
SVL: 35-45 mm (1.4-1.8 inches)
DAY

Carlia ailanpalai
Admiralty Brown Skink
Status: no record
4-Letter Code: CAAI
SVL: 48-60 mm (1.9-2.4 inches)
DAY

Nactus pelagicus
Pacific Slender-toed Gecko
Status: no record
4-Letter Code: NAPE
SVL: 50-75 mm (2-3 inches)
NIGHT

Quick Reference Guide

SPECIES WHICH MAY ARRIVE

Gehyra oceanica
Oceanic Gecko
Status: no record
4-Letter Code: GEOC
SVL: 60-85 mm (2.4-3.4 inches)
NIGHT

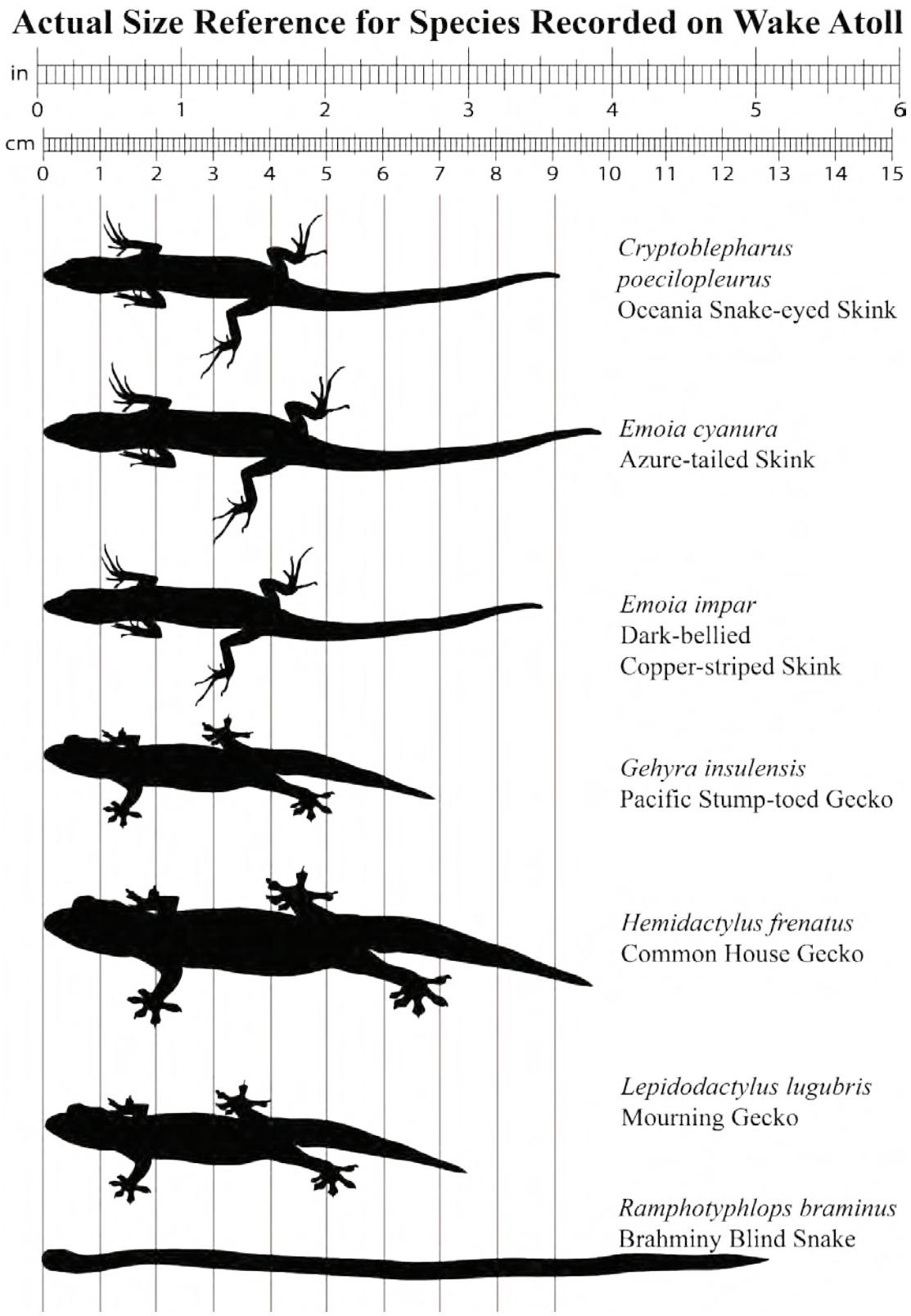
Phelsuma laticauda
Gold-dust Day Gecko
Status: no record
4-Letter Code: PHLA
SVL: 45-60 mm (1.8-2.4 inches)
DAY

