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Technical Report 83
BOTANICAL INVENTORY OF THE PROPOSED
TA'U UNIT OF THE NATIONAL PARK
OF AMERICAN SAMOA

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INTRODUCTION

The Geography

Samoa is a volcanic archipelago situated in the south Pacific Ocean at a latitude of 13–15° south (11° when Swains Island is included) and a longitude of 168–173° west, and runs in a west-northwest direction east of Fiji, north of Tonga, south of Tokelau, and west of Niue and the Cook Islands. It comprises nine inhabited volcanic islands, plus Swains Island and uninhabited Rose Atoll, and has a total area of *ca.* 3100 km².

The archipelago is divided politically into Western Samoa, which is an independent country, and American Samoa, which is an unincorporated territory of the United States. American Samoa consists of five main volcanic islands and two atolls. Ta'u, on which the new proposed park is located, is the easternmost of the volcanic islands. It is one of three islands collectively known as Manu'a (the others being 'Ofu and 'Olosega lying several km to the west of Ta'u), and has an area of 39 km² and a maximum elevation of *ca.* 960 m at the summit of Mt. Lata. The population of the island, estimated (1986) to be about 3500, resides in three villages—Fiti'uta, Faleasao, and Ta'u (Douglas & Douglas 1989).

The Climate

Since Ta'u is a small island situated between the Tropic of Capricorn and the Equator, its climate is maritime and tropical. It belongs to Koeppen's "tropical climate zone" characterized by average monthly temperatures of more than 18°C, no winter season, and abundant annual rainfall that exceeds annual evaporation. Although there is no climatological data available from the island, data from a nearby weather station at Tafuna, Tutuila, suggests that typical mean monthly temperatures (at sea level) are about 24°C, and the difference between winter (July to September) and summer (January to

March) mean is only about 1°C (Amerson *et al.* 1982).

The relative humidity is constantly high, ranging between 82 and 86% (at 5 p.m.) throughout the year (Amerson *et al.* 1982). Rainfall is heavy, probably averaging over 2500 mm in all places on Ta'u. At Tafuna on Tutuila, the highest mean monthly rainfall occurs in December (350 mm) and the lowest in September (150 mm); the wettest season is December to April, the driest is June to September. Droughts of varying duration occasionally occur, but these do not have much permanent effect on the vegetation. Hurricanes, the most recent of which were in 1987 (known as Tusi), 1990 (Ofa), and 1991 (Val), periodically hit the islands, but the occurrence of three strong hurricanes in such close proximity is unusual.

The Geology

Samoa is a volcanic archipelago that is "oceanic" in origin, i.e., it was formed from basalt rising from a "hot spot" on the ocean floor of the Pacific basin beyond the continental islands to the west. The archipelago was born in isolation, and has never had a connection to any other land area. The islands originated in the Pliocene Epoch (over two million years ago), and the islands were formed generally in a westerly direction, with the youngest on the west end of the chain (Savai'i) and the oldest on the east end (Rose Atoll). The most recent volcanic activity in the vicinity of Ta'u, a submarine eruption between Ta'u and 'Olosega, occurred in 1866, but there are no signs of recent vulcanism on the Manu'a Islands themselves over the last two thousand years or more.

Ta'u was formed mostly by a single shield volcano whose caldera was located on the south side of the present island. The summit of the rim of the old caldera is called Mt. Lata, which reaches an elevation of about 960 m. A subsequent series of collapses formed the scenic escarpments, sea cliffs, and terraces that comprise the south coast of the island (Figs. 1 & 2). The largest and most accessible of the terraces,

Laufuti terrace, begins at the southeast corner of the island and gently slopes up to the west along the base of the imposing inland cliffs (Fig. 3) that lead up to the summit of Mt. Lata. A spectacular, short, steep-sided canyon (called Laufuti) cuts into its central portion, forming a series of waterfalls at its head.

Volcanic activity after the formation of the main shield left a series of volcanic cones and pit craters, the largest of which is Luatele Crater (listed on some maps as Judd's Crater, a name unknown to the local inhabitants) on the northeast corner of the island and the park (Fig. 4). There are also a series of volcanic cones near the summit of Mt. Lata (Fig. 5), including Olomanu, Olomatimu, and Olotania on the northwest portion of the park, and several craters on the terrace above Leavania. Marine erosion has produced the majestic cliffs (Fig. 6) and talus slopes that surround the island, and erosion and deposition created the flat and narrow bench that extends the length of the east coast of the island (and park) a few meters above sea level. The geology of the island was described in some detail by Stice and McCoy (1968).

Floristic Studies on Ta'u

The first collections of plant specimens from Ta'u were made during the visit of the United States Exploring Expedition (U.S.E.E.) to Samoa in 1839. The specimens, collected by W. Brackenridge, W. Rich, and C. Pickering, are now stored at the Smithsonian Institution and the Gray Herbarium. Unfortunately, they were poorly curated, and mistakes in locality are not uncommon. In fact, some specimens of endemic Samoan plants were incorrectly labelled as having been collected in Tahiti. Even the correctly labelled U.S.E.E. specimens only cite "Samoa" as the locality, so it is not certain which ones were collected from Ta'u—although there is some indication from the published list of U.S.E.E. specimens (Pickering 1876).

The next plant collector to visit Ta'u was apparently the Rev. T. Powell, an amateur English botanist employed as a missionary by the

London Missionary Society in Samoa (ca. 1862—1885). Powell collected about 400 specimens in Samoa, but since no listing of these has been published, and many of the specimens lack dates and localities of collection, it is not known how many are from Ta'u. The only relevant publication by Powell was a list of Samoan plant names (1868); only a few of the items on the list mention Ta'u or Manu'a. His specimens are stored at Kew in London.

The first flora of Samoa was written by Reinecke (1898), but it is not certain if he visited Ta'u; a few of his specimens list "Manu'a" as a locality, but this may have meant only 'Ofu or 'Olosega. The next botanist who is known to have collected on Ta'u was D. Garber, who visited the island in 1921. His collection, numbering about 240 specimens (nos. 541—782), is stored at the Bishop Museum, and is particularly representative of the fern flora of the island. Garber never published any of this Samoan work, but his collections were listed by both Christophersen (1935, 1938) and Yuncker (1945). Christophersen never collected on the island, nor did Rechinger, whose work (1907-1915) covered much of the archipelago.

The next known collections made on the island were by W. and A. Harris in 1938 and T. Yuncker in 1939. The number of specimens attributed to W. and A. Harris is about 350, most of which are weeds, while Yuncker collected about 300 specimens (nos. 9001—9298). Both of these collections were listed by Yuncker in his publication, *Plants of the Manua Islands* (1945), and are stored at the Bishop Museum. Other minor collections from Ta'u were made by Judd, McMullin, Swezey, Christ, and Schultz, but only a few specimens are known from each. P. Cox collected a small number of specimens on the island during trips in 1979 and 1987, but these records have not been published.

The original botanist on the study of American Samoa by Amerson *et al.* (1982), J. Kuruc, collected a number of specimens from the islands Samoa (including Ta'u), but except for a few, these are without any data. The remainder

of the specimens from the Amerson *et al.* study were collected in 1975 and 1976 by the present author, and along with specimens from an unrelated 1974 visit, number about 378 (1290—1418, 3125—3226, 3305—3331, 3552—3599, 3674—3745). A checklist of the flora of American Samoa, island by island, was published as an appendix in a vegetation study (Whistler 1980). The author's specimens from Ta'u are in his personal collection, with numerous duplicates stored in several herbaria, most notably, the Bishop Museum, Smithsonian, Kew, and Berlin. The most recent Ta'u collections were made during the present study (December 1990 to January 1991) by the author. This collection comprises about 513 numbers (7503—8015), a set of which is deposited with the National Park Service.

Compared to the "continental" islands of Melanesia to the west, Samoa has a highly attenuated flora—perhaps only a third as large as that of Fiji, which lies just 700 miles to the west. However, this is larger than that of any other tropical Polynesian archipelago except Hawai'i, which has fewer genera but more species. The Samoan flora is estimated to consist of about 550 native species of flowering plants (two thirds of them in the Dicotyledonae). These are included in about 282 genera in 95 plant families. There are also about 225 species of ferns and fern allies, most of which are listed in Christensen (1943). The level of endemism of the angiosperms is estimated to be about 30% (Whistler 1992) at the species level, but only one genus, *Sarcopygme* of the Rubiaceae family, is endemic to Samoa. Another 250 or so plants, most of them introduced species, are classified as weeds or adventive species (Whistler 1988b).

Based on the recent field work completed by the author in January of 1991, and on a review of the previous literature and collections from the island, the native flora of Ta'u is estimated to consist of approximately 329 native species of vascular plants (see Appendix B for a complete listing of species). This total comprises 71 monocots, 151 dicots, 100 ferns, and 7 fern al-

lies. An additional 131 species of vascular plants (all angiosperms) have been introduced and naturalized (most of them as "weeds"), about 43 of which were brought in by Polynesians ("Polynesian introductions") prior to the European Era and 88 brought in during recent times ("modern introductions") after about 1800.

The largest plant families represented in the Ta'u flora are Orchidaceae (43 native species), Rubiaceae (14), Fabaceae (11), Cyperaceae (11), Euphorbiaceae (8), Poaceae (7), Urticaceae (7), Piperaceae (6), and Moraceae (6). As noted earlier, the rate of endemism in Samoa is about 30%, but the endemism for the island itself is less than 1%; the only plant reported to be endemic to Ta'u is *Asplenium powellii*, and even this species needs further study. Another four species, *Malaxis* sp., *Pneumatopteris* sp., *Coryphopteris* sp., and *Polypodium* sp., need further work on their status.

Most of the plants found on the island are not rare, and of the 329 native species, about 76% were collected during the present 1990—1991 inventory. Another 9% were collected by the author in 1974—1976, and many others were seen in a sterile state during the present study, but were not collected. Eleven of the species on the checklist of the flora (Appendix B) have never been collected; these were either never seen fertile by the author, and hence were not collected, or they were not seen at all, but were included because native informants noted their presence on the island. Those not seen but reported by informants are *Mimosa pudica* ("vao fefe"), *Cordia aspera* ("tou"), *Caesalpinia major* ("anaoso"), and *Atuna racemosa* ("ifiifi"). Overall, species collected or seen by the author include 85% of the native flora. Most of the species not reported in the last 17 years are probably still found there, but one, *Sigesbeckia orientalis*, which was a weedy Polynesian introduction, is likely to be extinct on Ta'u (and in Samoa).

Vegetation Studies on Ta'u

The study of the vegetation of Samoa in general, and Ta'u specifically, has lagged far behind the study of the flora, and prior to 1976, very little had been published on it. The first known ecological research that included Ta'u was done on wetlands of American Samoa (Whistler 1976), but the only area on the island visited (the Ta'u Village marsh) is located outside the park boundaries. A more recent study (Cole *et al.* 1988) included a detailed vegetation map of all the American Samoan islands, but Ta'u was not visited during that study, and the numerous vegetation units recognized there proved to be so complicated (and perhaps spurious) that it was of little use during the present research. Aerial photos were to be made of Ta'u prior to the beginning of the present study, but heavy cloud cover at the time of the flights precluded this. Consequently, the vegetation map shown in Fig. 7 is basically a modified form of the one presented in Wingert (1981).

The survey of the wildlife and vegetation of American Samoa (Amerson *et al.* 1982) carried out in 1975—1976 includes most of the ecological information recorded until the present study. The botanical portion of that study (Whistler 1980) included ten plots sampled on Ta'u, and six of these are included within the park boundaries. Because the terminology in that study is now a little out of date, the vegetation units recognized in the present report are based on more recent and more comprehensive studies (Whistler 1991, 1992).

METHODOLOGY

A detailed checklist of the flora was prepared prior to the beginning of the field research on Ta'u, based on the publications of Christophersen (1935, 1938), Christensen (1943), Yuncker (1945), and Whistler (1980). The field study began in mid-December and continued until mid-January. During this period, daily field trips were made to various parts of the park. Unfortunately, because of recent hurricanes that hit the

island in 1987 and 1990, much of the forest recorded there in 1975—1976 has been severely damaged, and passage through these areas was extremely difficult. The cutting of a trail up to the summit of Mt. Lata from Fiti'uta, a map distance of only two miles, took over two full days of work to complete. Also, one of the two recent hurricanes destroyed a ladder that allowed passage to the southwest part of the park via the southwest tip of the island, making that corner of the park inaccessible during the short time of the present study.

During the field excursions, a large collection of voucher specimens was made, a set of which was submitted to the National Park Service. A complete list of the specimens collected, along with those of the previous collectors, is shown in Appendix B. Extensive field notes were taken, including information on both flora and vegetation. Since so little undisturbed forest was encountered, no plots were quantitatively sampled, but data from the plots sampled during the 1975—1976 field work (Whistler 1980) was utilized. Consequently, the following description of the vegetation of the park was prepared based upon the field work from the present study and the earlier one.

VEGETATION OF THE PARK

The Samoan archipelago has been inhabited for over 3000 years, and has been extensively modified by human activity. This long period of disturbance has resulted in the loss of much of the native vegetation that once covered the islands. Compared to other Polynesian islands and archipelagoes, Samoa, with a large area and high elevation, is somewhat less disturbed, although probably over two thirds of the native vegetation of the archipelago has been severely altered by human activity and natural catastrophes. Much of this has occurred in the last few decades, as an increasing population, an unregulated forestry industry (in Western Samoa), and recent hurricanes have taken their toll. The area within the proposed park boundaries on Ta'u is one of the best remaining areas of native vegetation in

Samoa. Unfortunately, however, it was severely damaged by the hurricanes of 1987, 1990, and 1991.

To make sense out of the plant distribution patterns found on the island, the vegetation has been divided here into the following plant communities; (1) herbaceous strand; (2) littoral shrubland; (3) littoral forest; (4) *Dysoxylum* lowland forest; (5) Mixed lowland forest; (6) montane forest; (7) summit scrub; (8) managed land; (9) disturbed wetland (10) secondary scrub; (11) secondary forest. A vegetation map of the park is shown in Fig. 7.

LITTORAL VEGETATION

The term "littoral" applied to plants refers to species that occur on the seashore and whose presence and distribution are affected either directly or indirectly by the sea. The vegetation they comprise, littoral vegetation, differs from inland plant communities in both extent (area) and distribution. It occupies a narrow strip along the coast that usually exhibits zonation into several bands that run roughly parallel to the coastline. Typically, its seaward margin is dominated by herbaceous plants—grasses, sedges, and creeping vines. Inland from this, a zone of shrubby vegetation often occurs, and farther inland, a zone of forest. A zone of *Pandanus* scrub or thicket is sometimes also present and may be recognized as a separate plant community.

A case can be made for combining all of these zones into a larger "littoral forest" community. Such a combination is supported by several characteristics of littoral vegetation: (1) some littoral forests are without herbaceous and shrubby zones on their seaward margin; (2) the delineation of boundaries between zones is often difficult; and (3) the size of all of the zones (even when they are combined) is very small compared to that of inland plant communities. On the other hand, the zones occur on coasts throughout the tropics, and are characterized by distinctive life forms (e.g., herbs, shrubs, trees) and species. In any case, for the purposes of the descriptions

here, the vegetation zones will be treated as separate units, even though they are not so separate or distinct in reality.

Although names for the categories of littoral vegetation and the numbers recognized in the literature vary, three main types occurring on Ta'u are distinguished below; (1) herbaceous strand; (2) littoral shrubland; (3) littoral forest. *Pandanus* scrub is often recognized in other parts of Samoa, but since it does not form much of a distinct entity within the park, it will be included under littoral shrubland.

On Ta'u, littoral vegetation occurs on sandy, rocky, or coral-rubble shores, typically from just above the high-tide mark to 5 or 10 m elevation, but sometimes up to 100 m or more on the slopes and cliffs of the south coast. The rocky shores may be flat coastal lava "platforms," as they are at the southwest tip of the island (Fig. 8), or they may be sheer cliffs formed by marine erosion, as they are on much of the south coast (Fig. 9). Sandy beaches are found in scattered localities within the park, mostly on the south coast. The east coast of the island (and the eastern boundary of the park) consists of a narrow coastal terrace made from an accumulation of coral rubble, and the outer part of this strip is littoral forest with a road running through its entire length (Fig. 10).

The environmental conditions present in areas of littoral vegetation on Ta'u are the harshest on the island. Although rainfall exceeds 2500 mm (100 inches) annually, the ground surface retains little water for plant growth, at least at the surface. Soil drought in littoral areas can be a major factor limiting the habitat to species adapted to the arid conditions (i.e., "xerophytic" plants). The substratum itself is a limiting factor, either because of low organic content of the substrate (e.g., sandy beaches) or absence of soil (e.g., rocky coasts); in the latter case, the plants must root in cracks in the rock surface.

However, the most critical factor is the effect of the sea. The sea winds are salty, ground water is often saline or brackish, and occasional high waves, some with destructive force, can inundate the area, leaving behind pools of sea water.

Thus, littoral species must have some degree of salt-tolerance to survive the salt spray, brackish ground water, and occasional, although not prolonged, seawater inundation.

Temperature is another important environmental factor, particularly for herbaceous vegetation. While the mean annual temperature on the island is probably about 24°C with relatively little annual or diurnal variation, the rock or sand upon which the plants grow may be exposed to the sun, resulting in a high ground temperature. High temperature may in itself be harmful to the plants, or it may indirectly cause harm through increased transpiration and water loss.

Most littoral plants are heliophytes, i.e., they require bright sunlight for establishment and growth, a need which generally excludes the herbaceous species from shady forest habitats. The physiological characteristics that littoral plants share account for their restriction to a narrow zone of vegetation on the shore; they are limited inland by competition from the more vigorous species of the lowland and coastal forest, and seaward by the ocean.

Although plant species in littoral vegetation come in several different life forms, they have important characteristics in common. Most have buoyant, saltwater-resistant seeds that may be carried for long distances by sea currents. Those lacking this characteristic have instead sticky fruits that adhere to seabird feathers, or fruits that are eaten and transported internally by sea birds or migratory birds inhabiting coastal areas. These dispersal characteristics account for the wide distributions of most littoral species: few Pacific littoral species are endemic, and none in Samoa are.

(1) Herbaceous Strand

This is the herbaceous vegetation occurring in littoral areas; it is limited inland by the littoral shrubland or littoral forest, and seaward by the high-tide mark of the ocean. It is sometimes subdivided into "rock strand" and "sand strand" based on differences in substrate and species

composition, but since these two subdivisions are so limited in area, intermediates between them (such as herbaceous strand on coral-rubble beaches) exist, and many littoral herbaceous species occur in both, they are treated here as variations of herbaceous strand.

Herbaceous strand on rocky substrates occurs on two main geological structures on Ta'u—coastal cliffs and flat lava platforms. The steep coastal cliffs that predominate along most of the south shore of the island are formed by marine erosion, and may be directly at the seashore, or separated from it by a narrow sandy or bouldery beach. Coastal lava platforms are found at the southwest corner of the island and in a few places along the south coast (see Fig. 8).

Herbaceous strand on sandy substrate occurs in a few places along the south shore. The sand on these beaches is coralline and white—no black sand beaches occur on the island. Coral rubble beaches occur along most of the east coast of the island, but they are often devoid of littoral strand vegetation (Fig. 11).

The dominant life-form on sandy beaches, and sometimes on the top of coral rubble beaches, is that of creeping herbaceous vines (Fig. 12), most commonly the beach morning-glory, *Ipomoea pes-caprae*, the beach pea, *Vigna marina*, and *Ipomoea macrantha*, another species of morning-glory. The vines sometimes send their creeping stems across the beach sand or coral rubble below the high-tide mark, but they are probably uprooted and killed when higher than usual tides, or storm waves, wash the coast. Farther up the beach, however, they may have up to 100% cover. Plants on sandy beaches can root anywhere in the sand, unlike plants of rocky coasts, which are restricted to rock cracks.

A second typical life-form on sandy and coral-rubble beaches is that of creeping grasses, represented by *Thuarea involuta*, *Lepturus repens*, and *Stenotaphrum micranthum*. These grasses may also extend a short distance into the forest (particularly along the east coast road), but they are limited in this respect by available sunlight. Another species found in this habitat is

Triumfetta procumbens, a yellow-flowered, prostrate, subshrub.

The vegetation of the herbaceous strand of rocky substrates is typically dominated by grasses and sedges that grow from the rock cracks and depressions, between talus rocks, or occasionally in thin layers of sand deposited by waves over the rock surface. The species may show zonation, with the hardiest ones occurring nearest the shore and the less hardy ones increasing in abundance away from the shore. The characteristic species of flat lava coasts are *Lepurus repens*, a creeping grass widespread in the Pacific, *Fimbristylis cymosa*, a small, clump-forming sedge, and *Cyperus stoloniferus*, a sedge that spreads by means of underground runners. Other grasses occasionally found here include *Paspalum vaginatum*, which is more characteristic of mudflats and mangrove forest margins, and *Ischaemum murinum*.

On the rocky substrate of cliffs, the dominant species are *Hedyotis foetida*, *Ischaemum murinum*, *Portulaca samoensis*, *Cyrtandra samoensis*, *Acrostichum aureum*, *Phymatosorus scolopendria*, *Ficus scabra*, and *Wollastonia biflora*. These are a mixture of herbs, subshrubs, and shrubs: *Cyrtandra samoensis* is a member of the largest genus in Samoa (20 species), but is the only *Cyrtandra* found in coastal areas. *Acrostichum* is a fern more characteristic of coastal marshes and margins of mangrove swamps, and *Phymatosorus* is more typical as a terrestrial and epiphytic fern of littoral and inland forests. *Wollastonia* and *Ficus* are more commonly found in littoral shrubland. Other species occasionally found in this habitat include *Clerodendrum inerme*, *Scaevola taccada*, *Morinda citrifolia*, *Hibiscus tiliaceus*, and *Miscanthus floridulus* (a native reed). The first four are shrubs or trees characteristic of other littoral habitats, a distribution pattern that further tends to blur the distinction between the littoral communities.

The vegetation on the rocky slopes of the southwest tip of the island is similar to that along the south coast, but contains three additional

species—*Sesuvium portulacastrum*, *Portulaca lutea*, and *Capparis cordifolia*—that are otherwise uncommon or rare in American Samoa (they also occur on the south tip of 'Ofu and/or 'Olosega).

(2) Littoral Shrubland

This is the native shrubby vegetation typically occurring on the seaward margin of littoral forest. It is dominated by shrubby species up to 2 m or more in height, but these are sometimes prostrate or dwarfed by the action of strong, salty sea winds. Sometimes the boundary between this and littoral forest is quite distinct, but often the two intergrade into each other. The shrubs that comprise littoral shrubland are intolerant of shade, and hence are rarely found in littoral forest other than on the seaward margin. Littoral shrubland may sometimes occur directly on the shore in places where herbaceous strand is absent. In the park area of Ta'u, it occurs on talus slopes that extend to the south coast shore just east of Li'u, in a somewhat wider zone at the southeast tip of the island, and on the narrow seaward margin of the littoral forest on the east coast, but its overall area is very small.

The two most characteristic species of littoral shrubland are *Scaevola taccada* and *Wollastonia biflora*. *Scaevola*, a waxy-leaved shrub with white flowers and fruits, is common throughout the tropical Pacific. *Wollastonia*, the beach sunflower, which is also widely distributed in the Pacific, occurs in littoral shrubland and is sometimes a weed of coastal coconut plantations. These two, especially *Wollastonia*, dominate the talus slopes near the southeast corner of the island (Fig. 13). Other plants found here include *Acrostichum aureum*, *Pandanus tectorius*, and *Cyrtandra samoensis*, and a number of weedy herbaceous species.

In the littoral shrubland at the southeast tip of the island, several additional species are found—*Ipomoea macrantha*, *Cassytha filiformis*, and *Tacca leontopetaloides*—as well as wind-pruned littoral and coastal forest tree species such as *Guettarda speciosa*, *Pisonia*

grandis, *Syzygium dealatum*, and *Pandanus tectorius*. *Ipomoea* is a common vine in littoral forest, but it may also sprawl out across the herbaceous strand. *Cassytha* is a leafless parasitic vine that attaches itself to other plants of the herbaceous strand and littoral shrubland. *Tacca* is a large, stemless herb that may be found in both littoral and inland types of vegetation.

As noted earlier, some coasts in Samoa have a zone of *Pandanus* thicket that may be recognizable as a separate entity. This is composed almost entirely of *Pandanus tectorius*, a tree-like monocot with spiny leaves and spreading prop roots. Although it is common on the northeast corner of Ta'u (Fig. 14), where it occurs inland from a sparse herbaceous vegetation, this is mostly outside the park boundaries. The only other place where this kind of vegetation was noted was on the south coast at Ma'efu Cove, but this patch is very small in extent.

The zone of littoral shrubland is indistinct along much of the east coast of the island, and wind-pruned littoral trees such as *Pisonia grandis* may predominate instead. Several other species are common in littoral shrubland, but are not usually dominant. *Ficus scabra*, unlike most littoral species, has red fruits and bird-dispersed seeds, and also occurs as a small tree in littoral to lowland forest. Other shrubs or small trees include *Clerodendrum inerme*, *Colubrina asiatica*, *Premna serratifolia*, *Morinda citrifolia*, and *Achyranthes aspera*.

(3) Littoral Forest

This forest occurs on the seashore and is dominated by trees that owe their distribution and dispersal directly or indirectly to the sea. It covers a relatively small area and is not shown on the vegetation map (Fig. 7), since it rarely occupies a zone more than 50–100 m wide. It predominates in areas between 1 and 10 m elevation, but it occurs in a wide zone that extends to a much higher elevation on the steep slopes of the south coast. Farther inland, it is replaced by lowland forest.

The most common littoral forest tree on rocky shores throughout the Pacific islands is *Barringtonia asiatica*. It dominates the steep slopes of the south coast of Ta'u, the central portion of the west coast (which is outside the park), and the outer portion of the coastal terrace on the some parts of the east coast (Fig. 15). In a transect sampled on the east coast of the island in 1976, it dominated the shore but disappeared beyond 45 to 65 m inland. In sandy habitats, the tree may be at a disadvantage in competition with other littoral trees such as *Pisonia grandis* or *Hernandia nymphaeifolia*. This hypothesis is supported by the virtual absence of *Barringtonia* from atolls. On coral-rubble beaches, it usually forms a narrow zone beginning at the top of the coral rubble beach ridge; in such cases, rock strand, sand strand, and littoral shrubland species may be absent. The data from a plot of *Barringtonia* littoral forest at Saua on the east coast of the island is shown in Table 1 (Appendix A).

Barringtonia trunk diameters of 1–2 m or more are not uncommon in the littoral forest, and massive, ascending to nearly horizontal branches rise from the trunk to form a dense canopy up to 15 m or more in height.

On the steep coastal slopes of the south shore, a forest other than one dominated by *Barringtonia* might be expected. This community, called "coastal forest" elsewhere in Samoa, is not found within the park (it may occur on the northwest corner of the island). However, the presence of coastal forest trees such as *Syzygium dealatum*, *Sterculia fanaiho*, *Planchonella garberi*, *Diospyros samoensis*, *Myristica fatua*, and *Meryta macrophylla* show that this south coast *Barringtonia* forest is intermediate between littoral and coastal forest.

Three other large tree species are commonly found in the littoral forests of the island, *Pisonia grandis*, *Hernandia nymphaeifolia*, and *Hibiscus tiliaceus*. *Pisonia* is a huge, spreading tree (often with a dbh of over 2 m) distributed from East Africa to Hawai'i. It has sticky, single-seeded fruits that are dispersed by adhering to the feathers of sea birds, and typically occurs on

sandy areas of atolls and uninhabited places on high islands. Its distribution is strongly correlated with that of seabird colonies, most likely attributable to the specialized mode of seed dispersal. The soil is usually high in phosphate and nitrate, due to the excretions of sea birds over long periods of time. On Ta'u, it is the dominant species of the littoral forest of the southern part of the east coast, but is only occasional elsewhere on the island. It entirely dominates the small patch of forest present on Rose Atoll, which lies to the east of Ta'u.

Hernandia nymphaeifolia is a dominant species in some other parts of Samoa, but on Ta'u it was noted to be common only in parts of the east coast, and in small patches along the south coast, such as at Ma'efu Cove. It too forms massive trunks that make the tree relatively safe from hurricane destruction.

Hibiscus tiliaceus, the beach hibiscus, is particularly common in the *Barringtonia* forest on the south coast, as well as on the west coast outside the park boundaries. It is also a dominant species on talus slopes, inland cliffs, and disturbed lowland forest. Its presence is usually an indicator of disturbance, perhaps from hurricane damage or landslips, and is rarely found under an unbroken canopy of *Barringtonia*.

Although coconuts are common and sometimes dominant on Polynesian shores, they occur mostly in or near villages and in coastal plantations. They are rarely found in undisturbed littoral forests, particularly in those on rocky shores. Coconuts are usually unable to compete with other littoral forest tree species in undisturbed forest, and have usually been planted or are remnants of former cultivation in most places where they do occur.

Several other small to medium-sized trees, such as *Thespesia populnea* and *Guettarda speciosa*, are typically restricted to littoral habitats on Ta'u, but are not reported to be dominant species. Several smaller trees, such as *Pandanus tectorius*, *Ficus scabra*, *Ficus tinctoria*, *Morinda citrifolia*, *Allophylus timoriensis*, *Premna serratifolia*, and *Tournefor-*

tia argentea, are found in littoral forest. *Premna* and *Tournefortia* are usually restricted to the sunny forest margin, but the others may occur on the margins or within the littoral forest as understory species. Two other species, *Macaranga harveyana* and *Pipturus argenteus*, are sometimes found in disturbed places, particularly along the coastal road on the east side of the island.

The floor of littoral forest is typically open and easily traversed. Shrubs are virtually absent, since those adapted to littoral conditions, i.e., littoral shrubs, are usually heliophytes that are restricted to the sunny margins of the forest. Ground cover is also minimal because of the dense shade of the canopy, the dry rocky or sandy soil, and the salty sea air. The dominant ground cover species is typically *Asplenium nidus*, "bird's-nest fern." These large, clumped ferns with undissected fronds 1—2 m long often originate as epiphytes, at least in the littoral forest. When a tree branch bearing the epiphyte, or the epiphyte by itself, falls to the ground, the fern may survive and flourish on the forest floor. Two other species of terrestrial ferns are commonly found in littoral forest—*Phymatosorus scolopendria* and *Pteris comans*—but both are more characteristic of other types of vegetation. Other terrestrial species occasionally found here are *Tacca leontopetaloides*, *Tectaria stearnsii*, *Cyrtandra samoensis*, and seedlings of *Barringtonia*. The floor of inland areas of *Barringtonia* forest has a much more diverse flora, since their greater distance from the shore affords them some protection from the effects of the salty sea winds. In addition to the species noted above, others, such as *Asplenium cuneatum*, *Asplenium marattoides*, and *Asplenium feejeense*, are also common. However, *Asplenium nidus* is often the dominant ground cover species in these habitats.

Lianas or climbers are also scarce compared to their presence in other types of forest. The most frequently encountered species are *Ipomoea macrantha*, *Mucuna gigantea*, *Derris trifoliata*, *Epipremnum pinnatum*, *Hoya*

australis, and *Clerodendrum inerme*. The latter species is actually a scandent shrub that sometimes climbs into the canopy. By far the most common of the vines is *Ipomoea*, which is also frequently found growing prostrate in open areas on the beach. With the exception of the latter three species, which are more characteristic of the coastal and lowland forest, the vines have buoyant, saltwater-resistant seeds. When young, the plants grow across the forest floor until they find a suitable tree on which to climb.

Epiphytes are scarce in littoral forest. Those present are mostly on ascending or horizontal branches of trees away from the immediate shore. The two most common species are the previously mentioned *Phymatosorus* and *Asplenium*, which appear to be equally at home as epiphytes or terrestrial plants. Another one occasionally found there, *Hoya australis*, is a vine that may become epiphytic by losing its connection to the ground.

RAINFOREST

The tropical rainforest is the natural forest vegetation that covered most of Ta'u before the arrival of the first Polynesians centuries ago. It extended from the inland side of the littoral forest up to the summit of the island, except at the higher elevations, where weather factors apparently created summit scrub vegetation, and at all elevations where windfalls from hurricane winds created secondary scrub and forest.