Anolis carolinensis
Green Anole
Status: no record
4-Letter Code: ANCA
SVL: 50-70 mm (2-2.8 inches)
DAY

Anolis sagrei
Brown Anole
Status: no record
4-Letter Code: ANSA
SVL: 45-70 mm (1.8-2.8 inches)
DAY

Boiga irregularis
Brown Tree Snake
Status: no record
4-Letter Code: BOIR
SVL: 80-250 cm (31.5-98.5 inches)
NIGHT

Pituophis catenifer
Gopher Snake
Status: single record
4-Letter Code: PICA
SVL: 76-153 cm (30-60 inches)
DAY



Graphics and illustrations were created by C.J. Hitchcock, U.S. Geological Survey.

Species Accounts for Taxa Recorded at Wake Atoll

Diagnostics for species accounts for taxa recorded at Wake Atoll and for horizon species were based our own data as well as drawn from Buden, 2009; Tonione and others, 2011; Zug, 2013; and Buden and Taboroši, 2016.

Lizards (Skinks and Geckos)

Oceania Snake-eyed Skink, *Cryptoblepharus poecilopleurus* (Weigmann, 1836)

Description: The Oceania snake-eyed skink is small to midsized, with slightly elongate-body, short limbs, and a long sub-cylindrical tapering tail. The head is ovate and barely distinguishable from the neck. This species does not have eyelids. The eyes are protected by a clear scale. The dorsum color is variable but consistent within local populations from golden tan to coppery brown with dark flecks on top and cream spots on the sides. The tail is typically a lighter shade than the body. The underside can be bluish white to creamy tan. Adult SVL ranges from 37 to 51 millimeters (mm) and hatchlings from 21 to 23 mm.

Habitat: This species is typically detected in beach habitats of rock shorelines and beach side trees and shrubs. Most active during daytime.

Historical Status and Distribution: Native or endemic. First recorded in 1871, last recorded in 2019 (U.S. Geological Survey) on Wake, Wilkes, and Peale Islets.

Risk Assessment: Not applicable.

Photographs by A.R. Backlin, U.S. Geological Survey

Azure-tailed Skink, *Emoia cyanura* (Lesson, 1830)

Description: The azure-tailed skinks' dorsal ground color is black to dark copper, overlain by three bright cream-to-copper stripes. The mid-dorsal stripe extends from the tip of the snout to the tail. In "melanistic" individuals, stripes are often lacking, and the skin is dark copper. The tail is bluish in some small juveniles but typically greenish brown in juveniles and adults, although more often brown in adults. The underside is white with coppery overtone and may be tinged with green near the vent. This species may have a distinct parietal eye. Adults range from 39 to 56 mm SVL, and hatchlings range from 20 to 23 mm SVL. The tail is 150–175 percent of the SVL.

Habitat: This species is predominantly terrestrial but forages occasionally on the low bases of trees and in the lower branches of trees or axils of palms and pandanus. The azure-tailed skink prefers open-sky habitat, such as lawns and shrubby areas within urban landscapes or grassy beach-sides, gardens, and open-canopied, secondary-growth forests. Most active during daytime.

Historical Status and Distribution: Adventive or native. First recorded in 1923 (Tanager Expedition), last recorded in 2019 (U.S. Geological Survey) on Wake, Wilkes, and Peale Islets.

Risk Assessment: Low.