The rainforest of Ta'u is not uniform because several different types can be recognized on the basis of floristic composition. Four major factors cause the floristic differences: soil, topography, elevation, and disturbance. Soils differ in origin and age of the parent bedrock, and younger rocky soils tend to be more fertile than older, clayey soils. Species composition of forests can sometimes be correlated with different parent material of the soil—ash, lava, or alluvium.

Topography is important since steeper slopes create faster rainfall run-off and, presumably, drier soil conditions. This may be

the primary cause of floristic differences between the forests on the ridges and those on the flatlands. Elevation is important for two main reasons—rainfall and temperature. Rainfall generally increases with elevation. In Western Samoa, Wright (1963) reported an estimated increase of about 22—30% in precipitation for every 100 m increase in elevation, at least in the “foothills.” Temperature decreases with increasing elevation at about 0.7°C per 100 m. The lower temperature and/or higher rainfall at higher elevations account for the characteristic elevation ranges of some species; trees such as *Reynoldsia lanutoensis* and *Ascarina diffusa* occur only above 500 m elevation, while others, such as *Dysoxylum samoense*, occur mostly below this figure. The upland area of Ta'u, with its cooler, wetter climate, is home to a number of genera that are otherwise characteristic of temperate regions of the world.

The last factor, disturbance, is very hard to assess. When an area of mature forest is disturbed, whether by natural means (hurricane, fire) or unnatural means (clearing for agriculture), the vegetation and flora of the disturbed area are altered. If the disturbance is complete, i.e., the canopy is removed, and the disturbance is of short duration, the disturbed area will undergo a series of structural and floristic changes over a long period of time. If the disturbance is minor, as when an individual tree falls, a gap is created in the canopy. The resulting sunny patch on the forest floor then undergoes succession until the canopy gap is closed by the surrounding trees or by new trees growing up from the clearing. This “gap replacement” can result in a mosaic of differences in dominant species or a patchwork of secondary forest species in what otherwise appears to be primary forest.

The division of the Ta'u rainforest into different “communities” or “associations” is a difficult and unrewarding task. The primary problem comes with the creation of artificial categories that are imposed on a natural pattern of vegetation. These categories are formed for our convenience and understanding; although

they may look nice and neat on paper, they are often not so nice and neat in reality. Plant species each distribute themselves in their own way, based on their own limitations and abilities, and to try to put them into artificial groups with the same or similar distributions usually leads to inconsistencies.

In some types of vegetation, the boundaries are clear and precise. This is particularly the case in monodominant communities, and in communities that are delimited by a sharp environmental boundary (such as mangroves). However, the distribution of rainforest species is controlled by a number of independent factors that are difficult to analyze. A continuous soil type or "volcanic series" may extend from the seashore up to the summits of the mountains. However, the flora over this elevational range is completely different at its two elevational extremes with no distinct boundary between them.

Nevertheless, the rainforest does have obvious differences and it is useful to point out some of these. The rainforest is divided here into four types, but it must be kept in mind that some forests, because of the dominance of several species rather than a single one, will defy categorization in the present scheme. The four are *Dysoxylum* lowland forest, mixed lowland forest, montane forest, and summit scrub. The latter type is not actually a "forest," as will be explained later.

The rainforest types share some similarities in structure and physiognomy. The floor of mature rainforest is typically open, especially in areas with little past disturbance. A continuous canopy produces a shade that prohibits all but the most shade-tolerant species from surviving. The shrub layer is occupied by scattered shrubs, small trees, and saplings of canopy trees, except where a break in the canopy and the resulting light conditions have allowed for more. The seedlings and saplings present are usually of canopy species whose large seeds can germinate and grow in shade, for awhile anyway.

The herb layer is dominated by shade-tolerant ferns and orchids. There are 43 species

of orchids and 107 ferns and fern allies reported on Ta'u (See Appendix B), and a significant number of these are terrestrial (as opposed to epiphytic). Grasses are infrequent, since most native species are heliophytes (sun-loving plants), but a few species may be common along forest trails. Introduced grasses and other weeds are likewise uncommon in mature rainforest. On the other hand, forests with a broken canopy, usually as the result of disturbance, typically have a dense growth of ground cover dominated by sun-loving ferns and introduced, weedy grasses, vines, and herbs. As the gaps in the canopy eventually close, the density of the ground cover decreases proportionally, and shade-tolerant ferns dominate.

Trees and shrubs are obviously the predominant life form in the rainforest, but other life forms are present as well. Climbers are particularly common in Ta'u rainforests, and two strategies are employed. In the first, woody vines (lianas) grow into and spread out in the canopy, maintaining their connection to the ground with their cable-like stems. It appears that these vines usually become established during some kind of major disturbance. The resulting open, sunny conditions on the forest floor allow the liana seeds to germinate and the young stems to twine around small trees that eventually grow to be canopy trees, with the vines growing apace and spreading in the crown where they receive the sunlight they need.

The other strategy is that employed by trunk climbers. These plants, which perhaps have a greater tolerance to shade, spread out across the forest floor, and when they encounter a suitable tree trunk, they grow up the bark surface, adhering by adventitious roots or other means (rather than twining).

Another life form common in the rainforest is that of epiphytes, which are most prevalent on horizontal branches and branch angles in the forest canopy, where light conditions are better and the substrate more suitable for establishment. Most of the numerous orchid species in Samoa are epiphytes, as are many of the ferns.

Since these species are not in contact with the ground, they must obtain all their nutrients and water principally from dust and rain. Numerous non-vascular plants, such as mosses and lichens, are also epiphytic—some of them restricted to leaf surfaces. When the conditions in the forest are extremely wet, as they are in the montane forest, epiphytes may also cover tree trunks, sometimes becoming so dense that the apparent diameter of the trunk may be doubled. Only two vascular plant species on the island can be classified as parasites, *Korthalsella horneanum* of the mistletoe family Viscaceae, and *Cassytha filiformis* of the Cassythaceae.

The four rainforest types present on Ta'u are discussed below.

(4) *Dysoxylum* Lowland Forest

This is the tropical rainforest occurring in the lowlands of Ta'u, mostly below 200 m elevation, and dominated by *Dysoxylum samoense*, a large tree of the Meliaceae family. This community was referred to as "mamala lowland forest" in American Samoa (Whistler 1980) and as "mamala forest group" in Western Samoa by Chandler *et al.* (1978). However, Chandler's forest group, located mostly in the eastern portion of 'Upolu, comprises a heterogeneous assemblage of three forest types, having in common a large amount of *Dysoxylum samoense*; these three would be classified better as types of old secondary forest that will eventually be dominated by one or more other lowland species.

Three variations of *Dysoxylum* lowland forest can be distinguished within the park boundaries on Ta'u, one on the coral-rubble terraces along the coasts, another on the cliffs and talus slopes that surround the island, and a third on the plateau. The latter one will be discussed under secondary forest, since many of the codominant tree species are typical of disturbed habitats. The vegetation on the cliffs and talus slopes also could be included in the discussion of secondary forest, but because the disturbance that contributes to their presence is natural (erosion,

landslips, and strong winds), this vegetation is included here as a variant of *Dysoxylum* lowland forest.

A. On Coral Rubble

The best remaining example of *Dysoxylum* lowland forest in American Samoa is found on the coral-rubble terrace along the east coast of the island south of Fiti'uta and seaward of the talus slopes and cliffs (Fig. 16). Smaller examples of this forest type occur in several bays near the southwest corner of the island, which is outside the park boundaries.

Although no plots of *Dysoxylum* lowland forest were sampled during the 1990–1991 survey, the forest on the east coast appeared to be relatively unchanged from its condition when it was sampled fifteen years earlier (Whistler 1980), except, perhaps for some signs of windfall probably attributable to one of the recent hurricanes. A combination of data obtained from two plots, one at Saua and one at Leavana (which was on a talus slope), is shown in Table 2. In these two forests, *Dysoxylum samoense* was clearly the dominant tree with an average relative dominance (based on dbh) of 68%. No other species averaged more than 11%. Other canopy trees sometimes found in this forest include *Neonauclea forsteri*, *Sterculia fanaiho*, *Garuga floribunda*, and *Ficus obliqua*.

The vegetation on the seaward boundary of the *Dysoxylum* lowland forest is littoral forest, and going inland from the beach there is a fairly rapid change from one forest type to the other somewhere between 30 and 70 m from the shore. Only occasionally are littoral forest trees, such as *Barringtonia asiatica* and *Pisonia grandis*, found in *Dysoxylum* lowland forest beyond 70 m inland.

This forest often has a subcanopy comprised of species that never reach the height of the *Dysoxylum* canopy. The most common of these trees are *Myristica fatua* and *Diospyros samoensis*. The Samoan nutmeg, *Myristica fatua*, is one of the most common trees in lowland forests in Samoa. It has characteristic proproots and a red

sap that oozes out when the trunk is cut. In some lowland forests, it is the most numerous tree, but it is usually not dominant since it is a subcanopy species with a relatively small average basal diameter (dbh). The Samoan ebony, *Diospyros samoensis*, was the most common tree in the two sampled plots, and is also typical of coastal forest. The *Dysoxylum* lowland forest also includes other common, but somewhat smaller, trees, which are sometimes identified as "understory trees;" the most frequent of these are *Morinda citrifolia*, *Pisonia umbellifera*, *Ficus scabra*, *Ficus tinctoria*, and *Psychotria insularum*.

Because of the distinct dominance of *Dysoxylum* in the canopy and the presence of subcanopy trees, the *Dysoxylum* lowland forest is one of the few forests in Samoa that appears to have stratification. The canopy may reach 25 or 30 m in height, below which there may be a subcanopy of *Diospyros* and *Myristica*, and below that, an understory of smaller trees. In the two sampled plots noted in Table 2, the basal stem area ranged from 0.59 to 0.62 m² per 100 m² of surface area (Whistler 1980). The number of trees ranged from 8.8 to 16.3 per 100 m², which is more than in most littoral forests. In areas of the forest that show signs of disturbance, the dominant tree is typically *Hibiscus tiliaceus*, which sometimes forms thickets at the base of, and extending up, the talus slope. Other trees found in these disturbed areas in this forest include *Pipturus argenteus*, *Carica papaya*, and *Macaranga harveyana*.

The ground cover of *Dysoxylum* lowland forest is usually moderate in amount, and consists mostly of climbing species that grow along the forest floor until they encounter a tree. The most common of these climbers are *Piper graefei*, *Epipremnum pinnatum*, and *Arthropteris repens* (a fern). Also common on the ground is the bird's-nest fern *Asplenium nidus*, which appears to be equally at home on the ground or as an epiphyte. Less common species include the ferns *Asplenium marattoides* (especially on talus slopes), *Asplenium polyodon*, *Tectaria stearnsii*,

and *Pteris comans*, the angiosperm vines *Hoya pottsii* and *Hoya australis*, and the prostrate herb *Geophila repens*. The relatively open shrub layer is comprised mostly of scattered saplings and small trees such as *Psychotria insularum*. Orchids are virtually absent.

The two types of vines—trunk climbers and lianas—are both represented in *Dysoxylum* lowland forest, but by far the most common are the former. Perhaps a third of all the large trees have one or more species of trunk climbers on them, the most common of which are *Piper*, *Epipremnum*, and *Arthropteris*, which were noted above, and *Freycinetia storckii*. The most common lianas are *Derris trifoliata*, *Mucuna gigantea*, *Jasminum didymum*, and *Faradaya amicornum*. Herbaceous vines, such as *Zehneria samoensis* and *Dioscorea bulbifera*, may also be common climbing over the smaller trees and shrubs. Two other common climbing species, *Hoya australis* and *Hoya pottsii*, are somewhat intermediate between trunk climbers and herbaceous vines.

Epiphytes, mostly ferns, are relatively sparse, probably due to proximity of the forest to the shore. The most frequently encountered species are *Asplenium nidus* and *Phymatosorus scolopendria*, and plants such *Hoya australis*, which start out as vines but eventually lose their connection to the ground and become epiphytic.

B. On Talus Slopes and Cliffs

This type of forest occurs mostly on cliffs and talus slopes along coasts with a narrow terrace separating them from the sea; where the cliffs abut the sea, the vegetation is usually *Baringtonia* forest. The vegetation of these protected cliffs and slopes is often contiguous with the *Dysoxylum* lowland forest of the coastal terrace. It is somewhat intermediate between this forest and secondary forest, probably because the natural landslips and steep slopes allow sunlight to reach the floor, promoting the germination and establishment of secondary forest species.

The two most common species on these slopes are *Dysoxylum samoense* and *Hibiscus tiliaceus*. Other species frequent here include *Macaranga harveyana*, *Pipturus argenteus*, *Ficus obliqua*, *Garuga floribunda*, *Neonauclea forsteri*, *Rhus taitensis*, and *Sterculia fanaiho*. Near the top, *Syzygium inophylloides* may be common in places, and is probably the dominant tree on the adjacent plateau above the cliffs. *Barringtonia asiatica* is found in some places along the east coast cliffs, but is more typical of littoral forest.

Recent landslips, or sheer rock faces, are often dominated by weedy species such as *Mikania micrantha* (mile-a-minute vine), grasses such as *Miscanthus floridulus*, or tree ferns (*Cyathea* spp.). Many of the landslips will probably eventually be covered with *Hibiscus tiliaceus*, which forms wide thickets elsewhere on the slopes. On the inland slope above Laufuti, the dominant species are *Dysoxylum samoense*, *Cyathea* spp., *Macaranga* spp., *Melochia arisata*, and *Maoutia australis*. Within Laufuti canyon (Fig. 17), the vegetation on the steep walls is dominated by *Cyrtandra samoensis*, *Maoutia australis*, and many species of ferns, herbs, and small, secondary forest trees.

(5) Mixed Lowland Forest

This is the forest that originally covered much of the interior of the island, from the edge of the cliffs up to about 500 m elevation on the west side and 350 m or so on the east side, including the plateaus on the south side of the island. This forest has been extensively disturbed by agriculture, and within the park boundaries the lower portion of it along the slopes above the east-coast cliff was mostly secondary forest. Since the last three hurricanes, it is doubtful if any undisturbed mixed lowland forest remains on the island. However, if left undisturbed by man and hurricanes, the vegetation can be expected to return to a high forest in a few decades.

In the rest of the islands of the archipelago west of Manu'a, this habitat is usually dominated

by *Planchonella torricellensis*, but this species is absent from Manu'a. The most common canopy species in these Ta'u lowland forests is often *Syzygium inophylloides*, which in the rest of Samoa typically dominates steep slopes and ridges rather than valleys, flatlands, and gentle slopes. Because of this, these Ta'u mixed lowland forests probably correspond floristically most closely to "asi ridge forest" of Tutuila (Whistler 1980), "mafoa ridge forest" of 'Upolu (Ollier et al. 1979), and "asi forest" and "tamanu forest" of Savai'i and 'Upolu (Chandler et al. 1978). *Syzygium inophylloides* is a very strong tree that may be better than other lowland forest trees at surviving storm winds, and this may account for its frequency in the hurricane ravaged-lowland forests observed during the present study (Fig. 18). Because many other tree species may share dominance, this forest is floristically one of the richest of any of the plant communities on the island. The most common of these other tree species are *Calophyllum neobudicum*, *Elaeocarpus tonganus*, *Endiandra elaeocarpa*, *Fagraea berteriana*, *Hernandia moerenhoutiana*, *Myristica fatua*, *Palaquium stehlinii*, *Syzygium samarangense*, *Syzygium samoense*, *Terminalia richii*, and *Trichospermum richii*. All of these trees are typical of lowland forests in the rest of the archipelago.

When undisturbed, the canopy height of the mixed lowland forest is mostly 18 to 25 m, but undisturbed examples were not observed during the field work for this project, nor were they sampled during earlier work on Ta'u in 1976 (Whistler 1980). Consequently, most areas which would be expected to have mixed lowland forest are currently covered with secondary forest, and any discussion of the forest structure would be only speculative and laced with generalities based on similar forests in the rest of the archipelago. Consequently, these disturbed forests are discussed in the section on secondary forest.

However, one variation of this forest should be mentioned— the herbaceous vegetation that occurs in rocky streambeds. The incessant for-

sap that oozes out when the trunk is cut. In some lowland forests, it is the most numerous tree, but it is usually not dominant since it is a subcanopy species with a relatively small average basal diameter (dbh). The Samoan ebony, *Diospyros samoensis*, was the most common tree in the two sampled plots, and is also typical of coastal forest. The *Dysoxylum* lowland forest also includes other common, but somewhat smaller, trees, which are sometimes identified as "understory trees;" the most frequent of these are *Morinda citrifolia*, *Pisonia umbellifera*, *Ficus scabra*, *Ficus tinctoria*, and *Psychotria insularum*.

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This is the forest that originally covered much of the interior of the island, from the edge of the cliffs up to about 500 m elevation on the west side and 350 m or so on the east side, including the plateaus on the south side of the island. This forest has been extensively disturbed by agriculture, and within the park boundaries the lower portion of it along the slopes above the east-coast cliff was mostly secondary forest. Since the last three hurricanes, it is doubtful if any undisturbed mixed lowland forest remains on the island. However, if left undisturbed by man and hurricanes, the vegetation can be expected to return to a high forest in a few decades.

In the rest of the islands of the archipelago west of Manu'a, this habitat is usually dominated

by *Planchonella torricellensis*, but this species is absent from Manu'a. The most common canopy species in these Ta'u lowland forests is often *Syzygium inophylloides*, which in the rest of Samoa typically dominates steep slopes and ridges rather than valleys, flatlands, and gentle slopes. Because of this, these Ta'u mixed lowland forests probably correspond floristically most closely to "asi ridge forest" of Tutuila (Whistler 1980), "mafoa ridge forest" of 'Upolu (Ollier et al. 1979), and "asi forest" and "tamanu forest" of Savai'i and 'Upolu (Chandler et al. 1978). *Syzygium inophylloides* is a very strong tree that may be better than other lowland forest trees at surviving storm winds, and this may account for its frequency in the hurricane ravaged-lowland forests observed during the present study (Fig. 18). Because many other tree species may share dominance, this forest is floristically one of the richest of any of the plant communities on the island. The most common of these other tree species are *Calophyllum neoebudicum*, *Elaeocarpus tonganus*, *Endiandra elaeocarpa*, *Fagraea berteriana*, *Hernandia moerenhoutiana*, *Myristica fatua*, *Palaquium stehlinii*, *Syzygium samarangense*, *Syzygium samoense*, *Terminalia richii*, and *Trichospermum richii*. All of these trees are typical of lowland forests in the rest of the archipelago.

When undisturbed, the canopy height of the mixed lowland forest is mostly 18 to 25 m, but undisturbed examples were not observed during the field work for this project, nor were they sampled during earlier work on Ta'u in 1976 (Whistler 1980). Consequently, most areas which would be expected to have mixed lowland forest are currently covered with secondary forest, and any discussion of the forest structure would be only speculative and laced with generalities based on similar forests in the rest of the archipelago. Consequently, these disturbed forests are discussed in the section on secondary forest.

However, one variation of this forest should be mentioned— the herbaceous vegetation that occurs in rocky streambeds. The incessant for-

ces of nature have left the interior of the island marked by numerous canyons and streams. On more recent lava rock substrates, these streams are intermittent and flow only during heavy rainfall. The rest of the time, the streambeds, called "alia", are dry.

The vegetation on these streambeds, which often consist of smooth, water-worn rock (Fig. 19), is different from the ground cover in the surrounding lowland or montane forest; it is composed mostly of heliophytic (sun-species) that are able to grow and survive in rock cracks, and can withstand the rush of water when the stream is flooding. The most common species here are grasses such as *Centosteca lappacea*, *Chrysopogon aciculatus*, *Paspalum conjugatum*, and *Paspalum orbiculare*, terrestrial ferns and fern allies such as *Christella harveyi*, *Ophioglossum petiolatum*, *Selaginella whitmeei*, *Trichomanes boryanum*, and *Trichomenes dentatum*, lower plants such as liverworts and mosses, and angiosperm herbs such as *Ageratum conyzoides*, *Elatostema scabriscula*, *Lindernia crustacea*, and *Vernonia cinerea*.

(6) Montane Forest

The montane forest is the rainforest on the upper slopes of the island, and is characterized by the dominance of several tree species not found at lower elevations. It begins at about 450 to 500 m elevation, where the lowland forest and its typical species *Syzygium inophylloides* give way to a new combination of species. It corresponds to what was previously called "maotamea montane forest" and "fega-vao cloud forest" in American Samoa (Whistler 1980).

The two environmental factors most affecting the montane forest are prevailing cool temperatures and high rainfall. Little reliable temperature data has been recorded from montane forest, but if the decrease of 0.65°C (1.17 F) per 100 m increase in elevation suggested by Wright (1963) for Western Samoa applies to Ta'u, the mean temperature is probably 6°C cooler than at sea level. The cooler temperatures at higher elevations may be the main factor al-

lowing for the presence of some subtropical "austral" genera (e.g., *Weinmannia* and *Ascarina*) in the flora of the island.

The rainfall throughout the montane forest is probably between 4500 to 9000 mm per year, depending upon elevation and exposure. This consists mostly of orographic precipitation—condensation of water when moisture-laden tradewinds ascend the mountains. Wright (1963) cited rainfall figures on 'Upolu in Western Samoa (at ca. 650 m), where an average annual precipitation of about 6200 mm was recorded, but this figure may be higher on Ta'u because of local geographic factors. There is no dry season since no month has less than 400 mm of rainfall, and humidity is always high. Clouds form nearly every day and the ground and vegetation are usually wet. These factors contribute to the profusion of terrestrial and epiphytic herbaceous species, particularly mosses, ferns, and orchids.

The forest is shorter in stature than lowland forest, with the tallest trees mostly less than 18 m in height (Fig. 20). In all examples seen during the current study, the trees were widely spaced and the canopy was broken, leading to the typically heavy growth of ground cover beneath. In this regard, montane forest blends into the next community, summit scrub, which is typically dominated by many of the same species that dominate the ground cover of open montane forest. In other words, the summit scrub is like montane forest with few trees.

The montane forest probably has the richest flora of any community on the island. The dominant trees are *Astronidium pickeringii*, *Cyathea* spp., *Dysoxylum huntii*, *Fagraea berteriana*, *Reynoldsia lanutoensis*, *Syzygium samoense*, and *Weinmannia affinis*. Other typical but less common tree species include *Ascarina diffusa*, *Ficus godeffroyi*, *Melicactus samoensis*, *Meryta macrophylla*, *Sarcopygme pacifica*, and *Streblus anthropophagorum*. *Syzygium samoense* may be the commonest tree in this forest. In a plot sampled in 1976 west of Lata at 750 m elevation, it ranked second in

dominance (Table 3), and in a qualitative sample made during the present study near 'Olomanu on the west edge of the park at 600 m, it was estimated to be second in dominance. In fact, a "fega-vao cloud forest" dominated by this species was distinguished in American Samoa in a previous study (Whistler 1980). Although *Syzygium samoense* is found on all the main high islands of the archipelago, it has not been reported as a dominant species on any island outside Manu'a. However, Chandler *et al.* (1978) noted an "asi forest group" that may include forests dominated by *Syzygium samoense* since the name "asi" can refer to several different species in the large genus *Syzygium* (Whistler 1988a).

Perhaps even more common in the montane forest is *Weinmannia affinis*. In the 1976 sample mentioned above, it was ranked third in relative dominance (Table 3), and in the qualitative sample at Olomanu at 600 m during the present study, it was by far the dominant species. At similar elevations in Western Samoa, i.e., above 600 m, the dominant tree is *Dysoxylum huntii*, but on Ta'u, this was never seen to be so important. *Fagraea berteriana*, a large tree that may start out as a strangler in montane forest, and *Reynoldsia lanutoensis*, a common species in the montane forest of 'Upolu, are less common but still characteristic of this forest on Ta'u.

Three species of tree ferns are found on Ta'u, *Cyathea decurrens*, *Cyathea lunulata*, and *Cyathea vaupelii*, and all three are common in montane forest. In a plot sampled west of Mt. Lata in 1976, tree ferns (most likely *Cyathea decurrens*) were dominant (Table 3). The dominance of tree ferns usually indicates heavy disturbance, since they are heliophytes adapted to sunny conditions. An abundance of *Astronidium pickeringii*, usually a small, understory tree, but which was common in the 1976 plot, also is an indication of disturbance.

Because most or perhaps all of the montane forest on Ta'u has a broken canopy, the ground cover is dense and often difficult to traverse (Fig. 21). The dominant species are predominately

ferns such as *Asplenium multifidum*, *Blechnum vulcanicum*, *Dicksonia brackenridgei*, *Lastreopsis davalloides*, *Nephrolepis biserrata*, and *Pneumatopteris magnifica*. Somewhat less common are some of the terrestrial species among the 43 orchids recorded from the island, such as *Calanthe hololeuca*, *Moerenhoutia heteromorpha*, and *Phaius tankarvilleae*. Dicot herbs are even less common, with *Elatostema grandifolium* and *Peperomia reineckei* being the most frequently encountered species.

Several other common species do not fit well into either a ground cover or a tree category. One of the most frequent of these is *Angiopteris evecta*, a fern with a short, stout, spherical base, from which emerges a series of thick, spreading fronds up to 4 m or more in length. Shrubs or shrub-like plants such as *Clidemia hirta*, *Cyrtandra* spp. (3 species), *Psychotria garberiana*, and *Cordyline fruticosa* are also common. *Clidemia* was introduced sometime after 1976, but is widespread in many habitats on the island.

Woody lianas species are relatively uncommon, but the climbing monocot *Freycinetia storckii* is abundant. Its scrambling habit and tough stems make passage through the forest difficult. Less common vines include *Faradaya amicornum* and *Medinilla samoensis*.

Epiphytes are also abundant in the montane forest, and because the ground, live tree trunks, and fallen trees are continuously wet, the difference between epiphytes and terrestrial species is indistinct. Ferns and orchids are the most common species along with mosses and liverworts. The most common ferns are *Ctenopteris* spp., *Grammitis* spp., *Humata* spp., *Hymenophyllum* spp., *Oleandra neriiformis*, and *Trichomanes* spp. The most abundant epiphytic orchids are probably *Glomera montana* and *Pseuderia ramosa*, but numerous other species are present.

(7) Summit Scrub

This scrubby vegetation dominated by ferns and climbers is found at elevations where montane forest would normally be expected. Floris-

tically, it is similar to the ground cover in montane forest, and was not recognized as separate from "fega-vao cloud forest" by Whistler (1980). The summit of Ta'u, at about 960 m elevation, is adjacent to a steep, south-facing cliff. The moisture-laden tradewinds ascend this cliff and produce prodigious amounts of precipitation on the summit and coastal terraces, and during the daytime the montane region is nearly always covered in clouds. The summit scrub may be what is called a disclimax vegetation: it does not appear to be in equilibrium, but may always stay in this condition. One would expect montane forest at this elevation, but perhaps the heavy rainfall, soggy soil, and exposure to tradewinds and occasional hurricanes is detrimental to tree growth, and the understory species predominate.

Montane forest and summit scrub together occupy the whole upper region of the island and the park above 500 m elevation. There was no evidence of montane forest on the eastern portion of the summit area during the present study in the area, but on the leeward (western) side of the island near Olomanu Crater it was recorded in both 1976 and 1991. But because of the lack of up-to-date aerial photos, the two could not be separated on the vegetation map (Fig. 7). In fact, even the detailed vegetation map of Cole *et al.* (1988), which recognized 91 vegetation units on the island, included nearly the whole montane region in single vegetation type, "moss forest."

The vegetation at the summit is virtually untouched by man, because it is too far away, too wet, and too cool to be used by villagers. It is rarely even visited, especially since the recent hurricanes. The few visitors in the past usually went there to capture shearwaters that nest in the area.

Summit scrub is composed of a tangle of ferns, shrubs, small trees, and vines which make passage extremely difficult (Fig. 22). The trees are scattered and many of them have been killed, presumably by the recent hurricanes (Fig. 23). The most common species are the same ones that dominate the montane forest—tree ferns (mostly *Cyathea decurrens*), *Acronychia heterophylla*,

Astronidium pickeringii, *Dysoxylum huntii*, *Ficus godeffroyi*, *Meryta macrophylla*, *Reynoldsia lanutoensis*, *Sarcopygme pacifica*, *Syzygium samoense*, and *Weinmannia affinis*. Shrubs and small tree species are also particularly common; the most frequent of these are *Cyrtandra angustifolia*, *Cyrtandra pulchella*, *Melastoma denticulatum*, and *Psychotria garberiana*. The *Cyrtandra* species are Samoan endemics, and *Psychotria* is endemic to Manu'a. Another shrub common here is the introduced *Clidemia hirta* (Koster's curse), which apparently was not present on the island before 1976.

The ground cover is abundant, and because of the large amount of wet, decaying vegetation, many species are equally at home on the scattered trees as they are on the ground. By far the most abundant species is the coarse climber *Freycinetia storckii*, and to a lesser extent, *Freycinetia reineckeii*, which form the tangle that makes passage through the vegetation so difficult. The most common ground ferns are *Asplenium multifidum*, *Blechnum vulcanicum*, *Dicksonia brackenridgei*, and *Lastreopteris davalloides*. Common flowering plants include the orchids *Calanthe hololeuca*, *Glomera montana*, and *Phaius tankarvilliae*, and the dicot herbs *Elatostema grandifolium* and *Peperomia reineckeii*.

Epiphytes, especially mosses, are also abundant on suitable tree trunks. Particularly common are delicate ferns belonging to *Trichomanes* and *Hymenophyllum*. Other common epiphytic ferns include *Ctenopteris* spp., *Humata serrata*, and *Oleandra neriiformis*. The most common epiphytic orchids are *Appendicula bracteosa*, *Glomera montana*, and *Pseuderia montana*. Other than *Freycinetia storckii*, climbers are uncommon, except perhaps *Freycinetia reineckeii*.

DISTURBED VEGETATION

This category includes several types of vegetation which, because of climatic or human disturbance, have a structure and flora that are in a state of transition. Four types are recognized on Ta'u: (8) managed land; (9) disturbed wet-

land; (10) secondary scrub; and (11) secondary forest.

(8) Managed Land

Managed land comprises the areas that are actively managed by man for his uses, and includes roads, villages, and plantations. Active use of management prevents the land from returning to natural plant cover. Thus, the vegetation is maintained in the first successional stages, which are dominated by weeds, ornamentals, and crop plants. Over 250 plants can be classed as weeds in Samoa (Whistler 1988b), but only about 100 of these occur on Ta'u.

Weeds are typically heliophytes (light-loving plants) that can grow only in sunny conditions, and, consequently, they are uncommon in undisturbed forests. Most of the weeds in Samoa are alien (introduced) species, while most of the shade-tolerant species present in the undisturbed forests are native. When land is managed, such as when lawns are cut, or plantations are maintained and weeded, alien species dominate, and will continue to do so until long after management has ended. Only a small portion of the park fits into this category, and most of it is at the lower elevation at Li'u on the south side of the island.

(9) Disturbed Wetland

Except for the coastal marsh located behind Ta'u Village at the northwest corner of the island (and outside the park boundaries), there is only a single site that could be considered a wetland. This is a small patch of disturbed vegetation located at Tufu Point at the southeast corner of the island. It is mostly an open patch of herbaceous vegetation surrounded by a thicket of *Hibiscus tiliaceus* that continues up the hillside. This area is currently used for growing taro, but the dominant weedy species there are *Acrostichum aureum*, *Ludwigia octovalvis*, *Mariscus javanicus*, *Mikania micrantha*, *Operculina turpethum*, *Paspalum conjugatum*, and *Pycnus polystachyos*.

(10) Secondary Scrub

This is the scrubby vegetation that occurs on recently disturbed or managed land that has been recently abandoned. The first stage after the land has been abandoned, or after a severe disturbance has ended, is dominated by herbaceous weeds. They are soon followed by shrubby or woody invaders that eventually dominate. These woody plants are prevented from dominating when the land is managed, because, being woody perennial species, they take a longer time to reproduce, and are more easily eliminated by cutting or weeding. However, when management ends, they become established and grow over and above the lower herbaceous plants, producing shade that is unfavorable for the growth of most herbaceous species. Vines, however, avoid being shaded out by climbing on the shrubs and trees to maintain their place in the sun.