Photographs by C.W. Brown and A.R. Backlin, U.S. Geological Survey

Dark-bellied Copper-striped Skink, *Emoia impar* (Werner, 1898)

Description: The dark-bellied copper-striped skink has a dorsal ground color of black to dark copper, overlain by three bright copper-color stripes, which are usually distinct to the anterior trunk and fading thereafter. The mid-dorsal stripe extends from the tip of the snout to the tail. In "melanistic" individuals, stripes are generally absent, and the skin is dark copper. The tail is bright blue in juveniles and fading but distinctly blue in adults. The mid-dorsal paired row of scales almost always has some pairs fused into larger single scales. The underside is a gray/dusky color. Adult SVL ranges from 40 to 47 mm, and hatchling SVL is about 22 mm. The tail is usually 125–175 percent of the SVL.

Habitat: This species is generally shade-loving, detected mainly in strong canopied forest or at forest edges. This skink is predominantly terrestrial but forages occasionally on the bases of trees and in the lower branches of trees or axils of palms and pandanus. Most active during daytime.

Historical Status and Distribution: Adventive or native. Only one record from 1923 (Tanager Expedition); no additional location description beyond "Wake Island."

Risk Assessment: Low.

Photographs by C.W. Brown U.S. Geological Survey

Pacific Stump-toed Gecko, *Gehyra insulensis* (Girard, 1857)

Description: The Pacific stump-toed gecko is usually unicolor dorsally from light gray to medium brown, often with brown blotches, and occasionally, white spots with the tail often alternating lighter and darker bands. The underside tends to be pale gray or yellow. Toe pad lamellae are broad and divided. The tail is usually a thick, slightly flattened cylinder, tapering to a blunt tip. Adult SVL ranges about 36–50 mm, and hatchlings range about 21–23 mm SVL. The skin is loosely attached and often peels when captured.

Habitat: Outside of its native range, this species is most often detected with human habitation and less often in forests. Most active during nighttime.

Historical Status and Distribution: Adventive. First recorded in 1923 (Tanager Expedition) on Wilkes Islet, and also the last record with a specimen; a verbal record on Wilkes Islet with no supporting documentation was last made in 1998.

Risk Assessment: Medium.

Photographs by R.N. Fisher, C.W. Brown, and A.R. Backlin, U.S. Geological Survey

Common House Gecko, *Hemidactylus frenatus* Schlegel, 1836

Description: The common house gecko is a midsized, moderately robust, slightly flattened lizard with well-developed limbs. Coloration is light to medium gray to dusky brown. There may be a lateral brown stripe from the snout to the hind limb. The underside may be whitish to dark beige. Toe lamellae are divided except near the base of the toe. The tail is strongly segmented with large, flattened cone-shaped scales. Adult SVL ranges from 42 to 60 mm, with the tail about equal length to the body. Hatchlings' SVL ranges from 19 to 26 mm.

Habitat: This species is rarely detected away from human structures, but on Wake, it has recently (2019) been reported throughout the atoll. This gecko species may be seen or heard during daytime but most often at night.

Historical Status and Distribution: Invasive. First recorded 1953, last recorded 2019 (U.S. Geological Survey) on Wake, Wilkes, and Peale Islets.

Risk Assessment: High.

Common house gecko (top, bottom left, and middle in bottom right). All other geckos (bottom) are mourning geckos. Photographs by C.W. Brown, A.R. Backlin, and S.A. Hathaway, U.S. Geological Survey

Mourning Gecko, *Lepidodactylus lugubris* (Duméril and Bibron, 1836)

Description: The mourning gecko is a small, moderately robust lizard with short, well-developed limbs and tail. Color is generally light to medium brown with variable dorsal patterns that may be unicolor to dark and may have chevrons or dark blotches. The underside is white to light beige. Only the distal two or three lamellae are divided. The tail is thick and flattened tapering to a blunt tip. Adult SVL ranges from 33 to 49 mm, with the tail longer than body, and hatchlings range from 14 to 20 mm SVL.

Habitat: This species is commonly associated with humans, but its habitat ranges from shrubs bordering beaches to secondary forest, and it is generally less abundant in gardens, disturbed forest, and rock outcrops. This species is seen or heard most often at night.

Historical Status and Distribution: Native. First recorded 1923 (Tanager Expedition), last recorded 2019 (U.S. Geological Survey) on Wake, Wilkes, and Peale Islets.