The most characteristic secondary scrub species are *Hibiscus tiliaceus*, *Kleinhovia hospita*, *Macaranga harveyana*, *Maoutia australis*, *Melochia aristata*, *Omalanthus nutans*, *Pipturus argenteus*, and *Trema canabina*, all of which are native plants. Other species common in some places are *Leucaena leucocephala* and *Psidium guajava*, both of which are aliens, and *Melastoma denticulatum*, *Mussaenda raiateensis*, and *Morinda citrifolia*, which are native or Polynesian introductions (Table 4).

The dominant species of secondary scrub are fast-growing, light-loving species, most of which are short and do not reach the height of typical forest trees. The taller tree species eventually overtop the shorter species and shade them out. When the taller trees become dominant, the next community, secondary forest, is formed, but the line between the two is necessarily indistinct. However, on the steep slopes of Ta'u, there is often a disclimax where these light loving species continuously dominate because of natural disturbances, such as landslips, hurricanes, and erosion. At the higher elevation,

these species may be replaced by plants typical of summit scrub.

(11) Secondary Forest

This is forest typically dominated by fast-growing trees with small, easily dispersed seeds that require relatively sunny conditions for germination and/or establishment. Because of the two recent hurricanes, it covers large areas of Ta'u, including what formerly was, or would normally be expected to be, mixed lowland forest (Fig. 24).

Although this kind of forest may superficially appear similar in structure to the climax forest types discussed above, its population structure and floristic composition are quite different. Secondary forest trees dominate the canopy, but other species, ones that can germinate and become established in shady conditions (and which usually have larger seeds), typically dominate the smaller size classes. Without further disturbance, the sunny conditions required for germination and establishment of secondary forest species will no longer be present, and the slower growing canopy tree species that dominate the smaller size classes will eventually take over when the large secondary forest trees of the canopy die. After a long period, the forest that replaces the secondary forest will be virtually the same as primary forests in the area.

The most common secondary forest tree species are *Alphitonia zizyphoides*, *Bischofia javanica*, *Elatostachys falcata*, *Dysoxylum samoense*, *Neonauclea forsteri*, *Pometia pinata*, and *Rhus taitensis*. The first four are typical secondary forest species, but the latter three are also dominant or component species of primary forests. Another tree, *Hibiscus tiliaceus*, is also common in littoral forest, and sometimes dominates on talus slopes that surround the island.

In the earlier stages of secondary forest, the sunlight reaching the forest floor may be greater than in primary forest, since the canopy has not had sufficient time to fully develop. This causes a proliferation of some terrestrial and climbing

species that are otherwise insignificant in undisturbed forest. This increase in ambient sunlight within the forest no doubt leads to other microclimatic differences, such as humidity and temperature, but specific data is lacking.

Several different types of secondary forest may be recognized in Samoa, the most common of which is dominated by *Rhus taitensis*, often in combination with *Alphitonia zizyphoides*. *Rhus* secondary forest exhibits a characteristic stratified canopy that is easily recognizable in aerial photographs, and in the 1976 survey (Whistler 1980) it was found to be dominant on the north slopes (which are mostly outside the park boundaries), on the west slope (also outside the park boundaries), and in places on the south coast on the terrace above Laufuti at 340 m elevation (within the park boundaries).

Two plots of *Rhus* secondary forest were surveyed in 1976. A plot above Laufuti was dominated by huge *Rhus* trees (80% relative dominance), some of which approached 2 m dbh. Other canopy or subcanopy trees present there included *Dysoxylum huntii*, *Endiandra elaeocarpa*, *Myristica fatua*, and *Neonauclea forsteri*. The ground cover was fairly sparse, with an estimated cover of 22%, and was dominated by *Lomagrumma cordipinna* and several other ferns.

Since no tree *Rhus* trees under 75 cm dbh were found, nor were any saplings or seedlings, presumably this site would eventually revert to mixed lowland forest. However, the forest may have been destroyed by the recent hurricanes. During the present study, the same Laufuti area was found to be highly disturbed, with scattered secondary forest trees dominating the tree layer. The most common species there now are *Cyathea* spp., *Endiandra elaeocarpa*, *Hibiscus tiliaceus*, *Macaranga stipulosa*, *Melochia aristata*, and *Myristica fatua*. *Syzygium inophylloides* is also present (and mostly branchless), but it is not common. The ground cover is dominated by secondary scrub species, such as the ferns *Angiopteris evecta*, *Christella harveyi*, *Diplazium harpeodes*, and young *Cyathea*

lunulata, and by *Clidemia hirta*, *Cyrtandra* sp. nov., and *Mikania micrantha*.

The second *Rhus* secondary forest sampled in 1976 was near Fale'ulu northwest of the park at 300 m elevation. Although not within the park boundaries, similar habitat is found on the plateau on the east side of the park. A summary of the population structure of this secondary forest is shown in Table 5. In that plot, *Rhus* and *Alphitonia* had a combined relative dominance of 72%, but all 24 of the trees of these two species in the sample were over 15 cm dbh. When the canopy trees die, they are replaced by the currently smaller trees in the plot, i.e., by the other species that comprise the 27 individuals under 15 cm dbh. It is likely that at this site, the end result of succession would be a forest dominated by *Syzygium inophylloides* along with other species. The ground cover there was moderate (estimated to be 38%), and was dominated by *Freycinetia storckii* and several ferns, such as *Pneumatopteris* sp. and *Lomagramma cordipinna*.

A third secondary forest was sampled during the 1976 survey, this one west of the park above Luma. It was actually an overgrown coconut plantation where *Cocos nucifera* had an estimated relative dominance of 26%. However, the second and third dominant species were *Dysoxylum samoense* and *Neonauclea forsteri* (with 19 and 16%, respectively). Once the coconut trees disappear, the forest would probably revert to *Dysoxylum* forest floristically similar to those found on talus slopes and coral rubble, as discussed under *Dysoxylum* lowland forest. Also, the most common subcanopy tree in the sapling class was *Myristica fatua*, which is characteristic of *Dysoxylum* lowland forest. This area was not visited during the present study (since it was outside the park boundaries), but it is likely that it too was severely damaged by the recent hurricanes. Why *Dysoxylum* was dominant here and *Syzygium inophylloides* elsewhere is not clear.

DISCUSSION

Two or three decades ago, Samoa had the highest percentage of intact native vegetation of any Polynesian archipelago. This may still be true, but since then nearly all of the forests of the lowlands (up to ca. 400 m elevation) have been felled or burned for agriculture to keep up with the explosive population growth of the islands, or were decimated by commercial logging operations (particularly in Western Samoa). Nearly all that is left of native Samoan forest is in the montane regions, and even those are currently under siege.

Because of this tragic loss of Samoan rain forest, the area of the park represents a significant remnant of native Samoan vegetation, and is important for the unique plant communities it contains. The summit scrub at the top of the island, dominated by vines, shrubs, and dwarfed trees, is found nowhere else in Samoa, not to mention in the world. The majestic but small area of *Dysoxylum* lowland forest extending along the east coast of the island is the best remaining representative of this forest type. Although the mixed lowland forest of the lower slopes of Ta'u is now highly disturbed as a result of the two recent hurricanes, it will eventually recover if left to its own devices—at least until the next hurricane hits the island.

The park is also important because of its rich flora. Only a few of the native species are endemic to the island (less than six), but 329 native vascular plant species have been recorded there. Although the island represents only about 1.5% of the total area of the archipelago, it is a home for about 42% of the native vascular plants of Samoa. Its flora includes 43 species of native orchids, a number similar to the combined total found on all of the Polynesian islands to the east. Although only few of the species on Ta'u would end up on an endangered species list, the importance of preserving such a diverse assemblage of plants in their native habitat cannot be over-emphasized. Even with the protection afforded the area by its ranking as a national park, there are

threats to the native vegetation and flora, the most serious of which come from human activities. The concept of a "park" is unheard of in the traditional "fa'asamoa," and the conflict that arises is complicated by the Samoan land tenure system and ancient concepts of land usage. The authority of a government-employed park ranger (who may not even be from the island) is likely to clash with the local "matai system" of chiefly authority. Politics may also have an influence on the park. Even while the botanical survey of the proposed park was proceeding, politicians back on Tutuila were talking of constructing a new inland road on the island that would run from one end of the island to the other via the montane region. The construction of new roads has always been a harbinger of doom for native vegetation and fauna in Samoa, because the new ease of accessibility leads to a proliferation of plantations and pigeon hunters. Thus, care must always be taken to see that the best aims and intentions of park managers are not compromised by the powers that be, whether local or political, that have a different agenda.

It may be illustrative to take a brief look at examples from Western Samoa, which has a national park and two nature reserves, all of which have had problems. The national park of 'O le Pupu- Pu'e on 'Upolu has been plagued by problems since its inception. There have been incursions from the inhabitants of the adjacent villages, and from the government as well, which have compromised the park's integrity. It has been poorly funded and even more poorly managed, and there are even reports of park employees poaching flying-foxes. A trail to a scenic "swiftlet cave" in the interior of the park disappeared over time. To complicate the problem, Hurricane Ofa nearly flattened the whole lowland area of the park.

The two nature reserves, both on Savai'i, were set up by non-governmental agencies and are currently managed by the people of the adjacent villages. The one at Tafua was hard hit by Hurricane Ofa, and shortly afterwards about a quarter of it was burned in a forest fire. The other

nature reserve, at Falealupo on the opposite (west) end of the island, was not as severely damaged by the hurricane, but a recent (September 1991) fire started by careless burning for nearby plantations scorched a small part of it. Political problems within the village may also be a threat to its existence.

Other threats to the native vegetation come from alien animal species. The most obvious pest is the feral pig, which has been on the island since antiquity. In the past, feral pigs probably established some kind of equilibrium with the native vegetation, and hunting pressure from the Samoans kept their numbers down. However, after Hurricane Tusi in 1987, the large area of cultivation on the plateau above Fiti'uta was abandoned, at least partly because of pigs. As the population of the villages has decreased from out-migration, pig-hunting has probably correspondingly diminished. Once the park is established, it may be necessary to institute some kind of pig control. Strangely enough, there are apparently no pigs on the south half of the island, where the inhabitants of Fiti'uta now do most of their farming.

Other smaller animals can also wreak havoc on the vegetation, as well as on the fauna. After Hurricane Tusi, the African snail was accidentally introduced to the island. So far, however, it seems to be restricted to the northwest coastal area of the island. As a control measure, the American Samoa Department of Agriculture introduced the carnivorous snail *Euglandina rosea*, despite the availability of information about its dire consequences on native snail populations. Now that it is there, it may only be a matter of time before the native snails of the island are devastated. An immediate study of this problem is highly advisable, to establish what native snail species are present, and what, if anything, can be done to control *Euglandina* before it is too late. This is a good example of a "different agenda"—the Department of Agriculture having one goal, and environmentalists who promote the establishment of parks having another.

Alien plants also pose a threat to the native plant communities. During the present survey, Koster's curse (*Clidemia hirta*) was found to be common throughout the island, and was the only significant alien plant species present in the unique summit scrub plant community. Only fifteen years earlier it was not even present on the island, based on the 1975—1976 botanical surveys there (Whistler 1980). Koster's curse was first reported from Tutuila in 1955, and spread to Western Samoa by 1978 where it is now common in many plant communities. Some control measures may be available, and every effort should be made to introduce the appropriate pathogens to control this aggressive weed.

The only other alien plant that may cause significant problems on Ta'u is the mile-a-minute vine (*Mikania micrantha*). In some places it is thought to inhibit forest regeneration, but there are no studies to substantiate this. However, there is a strong possibility that this fast-growing weed, along with other alien species,

may have decimated the native or aboriginally introduced weeds. A case in point is *Sigesbeckia orientalis*, which a century ago was apparently common in Samoa, but may now be extinct there. *Mikania* has been in the islands since the turn of the century, and it may have already done all the damage it can. However, if appropriate control measures are available, it may be advisable to study the possible consequences of their introduction.

Other alien plant pests are reported from Western Samoa but not American Samoa, and every effort should be made to keep them out of the park and out of the territory. The worse of these is the African rubber tree (*Funtumia elastica*), which now dominates the secondary forests of western 'Upolu. Also causing problems in Western Samoa are the giant sensitive plant (*Mimosa invisa*), *Solanum torvum*, and night blooming cestrum (*Cestrum nocturnum*).

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**APPENDIX A:
VEGETATION TABLES**

Table 1. Relative dominance of trees in a littoral forest at Saua, Ta'u (Whistler 1980).

Species	Number of trees	Relative Dominance (in %)
1. <i>Barringtonia asiatica</i>	28	55
2. <i>Pisonia grandis</i>	15	31
3. <i>Hernandia nymphaeifolia</i>	3	14
4. <i>Hibiscus tiliaceus</i>	1	+
5. <i>Diospyros samoensis</i>	1	+
6. <i>Guettarda speciosa</i>	1	+

Table 2. Relative dominance (%) of trees in two plots of *Dysoxylum* lowland forest on Ta'u (Whistler 1980).

Species	Saua	Leavania	Total
1. <i>Dysoxylum samoense</i>	86 (12) ¹	49 (10)	66 (22)
2. <i>Neonauclea forsteri</i>	— —	21 (8)	12 (8)
3. <i>Diospyros samoensis</i>	7 (29)	2 (5)	5 (34)
4. <i>Pisonia umbellifera</i>	3 (8)	4 (10)	4 (18)
5. <i>Myristica fatua</i>	+ (3)	5 (20)	3 (23)
6. <i>Sterculia fanaiho</i>	2 (4)	2 (1)	2 (5)
7. <i>Ficus scabra</i>	1 (7)	3 (6)	2 (13)
8. <i>Ficus tinctoria</i>	+ (1)	3 (11)	2 (12)
9. <i>Planchonella garberi</i>	— —	1 (9)	1 (9)
10. <i>Morinda citrifolia</i>	+ (10)	+ (4)	+ (14)
11. <i>Psychotria insularum</i>	+ (6)	+ (5)	+ (11)

¹ Number of individuals. Species with less than 5 were excluded.

Table 3. Relative dominance of trees in the montane forest west of Lata (Whistler 1980).

Species	Number of trees	Relative dominance (%)
1. <i>Cyathea</i> spp.	29	31
2. <i>Syzygium samoense</i>	23	28
3. <i>Weinmannia affinis</i>	5	16
4. <i>Dysoxylum huntii</i>	4	6
5. <i>Ascarina diffusa</i>	9	5
6. <i>Streblus anthropophagorum</i>	9	4
7. <i>Astronidium pickeringii</i>	10	3
8. <i>Acronychia heterophylla</i>	1	3
9. <i>Fagraea berteriana</i>	1	1
10. <i>Reynoldsia lanutoensis</i>	2	1
11. <i>Sarcopygme pacifica</i>	5	1
12. <i>Ficus godeffroyi</i>	2	1
13. <i>Meryta macrophylla</i>	1	+

Table 4. Trees and shrubs of secondary scrub and secondary forest on Ta'u.

Species	Family	Status ¹	Samoan Name
MATURE SECONDARY FOREST CANOPY SPECIES			
<i>Alphitonia zizyphoides</i>	Rhamnaceae	n	toi
<i>Bischofia javanica</i>	Euphorbiaceae	n?	'o'a
<i>Elattostachys falcata</i>	Sapindaceae	n	tapumatau
<i>Rhus taitensis</i>	Anacardiaceae	n	tavai
SECONDARY AND PRIMARY FOREST CANOPY SPECIES			
<i>Dysoxylum samoense</i>	Meliaceae	n	maota
<i>Neonauclea forsteri</i>	Rubiaceae	n	afa
<i>Pometia pinnata</i>	Sapindaceae	n	tava
MATURE SECONDARY FOREST SUBCANOPY TREES			
<i>Adenanthera pavonina</i>	Fabaceae	m	lopa
<i>Cananga odorata</i>	Annonaceae	p	moso'oi
<i>Cyathea</i> spp.	Cyatheaceae	n	olioli
<i>Flacourtia rukam</i>	Flacourtiaceae	n	filimoto
<i>Glochidion ramiflorum</i>	Euphorbiaceae	n	masame
<i>Hibiscus tiliaceus</i>	Malvaceae	n	fau
<i>Kleinhovia hospita</i>	Sterculiaceae	n	fu'afu'a
<i>Macaranga stipulosa</i>	Euphorbiaceae	n	lau fatu
SHRUBS AND SMALL TREES OF SECONDARY SCRUB			
<i>Clidemia hirta</i>	Melastomaceae	m	---
<i>Leucaena leucocephala</i>	Fabaceae	m	fua pepe
<i>Macaranga harveyana</i>	Euphorbiaceae	n	lau pata
<i>Maoutia australis</i>	Urticaceae	n	---
<i>Melastoma denticulatum</i>	Melastomaceae	n	fua lole
<i>Melochia aristata</i>	Sterculiaceae	n	ma'o
<i>Morinda citrifolia</i>	Rubiaceae	p	nonu
<i>Mussaenda raiateensis</i>	Rubiaceae	n	aloalo vao
<i>Omalanthus nutans</i>	Euphorbiaceae	n	fogamamala
<i>Pipturus argenteus</i>	Urticaceae	n	soga
<i>Psidium guajava</i>	Myrtaceae	m	kuava
<i>Trema cannabina</i>	Ulmaceae	n	magele

¹ n = native; p = Polynesian introduction; m = modern introduction.

Table 5. Population structure of canopy and subcanopy trees in a secondary forest plot at Fale'ulu, Ta'u (Whistler 1980).

Species	Relative dominance	No. over 15 cm dbh	No. under 15 cm dbh
<i>Rhus taitensis</i>	40	12	0
<i>Alphitonia zizyphoides</i>	32	12	0
<i>Syzygium inophylloides</i>	10	4	3
<i>Terminalia richii</i>	5	1	0
<i>Elaeocarpus tonganus</i>	2	2	2
<i>Myristica fatua</i>	2	1	5
<i>Dysoxylum huntii</i>	1	2	1
<i>Fagraea berteriana</i>	1	1	1
<i>Endiandra elaeocarpa</i>	1	1	2
<i>Neonauclea forsteri</i>	+	0	1
<i>Hernandia moerenhoutiana</i>	+	0	4
<i>Palaquium stehlinii</i>	+	0	2
<i>Canthium merrillii</i>	+	0	2
<i>Calophyllum neo-ebudicum</i>	+	0	1
<i>Syzygium samoense</i>	+	0	2
<i>Syzygium samarangense</i>	+	0	1

APPENDIX B

ANNOTATED CHECKLIST OF THE FLORA OF TA'U

The following checklist of the flora of Ta'u is based on field work carried out on the island from December 1990 to January 1991, and on specimens of earlier botanical collections made there. Most of the species listed occur inside the park, but a few are restricted to habitats not found within the park (e.g., coastal marsh); these exceptions are noted in the text.

The species are divided into four groups, Pteridophyta (Ferns), Fern Allies, Dicotyledonae, and Monocotyledonae. Each of these taxonomic categories are further divided into plant families arranged in alphabetical order; the species within the families are also arranged alphabetically. Each entry includes the scientific name, common names (if any; English names, when present, are in brackets), a brief description, habitat, reported elevation, geographic range, and a list of all the specimens noted from the island. Because of the small number of specimens that have been collected for each species, the elevations noted here have been taken from the whole Samoan archipelago. Elevation data is not given for weedy species. Nearly all of the specimens cited can be found in either the Bishop Museum Herbarium or in the personal collection of the author. Specimens noted in previous publications, but not verified by the author during the present study, are noted by "n.s." (not seen). The taxonomy employed on the list follows *The Pteridophyte flora of Fiji* (Brownlie 1977) for the ferns and fern allies, and *Flora vitiensis nova* (Smith 1979–1991) for the flowering plants, with only a few exceptions. The Samoan names were taken from Whistler (1984).

PTERIDOPHYTA

ADIANTACEAE

Acrostichum aureum L.

Large, erect fern up to 2 m or more in height, with pinnate, leathery fronds and with sori densely covering the lower surface of the upper, fertile pinnae. Common in coastal marshes and on littoral rocks and cliffs near sea level.

Indigenous, pantropic in distribution.

TA'U: Garber 782; Whistler 1319, 7533.

Adiantum philippense L.

Delicate fern with shiny black to dark brown stipes, pinnate fronds with a lamina 15–20 cm long, and sori extending all along the outer margins of the fertile lobes. Rare on rocks in shady plantations, reported from 50–200 m elevation.

Indigenous, widespread in the Old World tropics.

TA'U: Whistler 7592.

Bolbitis palustris (Brack.) Hennisman

Medium-sized terrestrial fern with a short, creeping rhizome, dimorphic pinnate fronds, margins cut about 1/3 of the way to the midrib into rounded lobes, and the sori covering the entire lower surface of the pinnae of the fertile fronds. Occasional to locally common in shady forest, reported from ca. 50 to 600 m elevation.

Indigenous, ranging from Australia to Rapa.

TA'U: Whistler 3554, 7736.

Doryopteris concolor (Langs. & Fischer) Kuhn

Small terrestrial fern with a short rhizome, tufted fronds up to 20 cm in height, stipes shiny dark brown or black, deltoid, palmatifid lamina, and sori continuous along the margins of the lobes. Rare on rocks in coastal areas.

Indigenous, pantropic in distribution.

TA'U: Brackenridge s. n. ("Manua") (n.s.); Whistler 7591.

Pityrogramma brackenridgei (Carruthers) Maxon

Small terrestrial fern with a short rhizome covered with linear brown scales, fronds tufted, lamina pinnatifid, and sori covering the silvery undersurface of the lobes. Uncommon on coastal rocks on Ta'u, reported from near sea level to high elevation.

Endemic.

TA'U: Garber 666. The only record of this species is from the north coast of the island at 100 m, and it is not reported from within the park boundaries.

***Pteris comans* Forst. f.**

Medium-sized terrestrial fern with a short, erect rhizome, deltoid-ovate, deeply bipinnatifid fronds, reticulate venation, lanceolate lobes, and sori arranged along the entire margin. Occasional to common in littoral to lowland forest, reported from near sea level to 80 m elevation.

Indigenous, ranging from Australia to Polynesia.

TA'U: Garber 674; Yuncker 9093; Harris 315; Whistler 1357, 7554.

***Pteris ensiformis* Burm. f.**

Small terrestrial fern with a creeping rhizome, clumped pinnate fronds, 3 or 4 pairs of long, narrow-lanceolate, finely-toothed lobes (fertile ones often 3-branched), and sori continuous along the margins. Occasional in lowland forest, reported from near sea level to 200 m elevation.

Indigenous, ranging from India to Polynesia.

TA'U: Garber 605; Harris 28; Whistler 7795.

***Pteris pacifica* Hieronymus**

Medium-sized terrestrial fern with an erect rhizome, clumped, deeply pinnatifid, glossy fronds with up to 8 pairs of lateral pinnae cut to near the midrib into narrowly lanceolate, rounded lobes, and sori nearly continuous along the pinnae margins. Occasional in coastal to montane forest, reported from 20 m to high elevation.

Indigenous, ranging from the Solomon Islands to Polynesia.

TA'U: Garber 587, 660; Harris 382; Whistler 7903.

***Pteris tripartita* Sw.**

Large terrestrial fern up to 2 m or more in height, with a short, erect rhizome, tripartite fronds, open venation, narrowly lanceolate pinnae mostly 2—3 cm wide and cut to near the midrib, and long sori extending to near the sinus on the lower edge of the lobes. Occasional in disturbed places, reported from near sea level to 800 m elevation.

Indigenous, ranging from Africa to Tahiti.

TA'U: A. Harris 144 (n.s.); Whistler 7555.

***Pteris vaupelii* Hieronymus**

Large terrestrial fern up to 2 m in height, with an erect rhizome, clumped, deeply pinnatifid, glossy fronds, pinnae mostly 3—5 cm wide and cut to near the midrib into narrowly lanceolate, rounded lobes, and sori nearly continuous along the pinnae margins. Uncommon in coastal to montane forest, reported from near sea level to ca. 700 m elevation.

Endemic.

TA'U: McMullin ("Manua") (n.s.); Garber 709.

ASPIDIACEAE

***Dryopteris arborescens* (Baker) Kuntze**

Medium-sized terrestrial fern with a scaly rhizome, tripinnate-pinnatifid, deltoid fronds, rachis distinctly grooved on upper surface, subsessile pinnules with dentate margins, medial sori, and reniform indusia. Occasional in montane forest and summit scrub, reported from 750 m elevation. This should probably be renamed *Lastreopsis arborescens*. Christensen thought this may be the same as *D. subarborea* (Baker) C. Christensen, but Brownlie does not list Samoa in the range of this species.

Endemic.

TA'U: Powell 87 (n.s.); Whistler 7818.

***Lastreopsis davalloides* (Brack.) Tindale**

Medium-sized terrestrial fern with a scaly rhizome, quadripinnate-pinnatifid fronds, lanceolate to elliptic ultimate segments cut to near the midrib into dentate lobes, sori near the base of the teeth of the lobes, and reniform indusia. Occasional to common in montane forest and summit scrub, reported from 700 m to high elevation.

Indigenous, ranging from Vanuatu to Tahiti.

TA'U: Whistler 3704, 7827, 7834.

***Polystichum aculeatum* (L.) Roth**

Medium-sized terrestrial fern with an erect rhizome, tufted fronds, hairy and scaly stipe and rachis, narrowly deltoid to lanceolate, bi- or tripinnate lamina up to 50 by 30 cm, ultimate segments bearing a short, terminal bristle, and small sori with a peltate, deciduous indusium. Uncommon in montane forest, reported from above ca. 800 m elevation.

Indigenous, cosmopolitan in distribution.

TA'U: Powell 220 (n.s.) ("Manua").

***Tectaria chrysotricha* (Baker) C. Christensen**

Large terrestrial fern with an erect rhizome, tufted fronds up to 3 m or more in length, bipinnate-pinnatifid lamina, pinnae up to 60 cm long, pinnules lanceolate, cut to near the midrib into toothed lobes, sori in 1 row on both sides of the costule, and small reniform indusia. Uncommon in lowland to montane forest, reported from near sea level to 660m elevation.

Endemic.

TA'U: Whistler 3552.

Tectaria decurrens (Presl) Copeland

Large terrestrial fern with an erect rhizome, stipes widely winged to near the base, deeply pinnatifid lamina up to 60 cm long bearing 2—4 lobes and a terminal one, margins dentate, sori in two rows between the main lateral veins, and round-reniform indusia. Occasional in lowland to montane forest, reported from 150 to 900 m elevation.

Indigenous, ranging from India to Polynesia.

TA'U: Garber 735; Whistler 3556, 8004.

Tectaria setchellii Maxon

Large terrestrial fern with a decumbent rhizome, un-winged stipes, deltoid, pinnate-bipinnate lamina 25—40 cm long, 2—5 pairs of lobed pinnae, and small, irregularly scattered sori lacking indusia. Occasional in coastal and lowland forest, reported from 5 to 100 m elevation.

Endemic.

TA'U: Garber 675; Whistler 7958.

Tectaria stearnsii Maxon

Medium-sized terrestrial fern with an erect rhizome, tufted fronds, ovate, mostly bipinnatifid lamina 30—50 cm long, small sori at the ends of short veinlets, and usually with no indusia. Common in coastal and lowland forest, reported from 10 to 450 m elevation. Apparently two forms exist, one with reticulate veins and formerly called *Tectaria dissecta* Lell., the other with all veins free and called *Tectaria stearnsii* Maxon. This problem needs study.

Endemic?

TA'U: Garber 542, 678; Yuncker 9137 (n.s.); Harris 48 (n.s.), 347 (n.s.), 383 (n.s.); Whistler 1299, 7520, 7561.

ASPLENIACEAE

Asplenium australasicum Hooker

Large epiphytic or terrestrial fern with a rosette of simple, sessile, glossy fronds up to 150 cm long, the midrib of the lower surface keeled, and sori in rows arranged on the veins of the lower surface from the midrib to halfway to the margins. Common in lowland to montane forest, apparently at generally higher elevations than the similar *Asplenium nidus*.

Indigenous, widespread in the south Pacific.

TA'U: Whistler 7519.

Asplenium cuneatum Lam.

Terrestrial fern with a short-creeping rhizome, bipinnate lamina up to 25 cm long, pinnae up to 12 on each side and merging into a lobed apex, 1—4 elongate sori on

each pinnule, and entire indusia. Occasional in coastal to montane forest, reported from near sea level to high elevation.

Indigenous, widely distributed in the tropics.

TA'U: Garber 680, 707; Harris s.n.; Whistler 3569, 3682, 7557.

Asplenium feejeense Brack.

Terrestrial fern with simple, narrowly lanceolate fronds up to 50 x 7 cm, tip attenuate and ending in a terminal, proliferous bud, and sori in parallel rows between the margin and midrib. Occasional in coastal to montane forest, reported from 20 to 900 m.

Endemic.

TA'U: Garber 736, 766; Whistler 3557, 7558.

Asplenium horridum Kaulf.

Terrestrial fern with pinnatifid fronds up to 2 m long, hairy stipes, numerous, narrowly lanceolate pinnae 10—15 cm long and lobed to near the midrib, and linear sori arranged several to a lobe. Uncommon in montane forest, reported from 400 m to high elevation.

Indigenous, also found in Hawai'i and the Cook Islands.

TA'U: Whistler 3590, 3720, 7819.

Asplenium insiticium Brack.

Medium-sized fern with an erect rhizome, clustered fronds, brown stipes, the upper part of the rachis often proliferous, long-deltoid lamina up to 40 x 20 cm and subbipinnate with a pinnatifid tip, pinnae up to 10 cm long, and several linear sori on the ultimate segments. Uncommon in montane forest, reported from 760 m to high elevation.

Indigenous, ranging from New Caledonia to Hawai'i.

TA'U: Whistler 3701, 7847.

Asplenium laerpitiifolium Lam.

Large terrestrial fern with a stout, long-creeping rhizome, tufted, dark brown or black stipes, deltoid, tripinnate to quadripinnatifid lamina up to 60 x 20 cm, rhomboid-trapezoid ultimate segments, and 1 or 2 linear sori on the ultimate lobes. Occasional in lowland to montane forest, reported from near sea level to 750 m elevation.

Indigenous, ranging from the Mascarenes to Polynesia.

TA'U: Yuncker 9240; Harris 41 (n.s.); Whistler 3558, 7744.

Asplenium marattioides (Brack.) C. Christensen

Medium-sized terrestrial fern with a widely creeping rhizome, bi-tripinnate juvenile fronds, pinnate adult

fronds, lanceolate pinnae with serrate margins, and numerous linear sori extending from the midrib to near the margin. Occasional in lowland to montane forest, reported from near sea level to high elevation.

Indigenous, also found in Fiji and Tonga.

TA'U: Powell 199 (n.s.); Garber 679; Whistler 3677, 7559.

***Asplenium multifidum* Brack.**

Medium-sized terrestrial or epiphytic fern with a short rhizome, subquadripinnate fronds up to 70 cm long, ultimate lobes linear, and sori 1—2 mm long reaching the edge of the ultimate lobes near the tip. Occasional in montane forest and summit scrub, reported from 400 m to high elevation.

Indigenous, also found in Tahiti.

TA'U: Whistler 3579, 3705, 7842, 8015.

***Asplenium nidus* L.**

Large epiphytic or terrestrial fern with simple, sessile, glossy fronds up to 150 cm long arranged in a rosette, midrib rounded on the lower surface, and sori in rows arranged on the lower surface of the frond from the midrib to halfway to the margin. Common in littoral to montane forest, reported from near level to over 300 m elevation.

Indigenous, widespread in the Old World tropics.

TA'U: Garber 682; Harris 123; Whistler 7527.

***Asplenium polyodon* Forst. f.**

Small terrestrial fern with a short-creeping rhizome, tufted fronds, deltoid, pinnate lamina 10—45 cm long, up to 15 pairs of falcate to lanceolate, acuminate pinnae, and linear sori almost covering the full length of the vein. Common in lowland to montane forest, reported from near sea level to 700 m elevation.

Indigenous, ranging from Madagascar to Hawai'i.

TA'U: Garber 541, 591, 595, 695; Yuncker 9003; Harris 39, 124, 349, 350, 387, s.n.; Whistler 1303, 7631A, 7918.

***Asplenium powellii* Baker**

Large terrestrial fern with a short rhizome, 5-pinnate fronds with ultimate fertile lobes hardly over 0.5 mm wide, and sori near the edge of the ultimate segments. Uncommon in montane forest, reported from 500 m elevation.

Endemic to Ta'u.