Risk Assessment: Not applicable.

Photographs by C.W. Brown and R.N. Fisher, U.S. Geological Survey

Snakes

Brahminy Blindsnake, *Ramphotyphlops braminus* (Daudin, 1803)

Description: The Brahminy blindsnake is a tiny snake that resembles an earthworm and has a rounded head with vestigial eyes that are difficult to see and a pointed tail with a tiny spur at the end. Total length is 98–170 mm.

Habitat: This species lives in soil and can be detected in leaf litter, rocks, and debris. This snake is occasionally seen on the surface, especially after rain.

Historical Status and Distribution: Invasive. First recorded 1998 on Wake Islet, last recorded 2017 on Peale Islet.

Risk Assessment: Low.

Photographs by A.J. Louros, U.S. Geological Survey

Horizon Species: Descriptions

Frogs and Toads

Cane Toad, *Rhinella marina* (Linnaeus, 1758)

Description: The cane toad has variable coloration from tan to reddish, brown to gray, with dark spots. This species has large prominent glands on its shoulders and ridges on the top of its head. Adults range from 80 to 238 mm.

Habitat: Cane toads can be detected near human habitation and will breed in the vegetated areas of any freshwater habitat. This species is most active during nighttime.

Historical Status and Distribution: No record on Wake.

Risk Assessment: Not assessed. Invasive on many islands, including Hawai`i and Guam.

Photographs by C.W. Brown, C.J. Hitchcock, and A.R. Backlin, U.S. Geological Survey

Coqui Frog, *Eleutherodactylus coqui* Thomas, 1966

Description: The coqui frog is a relatively small frog that is highly variable in coloration, including tan, yellow, orange, red, and dark brown. Coloration may have no pattern, one or two cream stripes, or patterns ranging from spots, blotches, v-shaped marks, or an "M" between the shoulders. Eyes are gold to brown. Coqui frogs are often identified (and detected) by the distinctive call "Ko-Kee" made by adult males. Adult SVL ranges from 35 to 60 mm, and froglets start at about 5 mm SVL.

Habitat: Coqui are habitat generalists and can be detected on the forest ground and varying heights using trees, shrubs, and leaf litter. This species is most active during nighttime.

Historical Status and Distribution: No record on Wake.

Risk Assessment: Not assessed. Invasive on Hawai`i and Guam.

Photographs by C.W. Brown, U.S. Geological Survey

Lizards (Skinks, Geckos, and Anoles)

Metallic Skink, *Lampropholis delicata* (De Vis, 1888)

Description: The metallic skink is a small typically brown or bronze skink often with a rainbow iridescence. Some individuals have a stripe down the back. The underside is whitish with gray striations on the throat. Adults range from 30 to 45 mm SVL. The tail is much longer than the body.

Habitat: The metallic skink is ground dwelling and uses leaf litter across a variety of habitats from urban to farmland and scrub to forest. This species is most active during daytime.

Historical Status and Distribution: No record on Wake.

Risk Assessment: Not assessed. This invasive species is now the dominant invasive skink on the island of Hawai`i.

Photographs by C.W. Brown, U.S. Geological Survey

Moth Skink, *Lipinia noctua* (Lesson, 1830)

Description: The moth skink is a small and slender lizard with a cylindrical tail. The body color is light to medium brown. The head is triangular with a light spot which transforms into a mid-dorsal stripe. It has a dark brown stripe that starts before the eye and runs down to base of the tail. Adult SVL ranges from 38 to 47 mm, and hatchling SVL ranges from 15 to 17 mm.

Habitat: This species prefers forest floor to scrubby forest and edge habitat in some areas but is strongly arboreal in open areas and less-disturbed areas. This species is most active during daytime.

Historical Status and Distribution: No record on Wake.

Risk Assessment: Not assessed.

Photographs by C.W. Brown, U.S. Geological Survey

Admiralty Brown Skink, *Carlia ailanpalai* Zug, 2004

Description: The Admiralty brown skink is mid-sized and stockier/bulkier than skinks known to inhabit Wake. It has normal shaped limbs and a thick tail. This species has only four toes on its forelimbs. No other skinks currently (2019) recorded on Wake have only four toes. The dorsum color is pale orangish, brown, or smokey grey. It has a lighter orange or pinkish underside and lacks striping seen in skinks at Wake, with the exception of melanistic azure-tailed skinks. Adult SVL ranges from 48 to 60 mm and hatchlings range from 22 to 25 mm SVL.