TA'U: Powell s.n. (n.s.); Garber 723 (n.s.).

***Asplenium tenerum* Forst. f.**

Small to medium-sized epiphytic or terrestrial fern with a short, erect rhizome, tufted fronds, pinnate lamina with 15—30 pairs of toothed, round-tipped, oblong pinnae, and linear sori along the veins from near the midrib to near the margin. Uncommon in lowland to montane forest, reported from 30 to 700 m elevation.

Indigenous, ranging from Ceylon to Polynesia.

TA'U: Whistler 7916.

***Asplenium unilaterale* Lam.**

Small terrestrial fern with a creeping rhizome, shiny black stipes, linear-lanceolate, pinnate fronds up to 20 x 4 cm with a pinnatifid tip, 20 or more pairs of pinnae, and numerous linear sori. Uncommon in coastal to montane forest, reported from near sea level to 500 m elevation.

Indigenous, ranging from Africa to Polynesia.

TA'U: Garber 681.

ATHYRIACEAE

***Diplazium bulbiferum* Brack.**

Medium-sized terrestrial fern with a short, erect rhizome, pinnatifid lamina, broadly lanceolate pinnae up to 15 cm long divided to near the midrib into oblong, toothed lobes, and linear sori on most of the veins of the lower surface of the lamina. Uncommon in lowland forest, reported from near sea level to 200 m elevation.

Indigenous, also found in Fiji and Vanuatu.

TA'U: Christ ("Manua") (n.s.).

***Diplazium harpeodes* Moore**

Large terrestrial fern with an erect rhizome, bipinnatifid to tripinnatifid lamina up to 1 m in length, lanceolate pinnules cut about halfway to the midrib into blunt, often toothed lobes, and linear sori on most of the veins of the lower surface. Uncommon in lowland to montane forest, reported from 30 m to high elevation.

Indigenous, ranging from Fiji to Pitcairn Island.

TA'U: Whistler 7677, 7790, 7932.

***Diplazium proliferum* (Lam.) Thouars**

Large terrestrial fern with a short, stout, erect rhizome, spiny stipe and rachis, bulbils in many of the pinnae axes, pinnate lamina up to 1 m in length, lanceolate pinnae with shallowly lobed margins, and sori along all the veins of the lower surface. Uncommon in lowland to montane forest, reported from near sea level to 600 m elevation.

Indigenous, ranging from tropical Africa to Samoa.

TA'U: Yuncker 9237; Harris 147; Whistler 7678.

Lunathyrium japonicum (Thumb.) Kurata

Medium-sized fern with scaly stipes and rhizomes, deeply binnatifid fronds, short sori along the veins midway between the costule and the margin, and thin, entire indusia. Uncommon in montane forest and summit scrub, reported from 280 to 800 m elevation.

Indigenous, ranging from Japan to Polynesia.

TA'U: Whistler 7848.

BLECHNACEAE

Blechnum orientale L.

Large terrestrial fern with a stout, erect rhizome, simply pinnate fronds up to 2 m in height, and sori in a continuous line on either side of the midrib. Common in lowland to montane forest, reported from near sea level to 700 m elevation.

Indigenous, ranging from tropical Asia to Polynesia.

TA'U: Yuncker 9011; Garber 749; Whistler 7601.

Blechnum vulcanicum (Bl.) Kuhn

Large terrestrial fern with an erect rhizome, dimorphic pinnate fronds, sterile fronds cut nearly to the midrib into narrowly lanceolate, finely parallel-veined lobes, and sori covering the entire lower surface of the linear lobes of the fertile fronds. Common to abundant in summit scrub, reported from 400 m to high elevation.

Indigenous, ranging from Malaysia to Polynesia.

TA'U: Whistler 3699, 7851.

CYATHEACEAE

Cyathea decurrens (Hooker) Copeland olioli

Tree fern with large fronds having smooth stipes, the upper surface of costa and costules densely covered with fine brown scales, bipinnate lamina with pinnules lobed to the costules, narrow-oblong, deeply dentate lobes 2—3 mm wide, and no indusia. Common in disturbed places, summit scrub, and montane forest, reported from 600 to 910 m elevation.

Indigenous, ranging from Australia and New Caledonia to the Cook Islands.

TA'U: Whistler 7853, 8010. Powell 210 and 246, and Brackenridge s.n. may also belong here.

Cyathea lunulata (Forst. f.) Copeland olioli

Tree fern with large fronds having warty, somewhat glaucous stipes, bipinnate lamina with pinnules lobed to the costules, linear-lanceolate lobes 2—3 mm wide, and inconspicuous indusia. Common in disturbed places,

secondary forest, and summit scrub, reported from 20 to 910 m elevation.

Indigenous, ranging from the Marianas to Samoa.

TA'U: Yuncker 9010; Whistler 7521.

Cyathea vaupelii Copeland olioli

Tree fern with large fronds having somewhat warty stipes, bipinnate lamina with pinnules lobed to the costules, oblong lobes mostly 4—5 mm wide, and conspicuous indusia. Occasional in lowland forest to summit scrub, reported from near sea level to 700 m elevation.

Endemic.

TA'U: Yuncker 9015, s.n.; Whistler 3593, 7508, 7823.

Dicksonia brackenridgei Mett.

Large terrestrial fern with a trunk up to 2 m or more in height, large, deltoid, tripinnate-pinnatifid fronds, lanceolate and deeply lobed pinnules having only the basal 2 or 3 pairs fertile, and filiform lobes bearing large sori. Common in summit scrub, reported from 450 m to high elevation.

Indigenous, also found in Fiji.

TA'U: Whistler 3585, 7850.

DAVALLIACEAE

Arthropteris repens (Brack.) C. Christensen

Epiphytic or terrestrial fern (typically on lower tree trunks) with a long-creeping, thin rhizome, pinnate fronds up to 30 cm long and 4—5 cm wide, and sori between the costa and the margin. Common in lowland to montane forest, reported from near sea level to 600 m elevation.

Indigenous, ranging from Borneo to Samoa.

TA'U: Garber 572; Yuncker 9292; A. Harris 388; Harris 44, 231 (n.s.), 348 (n.s.); Whistler 3217, 7786.

Davallia graeffei Luer.

Epiphytic fern with a scaly, creeping rhizome, finely divided dimorphic leaves, sori subtended by an acuminate pinna tip, and cup-like indusia. Uncommon in montane forest, reported from 430 to 700 m elevation.

Endemic.

TA'U: Whistler 3708, 7811, 7996.

Davallia solida (Forst. f.) Sw.

Epiphytic fern with a stout, creeping rhizome, tripinnate to tripinnatifid, deltoid fronds, sori on terminal subdivisions of lobes, and tubular indusia. Common in

lowland to montane forest, reported from near sea level to high elevation.

Indigenous, ranging from Malaysia to Polynesia.

TA'U: Garber 673; Yuncker 9050; Whistler 7610.

Humata heterophylla (Smith) Desv.

Epiphytic fern with a long-creeping rhizome, dimorphic fronds, simple, lanceolate, finely veined, sterile fronds, lanceolate, deeply lobed fertile fronds, marginal sori, and thin indusia. Occasional in lowland to montane forest, reported from near sea level to 700 m elevation.

Indigenous, ranging from Sumatra to Polynesia.

TA'U: Garber 620, 643; Yuncker 9068; Harris s.n.; Whistler 1344, 7609.

Humata polypodioides Brack.

Epiphytic fern with a long-creeping rhizome covered with appressed, brown scales, pinnate fronds with lamina and stipe of similar lengths, and marginal sori. Uncommon in lowland to montane forest, reported from near sea level to 700 m elevation.

Indigenous, widespread in the Pacific but not found in Fiji.

TA'U: Garber 738; McMullin 48; Whistler 7992.

Leucostegia pallida (Mett.) Copeland

Terrestrial fern with a wide-creeping rhizome, deltoid fronds with a tri- to quadripinnate lamina up to 60 cm long, and sori impressed on the lower surface of the margin of the lobes. Uncommon in montane forest and summit scrub, reported from 680 m to high elevation.

Indigenous, ranging from Malaysia to Tahiti.

TA'U: Whistler 7820.

Nephrolepis biserrata (Sw.) Schott

Epiphytic fern (sometimes terrestrial) with a short rhizome, erect, pinnate fronds up to 2 m in length, scales on young stipes, pinnae with crenate margins but lacking an auricle, sori between the margins and the costules, and reniform indusia. Common in lowland to montane forest, reported from 30 to 700 m elevation.

Indigenous, pantropical in distribution.

TA'U: Yuncker 9156; Whistler 7737.

Nephrolepis hirsutula (Forst. f.) Presl

Terrestrial fern with a short, thick rhizome, erect, pinnate fronds up to 1.2 m long, rachis and surfaces usually with pale scales, pinnae with an auricle and crenate margins, sori near the pinnae margins, and reniform indusia. Common in disturbed places, reported from near sea level to high elevation.

Indigenous, ranging from tropical Asia to Polynesia.

TA'U: Yuncker 9019, 9044; Harris 146; Whistler 7738.

Oleandra neriiformis Cav.

Epiphytic fern with a long, brittle rhizome, simple, linear-lanceolate fronds with close, conspicuous veins, sori in a single row close to the midrib, and reniform indusia. Occasional to common in montane forest and summit scrub, reported from 500 m to high elevation.

Indigenous, ranging from tropical Asia to Samoa.

TA'U: Garber 724; Whistler 7836.

DENNSTAEDTIACEAE

Microlepia speluncae (L.) Moore

Large terrestrial fern with a creeping rhizome, pinnate lower lamina, tripinnate upper lamina, and sori between the lobes in the sinus. Occasional in sunny, disturbed places, reported from near sea level to 600 m elevation.

Indigenous, pantropic in distribution.

TA'U: Garber 598; Harris 384; Whistler 1299, 7703, 7789, 7964.

HYMENOPHYLLACEAE

Hymenophyllum imbricatum Bl.

Medium-sized filmy fern with a widely creeping rhizome, winged rachis, spaced fronds up to 25 cm long, bi-tripinnatifid lamina, lobes narrowed below the tip, and a globose sorus enclosed within the suborbicular lips of the indusium. Locally common in montane forest, reported from 400 m to high elevation.

Indigenous, ranging from Sumatra to Tahiti.

TA'U: Garber 759; Whistler 3703, 3587, 3588, 7845.

Hymenophyllum polyanthos Sw.

Small filmy fern with a widely creeping, wiry rhizome, winged rachis, spaced fronds 5–25 cm long, bi-tripinnatifid lamina, lobes wider than the sorus, and an obovate sorus enclosed within the rounded lips of the indusium. Occasional in lowland to montane forest, reported from 360 to 600 m elevation.

Indigenous, pantropic in distribution.

TA'U: Garber 727, 737; Yuncker 9256; Harris s. n.; Whistler 7991.

Trichomanes apiifolium Presl

Medium-sized terrestrial fern with an erect rhizome, stipes with long, reddish hairs, tri-quadripinnatifid fronds up to 50 cm high, and a sorus enclosed within a

tubular indusium. Uncommon in montane forest and summit scrub, reported from 600 to 900 m elevation.

Indigenous, ranging from the Philippines to Samoa. Brownlie does not note the presence of this species in Samoa.

TA'U: Garber 722, 740, 743, 757; Whistler 3710, 7846.

Trichomanes asa-grayi van der Bosch

Small terrestrial fern with a short-creeping rhizome, lanceolate fronds with the lamina up to 20 cm long, segments bristle-like, and a sorus enclosed within a tubular, truncate indusium. Uncommon in montane forest, reported from 500 m to high elevation.

Indigenous, also found in Fiji and Tahiti.

TA'U: Whistler 8008.

Trichomanes assimile Mett.

Small epiphytic fern with a creeping, filiform rhizome, lanceolate to ovate, bipinnate lamina up to 5 cm long and having no specialized margin or intramarginal vein, and a sorus enclosed within a tubular indusium. Uncommon in lowland to montane forest, reported from 350 to 800 m elevation.

Indigenous, apparently also found in Vanuatu and New Caledonia.

TA'U: Garber 718.

Trichomanes bipunctatum Poir.

Small epiphytic fern with a slender, long-creeping rhizome, deltoid-ovate, tripinnatifid fronds 4—8 cm long with a submarginal, false vein in the segments, and a sorus enclosed within a tubular indusium. Uncommon in lowland to montane forest, reported from near sea level to 1200 m elevation.

Indigenous, ranging from Madagascar to Polynesia.

TA'U: Garber 741.

Trichomanes boryanum Kuntze

Small to medium-sized terrestrial fern with an erect rhizome, tufted, pinnate fronds with narrowly oblong pinnae, and a sorus enclosed within a tubular indusium located on the upper margins of the upper pinnae. Occasional to common in lowland to montane forest, and in streambeds, reported from 50 to 800 m elevation.

Indigenous, ranging from Vanuatu to Samoa.

TA'U: Garber 621, 715; Yuncker 9017; Whistler 1394, 3570, 7596, 7631, 7743, 7963.

Trichomanes dentatum van der Bosch

Small terrestrial fern with an erect rhizome, clustered, fronds with a tripinnatifid, broadly deltoid lamina up to

20 cm long, few hairs on the rachis, and a sorus enclosed within a tubular indusium. Uncommon in lowland to montane forest, reported from 200 to 900 m elevation.

Indigenous, ranging from New Caledonia to Polynesia.

TA'U: Whistler 7717.

Trichomanes endlicherianum Presl

Small epiphytic fern with a slender, creeping rhizome, winged rachis, irregularly bipinnatifid fronds 1.5—6 cm long, 2—6 pairs of narrowly oblong to lanceolate pinnae, margins with 2 rows of specialized cells, and a sorus enclosed within a tubular indusium. Apparently rare in montane forest, reported from ca. 400 to 670 m elevation.

Indigenous, ranging from New Zealand to Tahiti.

TA'U: Powell 155 (n.s.). This specimen should be checked for identification.

Trichomanes humile Forst. f.

Small epiphytic fern with a slender, long-creeping rhizome, winged rachis, bipinnatifid fronds 2—5 cm long, lobe margins with 2 rows of elongate cells, and a sorus enclosed within a tubular indusium. Common in littoral to montane forest, reported from 20 to 500 m elevation.

Indigenous, ranging from Malaysia to Tahiti.

TA'U: Garber 628; Yuncker 9001, 9057; Harris 682A, 1764A, s. n. (3); Whistler 7625, 7728, 7962.

Trichomanes intermedium van der Bosch

Medium-sized fern with an erect rhizome, tufted fronds, stipe with caducous wings, tripinnate-quadripinnatifid pinnae 8—30 cm long, ultimate segments narrow, and a sorus enclosed within a tubular indusium. Occasional in lowland to montane forest, reported from 50 to 670 m elevation.

Indigenous, ranging from New Guinea to Samoa.

TA'U: Garber 729; Harris s. n.; Whistler 3562, 3595, 7614, 7707, 7739.

Trichomanes saxifragoides Presl

Small fern with a wiry, creeping rhizome, flabelliform, reniform fronds up to 2.5 cm long and wide, and a sorus enclosed within a tubular indusium. Locally common in lowland to montane forest, reported from near sea level to 900 m elevation.

Indigenous, ranging from Africa to Polynesia.

TA'U: Powell 181 (n.s.); Garber 744; Whistler 3715, 7802.

HYPOLEPIDACEAE

Hypolepis aspidioides Christ

Large terrestrial fern with an erect rhizome, large tripinnatifid, broadly deltoid fronds, and linear, submarginal sori covered by the reflexed margin of the lamina. Occasional in disturbed places.

Endemic.

TA'U: Whistler 7562.

LINDSAEACEAE

Lindsaea harveyi Carruthers ex Seem.

Medium-sized terrestrial fern with a short-creeping rhizome, bipinnate or rarely simply pinnate fronds 10—50 cm long, 1—5 pinnae to a side with a similar terminal one, an oblong sorus one to a lobe on 2—4 nerve endings, and an indusium falling short of the margin. Uncommon in lowland to montane forest, reported from 150 to 800 m elevation.

Indigenous, ranging from New Caledonia to Samoa.

TA'U: Yuncker 9259.

Lindsaea pacifica Kramer

Medium-sized terrestrial fern with a short-creeping rhizome covered with reddish brown scales up to 1.5 mm long, bipinnate fronds with 3—6 pinnae on each side and a single terminal one, 20—35 pairs of pinnales, interrupted linear sori on 2—6 nerve endings, and an indusium falling short of the margin. Occasional in lowland to montane forest, reported from 200 m to high elevation.