Habitat: This species is quite broad in its habitat use, including extremely urban areas and even walking into the open doors of buildings. It is sometimes called the curious skink due to this behavior. Most active during daytime.

Historical Status and Distribution: No record for Wake.

Risk Assessment: High. This species is considered invasive where it has been introduced, including Guam, Palau, and in the Federated States of Micronesia on Yap and Chuuk (Buden, 2009). If observed, rapid action is warranted.

Photographs by R.N. Fisher, U.S. Geological Survey

Pacific Slender-Toed Gecko, *Nactus pelagicus* (Girard, 1858)

Description: The Pacific slender-toed gecko is a mid-sized gecko with a circular tail. It lacks wide toepads. The body and head are brownish grey with white spots along the labial scales and darker blotches or crossbands on the back. This species has rough skin with rows of elevated scales in parallel following its dorsal surface. The eyelids are yellowish, and the eyes are gold and red. The tail is banded. The underside is purplish grey but can change color to whitish. Adult SVL ranges from 48 to 75 mm.

Habitat: This species typically roams across the forest floor and stays low in trees and bushes and can sometimes be detected on the walls of houses. This species can be detected under rocks and coconuts during daytime. Most active at night.

Historical Status and Distribution: No record on Wake.

Risk Assessment: Low. This species is known to be in Guam and across the Federated States of Micronesia. This species is not known to be invasive anywhere; however, it is parthenogenic, so one female may start a new population on Wake if she arrives there.

Photographs by C.W. Brown and J.Q. Richmond, U.S. Geological Survey

Oceanic Gecko, *Gehyra oceanica* (Lesson, 1830)

Description: The oceanic gecko is a fairly robust lizard with short limbs. This species is usually unicolor dorsally from light or dark olive-brown to gray, with the tail often alternating lighter and darker bands. A pale stripe may extend from the snout through the eye to above the ear opening. The underside tends to be uniformly grayish olive or yellow. The toe lamellae are thin and undivided. The tail is usually a thick, slightly flattened cylinder, tapering to a blunt tip. Adult SVL ranges 59–84 mm, and hatchlings range 28–34 mm SVL. The tail is about the same length as the body.

Habitat: This species uses a range of habitats, including gardens, forests, and buildings. They are mostly seen at night but may be out in shade during the day. They particularly like banana plants.

Historical Status and Distribution: No record on Wake.

Risk Assessment: Low. Widespread in the central Pacific. There are no known invasive populations of this species. If this species established at Wake, it might only persist around the populated areas where there is more moisture.

Photographs by C.W. Brown, U.S. Geological Survey

Gold-dust Day Gecko, *Phelsuma laticauda* (Boettger, 1880)

Description: The gold-dust day gecko is a mid-sized gecko that is dorsally flattened and has a flat tail. The head is large and flattened. This species lacks claws on any of its toes. It is dorsally green with blue stripes on its head and red cross bands. It has three red streaks on its back and yellow/gold dusty coloration on the back of its head, neck, and shoulders. It has a blue ring around its eye and a red iris. Adult SVL ranges from 45 to 60 mm, and hatchlings range from 38 to 42 mm SVL.

Habitat: This species is invasive around houses on garden plants and can be detected on buildings and along rock walls as well as in scrubby habitats; however, it is not often seen on the ground. Most often active during daytime but can be detected near lights on buildings at night.

Historical Status and Distribution: No record on Wake.

Risk Assessment: Not assessed. This invasive species has been rapidly spreading and replacing all other lizards on islands in Hawai`i for the last 25 years. It has been detected in Moorea (at least since 2006) and in California (in 2017); it has been detected in a few nurseries. This species is considered invasive in Hawai`i and could become damaging to species in Wake if it arrived and spread.

Photographs by C.W. Brown, U.S. Geological Survey

Green Anole, *Anolis carolinensis* Voigt in Cuvier and Voigt, 1832

Description: The green anole is a mid-sized lizard with an elongated body, very pointed head, and a long and slender tail. This species has toe pads like some geckos. Coloration is uniformly green above but can be brown depending on the background substrates, and it has a white stripe along its dorsal mid-line. The underside is pure white and lacks any other color patterning. Adult SVL ranges from 50 to 70 mm, and hatchlings are about 21 mm SVL.

Habitat: This species is typically detected off the ground, on plants in gardens, and on the walls of houses. It will change colors to match its background. Most active during daytime but can be active near lights at night.

Historical Status and Distribution: No record on Wake.

Risk Assessment: High. This species is invasive in Hawai`i, some islands in Japan, the southern Mariana Islands, and Palau and Yap in the Caroline Islands. Because this species has affected the Oceania snake-eyed skink in Japan, we consider it a species of concern if it arrives in Wake.

Photographs by C.W. Brown and S. Fisher, U.S. Geological Survey

Brown Anole, *Anolis sagrei* Cocteau in A. M. C. Duméril and Bibron, 1837

Description: The brown anole is a mid-sized lizard and has a squat body and long limbs with a long tail. Coloration is brown with various possible patterns but typically has a white dorsal stripe. Males have an orange dewlap (a flap of skin that hangs beneath the lower jaw often brightly colored and used for territorial or mate signaling). The tail is dorso-laterally flattened. Adult SVL is from 45 to 70 mm, and hatchlings range 15–16 mm SVL.

Habitat: This species can be detected on various substrates on the ground and low on trees and bushes and rock and brick walls. Most active during daytime but can be active near lights at night.

Historical Status and Distribution: No record on Wake.

Risk Assessment: High. This species has been rapidly replacing many other lizards on islands in Hawai`i during the last decade and seems to have displaced Oceania snake-eyed skinks on Hawai`i in their nearshore habitats. This species has the potential to displace Oceania snake-eyed skinks because it utilizes the same habitats, and this species is much more aggressive and larger.

Photographs by S. Fisher, U.S. Geological Survey

Snakes

Brown Tree Snake, *Boiga irregularis* (Bechstein, 1802)

Description: The brown tree snake is a large and slender snake. It has vertical pupils and a large triangular head. It is brown or greenish yellow with some cross banding. Adult SVL ranges from 80 to 250 cm, and hatchlings are about 330-mm SVL.

Habitat: These snakes live in trees and shrubs but can be detected on houses, in the eves and other building features, in vehicles, and generally anywhere. They are active at night.

Historical Status and Distribution: No record on Wake.

Risk Assessment: High. These snakes have been a highly problematic invasive species in Guam, affecting biodiversity and economic health for more than 60 years (Rodda and Savidge, 2007; Soto and others, 2022). This species could decimate the birds and lizards of Wake if it arrived and could be difficult or impossible to eradicate if established.

Photographs by J.Q. Richmond and R.N. Fisher, U.S. Geological Survey

Gopher Snake, *Pituophis catenifer* (Blainville, 1835)

Description: The gopher snake is a heavier bodied snake with a tapering tail. It is tan with blotches across its dorsum. It has rounded pupils. Adult SVL ranges from 76 to 153 cm.

Habitat: The species is typically detected on the ground and will hide under surface objects. It is often active during daytime.

Historical Status and Distribution: There was one record at Wake from 1948.

Risk Assessment: Low. The species does not appear to be invasive anywhere. Because it is not a tropical species, it might not be able to establish in this environment.

Photographs by A.R. Backlin and C.W. Brown, U.S. Geological Survey

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Supplemental D.1.

Example Species Observation Data Sheet

Species Observation Data Sheet

Please return this form and any photographs and collected material to:
(Name/Contact Information) _____ _____

Contact the 611th CES, Natural Resources Manager, for further information (907-552-0788) or Wake Island Base Operations (808-424-2222)

BASEOPS@WAKEISLAND.NET ***and*** **james.stanford.5.ctr@us.af.mil**

Date of Observation:

Observer Name:

Contact Information:

email:

phone number(s):

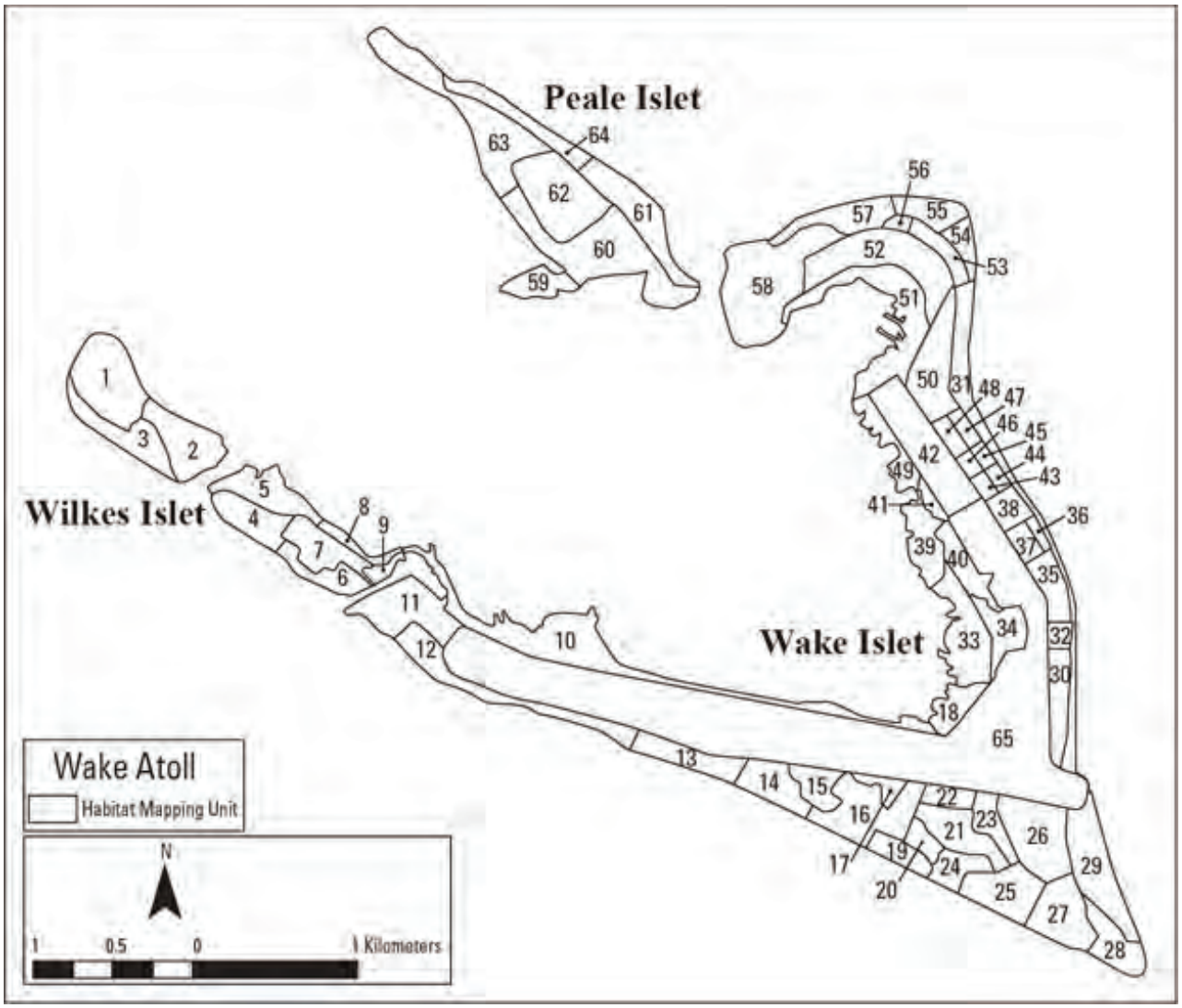
Species Observed (if identified):

Please circle one: Was it alive, dead, unknown

Was it collected?

Photographed?

Where was it seen? Please describe as many details as possible (for example, in woodpile at Building X) and indicate where as specifically as possible on the illustration on back of this page.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Wilkes Islet
Wake Islet
Wake Atoll
Habitat Mapping Unit
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