Indigenous, ranging from the Solomon Islands to Tahiti.

TA'U: Garber 742; Yuncker 9257; Whistler 3592, 3592A, 3712A, 7523, 8006, 8007.

Lindsaea pulchra (Brack.) Carruthers ex Seem.

Small terrestrial or epiphytic fern with a long-creeping rhizome covered with reddish brown, acuminate scales up to 3 mm long, some veins anastomosing, lamina simple, 15—40 pinnales per side, sorus 1 to each lobe on 2—4 vein endings, and a delicate indusium not reaching the margin. Uncommon in lowland to montane forest, reported from 300 to 820 m elevation.

Indigenous, ranging the Bismarck Archipelago to Samoa.

TA'U: Yuncker 9152; Whistler 3712, 7826.

Lindsaea repens (Bory) Thwaites

Small epiphytic fern with a long-creeping rhizome, all veins free, linear, pinnate lamina bearing up to 40 pinnae, sorus 1 to each lobe on 1—4 nerve endings, and an

indusium usually reaching the margin. Uncommon in montane forest, reported from 760 m to high elevation.

Indigenous, ranging from the Mascarene Islands to Hawai'i.

TA'U: Powell 156 (n.s.).

Sphenomeris chinensis (L.) Maxon

Medium-sized terrestrial fern with a short-creeping rhizome, tufted fronds, lanceolate to ovate, tripinnate-quadrripinnatifid lamina, cuneate, 1—3-lobed ultimate segments, and a sorus near the apex of the segments. Uncommon in sunny places, reported from ca. 200 to 900 m elevation.

Indigenous, ranging from Madagascar to Polynesia.

TA'U: Whistler 7629.

LOMARIOPSIDACEAE

Elaphoglossum reineckei Hieronymus & Lauterb.

Medium-sized epiphytic fern with a thick, short-creeping rhizome, simple, leathery, lanceolate to oblong fronds, and sori covering the entire undersurface of the fertile fronds. Occasional in montane forest, reported from 370 m to high elevation.

Indigenous, also found in Fiji.

TA'U: Whistler 3706, 7810.

Lomagramma cordipinna Holttum

Medium-sized terrestrial or epiphytic fern with a long-creeping or climbing rhizome, pinnate immature fronds, pinnate to bipinnate mature fronds, and sori covering the lower surface of fertile pinnae. Common to locally abundant in lowland to montane forest, reported from 200—300 m elevation.

Indigenous, also found in Fiji.

TA'U: Harris 209; Whistler 7820.

MARATTIACEAE

Angiopteris evecta (Forst. f.) Hoffm.

Large terrestrial fern with fronds up to over 3 m in length that radiate from a short, massive, fleshy stock, bipinnate lamina, lanceolate pinnales 10—20 cm long having an enlarged base, and sori of 7—12 sporangia in a dense row 1—2 mm from the margin. Common in lowland to montane forest, reported from near sea level to high elevation.

Indigenous, ranging from Malaysia to eastern Polynesia.

TA'U: Garber 579; Whistler 7560.

OPHIOGLOSSACEAE

Ophioglossum pendulum L.

Epiphytic fern with a small rhizome, pendulous, strap-shaped fronds 40—120 cm long, and sori embedded in a spike attached to the center of the frond. Uncommon in coastal to montane forest, reported from near sea level to 550 m elevation.

Indigenous, ranging from Madagascar to Polynesia.

TA'U: Garber 616, 632; Yuncker 9078; Whistler 1328, 7675.

Ophioglossum reticulatum L.

var. *pacifica* Christensen

Tiny terrestrial fern with a single ovate lamina and sori embedded in a single, erect spike. Uncommon in lowland to montane forest, reported from 300 m to high elevation. The variety appears to be distinct enough to be recognized as a new species (H. Wagner, pers. comm.).

Indigenous, ranging from tropical Asia to Polynesia.

TA'U: Whistler 3179A, 3582, 7941.

POLYPODIACEAE

Ctenopteris contigua (Forst. f.) Holttum

Small epiphytic fern with a short rhizome, clustered, narrowly lanceolate fronds 20—50 cm long with a winged stipe, lamina lobed to near the midrib, and sori several at the tip of the upper lobes. Uncommon in lowland to montane forest, reported from 200 to 880 m elevation.

Indigenous, ranging from Ceylon to Polynesia.

TA'U: Garber 719, 726, 731, 747; Yuncker 9260; Whistler 3709, 7840, 7946, 7987.

Ctenopteris seemanii (J. Smith) Copeland

Small epiphytic fern with a short-creeping rhizome, clustered, sessile, narrowly lanceolate fronds mostly 10—20 cm long, lamina lobed to near the midrib all the way to the base, and sori in submarginal rows on the upper lobes that grade imperceptibly into the lower sterile lobes. Occasional in lowland to montane forest and summit scrub, reported from near sea level to 900 m elevation.

Indigenous, also found in Fiji.

TA'U: Yuncker 9077; Whistler 7526, 7945, 7986.

Ctenopteris tenuisecta (Bl.) S. Sm.

Small epiphytic fern with a short-creeping rhizome, a pubescent rachis, clustered fronds up to 20 cm long and bipinnatifid with linear-lanceolate lobes having 1 or 2

long hairs at the tip, and sori arranged one to each segment of the upper pinnae. Uncommon in montane forest and summit scrub, reported from 760 m to high elevation.

Indigenous, apparently ranging westward to Malaysia, but not reported from Fiji.

TA'U: Whistler 3707, 7839.

Grammitis conformis (Brack.) J. Sm.

Small epiphytic fern with a short, thick rhizome, simple, linear-lanceolate fronds, stipes and margins with short (less than 1 mm) hairs, and circular sori in a single row on both sides of the midrib. Uncommon in montane forest and summit scrub, reported from 600 m to high elevation.

Indigenous, also found in Fiji.

TA'U: Whistler 7821.

Grammitis hookeri (Brack.) Copeland

Small epiphytic fern with a short, thick rhizome, simple, linear-lanceolate fronds, stipes covered with long (1—4 mm) reddish hairs, and a discontinuous row of sori on both sides of the midrib. Uncommon in montane forest and summit scrub, reported from 800 m to high elevation.

Indigenous, also found in Fiji and Hawai'i.

TA'U: Whistler 7821A, 7849.

Microsorium sylvaticum (Brack.) Copeland

Large terrestrial fern with a creeping rhizome, simple, deeply lobed fronds up to 2 m in height, and numerous, tiny sori scattered irregularly over the lower surface of the lobes. Occasional in lowland to montane forest, reported from 25 to 850 m elevation. This is apparently the same thing as *Polypodium polynesianum*.

Indigenous, widespread in the Pacific.

TA'U: Garber 578; Yuncker 9238; Whistler 7600, 7832.

Phymatosorus nigrescens (Bl.) Pichi-Serm.

Medium-sized terrestrial fern with a stout, creeping rhizome, frond deeply cut into 1—10 pairs of lobes (or sometimes simple and lanceolate), and deeply imbedded sori forming conspicuous tubercles on the upper surface. Occasional in lowland forest, reported from 200 to 1000 m elevation.

Indigenous, ranging from Ceylon to Polynesia.

TA'U: McMullin 49 (n.s.); Whistler 7598, 7750.

Phymatosorus scolopendria (Burn. f.) Pichi-Serm.

Large terrestrial and epiphytic fern with a long-creeping, scaly rhizome, simple, glossy-green lamina deeply cut into 1—10 lobes, and large, round sori in 1 or 2 rows on either side of the midrib of each lobe. Common to

abundant in littoral to montane forest, reported from near sea level to high elevation. Brownlie noted that individuals that are terrestrial and bear up to 10 pairs of lobes (vs. 1—4) belong to another species, *P. grossus*, but this distinction does not seem to be valid.

Indigenous, ranging from tropical Africa to eastern Polynesia.

TA'U: Garber 685; Yuncker 9023; Harris 126; Whistler 1298, 7783, 7959.

Polypodium sp.

Medium-sized epiphytic fern with pinnate fronds, ca. 10 pairs of narrowly lanceolate pinnae 6—10 cm long with dentate margins, the terminal pinna similar, and circular sori in a row on either side of the midrib and extending the entire length of the lamina. Rare in lowland forest to summit scrub, reported from 280 to 740 m. Similar to *Polypodium subauriculatum*, but much smaller.

Endemic?

TA'U: Whistler 7833, 7933.

Pyrrosia adnascens (Sw.) Ching

Small epiphytic fern with a long-creeping rhizome, simple, thick, narrowly lanceolate to oblanceolate fronds, and closely arranged sori covering the apical half of the lower lamina surface. Common in lowland to montane forest, and in plantations and villages, reported from near sea level to 540 m elevation.

Indigenous, ranging from India to Polynesia.

TA'U: Garber 558, 560, 561; Yuncker 9055; Whistler 7712.

SCHIZAEACEAE

Schizaea dichotoma (L.) Smith

Terrestrial fern with a creeping, underground rhizome, clumped fronds dichotomously branched 2—8 times ultimately into narrow, spreading lobes, and terminal sori with sporangia in 2 rows. Uncommon in lowland to montane forest, reported from 100 to 580 m elevation.

Indigenous, ranging from Madagascar to Polynesia.

TA'U: Garber 626A; Yuncker 9262; Whistler 7604.

THELYPTERIDACEAE

Christella dentata (Forssk.) Brownsey & Jermy

Medium-sized terrestrial fern with a short-creeping rhizome, pubescent stipes, pinnate lamina lobed about halfway to the costa, the lowest 2 or 3 pairs gradually reduced and generally reflexed, the basal pair of veins united to form an excurrent vein to the sinus, pubescent

surfaces, yellow glands on the lower surface, and a cordate-reniform indusium. Uncommon in sunny, disturbed places, reported from ca. 50 to 600 m elevation.

Indigenous, ranging throughout the Old World tropics and subtropics.

TA'U: Whistler 7649.

Christella harveyi (Mett.) Holttum

Large terrestrial fern with a long-creeping rhizome, pubescent stipes, pinnate lamina lobed to near the costa, up to 5 pairs of reduced pinnae, basal veins free, pubescent surfaces, yellow glands present on the lower surface, and a reniform, glabrous indusium. Common in disturbed places in the lowlands, reported from near sea level to 200 m elevation.

Indigenous, ranging from Vanuatu to Polynesia.

TA'U: Harris 381; Whistler 3567, 7512, 7679.

Coryphopteris sp.

Medium-sized terrestrial fern with tufted fronds, several pair of pinnae reduced to an acrophore, a pinnate lamina, glabrous pinnae less than 1 cm wide and cut less than halfway to the midrib, and all veins free. Common in dry stream beds, reported from 180 to 300 m elevation.

Endemic?

TA'U: Whistler 7943.

Cyclosorus interruptus (Willd.) H. Ito

Medium-sized terrestrial fern with a long-creeping rhizome, pinnate fronds, no reduced pinnae, pinnae cut about one-third of the way to the costa, flat scales on the costules of the lower surface, the basal pair of veins united, and a hairy indusium. Abundant in coastal marshes.

Indigenous, ranging from Australia to Hawai'i.

TA'U: Yuncker 9297; Whistler 7972. Not likely to be found within the park boundaries, for lack of appropriate habitat.

Macrothelypteris polypodioides (Hook.) Holttum

Large terrestrial fern with a short rhizome, bipinnate-tripinnatifid fronds, largest pinnales 7 x 2 cm, pale scales with marginal hairs on the rachises and lower surface of pinnales, small sori, and small indusia bearing a few capitate hairs. Occasional in open sunny places such as roadcuts, reported from ca. 100 m elevation.

Indigenous, ranging from tropical Asia to Tahiti.

TA'U: Garber 667; Whistler 7882.

Macrothelypteris torresiana (Gaud.) Ching

Large terrestrial fern with a stout, short-creeping rhizome, large bipinnate-tripinnatifid fronds, largest pinnae up to 5 cm long, hairs but no scales on rachises and lower surface of pinnae, small sori, and small indusia bearing a few capitate hairs. Occasional in sunny disturbed places, reported from near sea level to 250 m elevation.

Indigenous, ranging from the Mascarene Islands to Hawai'i.

TA'U: Yuncker 9239; Harris 386 (n.s.); Whistler 7562, 7702.

Pneumatopteris glandulifera (Brack.) Holttum

Large terrestrial fern with a decumbent rhizome, many reduced pinnae each consisting of an acrophore and a green rim at its base, costules with small acrophores at their bases, lower 1 or more veins united, and no indusia. Occasional in sunny places, reported from near sea level.

Indigenous, ranging from the Solomon Islands to Rarotonga.

TA'U: Powell 160 ("Manua"); Yuncker 9020; Whistler 7706.

Pneumatopteris magnifica (Copeland) Holttum

Large terrestrial fern with an erect rhizome, several pairs of reduced pinnae, pinnae cut about two-thirds of the way to the costa, surfaces glabrous, lowest pair of veins united, and 8—12 sori in a row along the main vein. Common in sunny places and forest openings, reported from near sea level to 820 m elevation.

Indigenous, also found in the Solomon Islands and Fiji.

TA'U: Whistler 7556, 7680.

Pneumatopteris sp.

Medium-sized terrestrial fern with pinnate lamina, surfaces mostly glabrous, several reduced pinnae, and 1—2 pairs of united veins. Uncommon on rocky streambeds, reported from 200 m elevation.

Endemic?

TA'U: Whistler 7627.

Sphaerostephanos invisus (Forst. f.) Holttum

Large terrestrial fern with a creeping rhizome, pinnate lamina having a pinnatifid apex, 1 or 2 reduced pairs of basal pinna, 1 pair of united veins, lamina cut nearly halfway to the costa, lower surface pubescent, sori in rows from the midrib nearly to the tip of the lobes, and pubescent indusia. Occasional in sunny, disturbed places, reported from near sea level.

Indigenous, ranging from Australia to Hawai'i.

TA'U: Yuncker 9038 (n.s.), 9039 (n.s.); Whistler 7586.

Sphaerostephanos reineckeii (C. Christensen) Holttum

Medium-sized fern with an erect rhizome, up to 15 pairs of reduced pinnae consisting of an acrophore and a tiny lamina, basal pair of veins united, lower lamina surface pubescent and bearing glands, and no indusia. Uncommon in montane forest, reported from 400 m to high elevation.

Endemic.

TA'U: Powell 252 ("Manua") (n.s.); Whistler 7511.

VITTARIACEAE

Antrophyum alatum Brack.

Epiphytic fern with a short-creeping rhizome, tufted, simple, spatulate fronds up to 30 cm long and 10 cm wide, and sori arranged in longitudinal rows on veins on the lower surface of the lamina. Occasional in lowland to montane forest, reported from 5 to 500 m elevation.

Indigenous, ranging from New Caledonia to Tahiti.

TA'U: Yuncker 9056, 9290; Harris 262 (n.s.), 382X (n.s.); Whistler 7524.

Vaginularia angustissima (Brack.) Mett.

Epiphytic, clump-forming fern with a creeping rhizome, simple, linear, simple fronds up to 40 cm long and ca. 2 mm wide, and sori in a groove on the under surface of the lamina. Occasional in lowland to montane forest, reported from 40 to 550 m elevation.

Indigenous, also found in Fiji and possibly Vanuatu.

TA'U: Garber 627, 767, 770; Yuncker 9070; A. Harris 164, 188; Harris 46, 133, 256, 405 (n.s.); Whistler 7607, 7715.

Vittaria elongata Sw.

Epiphytic fern with a creeping rhizome, simple, linear fronds 10—40 cm long and 3—7 mm wide, and sori in a marginal groove. Occasional in lowland to montane forest, reported from near sea level to high elevation.

Indigenous, ranging from Asia to Polynesia.

TA'U: Garber 734, 758; Whistler 7993.

Vittaria scolopendrina (Bory) Thwaites

Epiphytic fern with a creeping rhizome, simple, sessile, pendent, linear fronds 40—90 cm long and ca. 2.5 cm wide, and sori in a marginal groove. Uncommon in lowland to montane forest, reported from 300 to 850 m elevation.

Indigenous, ranging from Madagascar to Polynesia.

TA'U: Garber 733.

FERN ALLIES

LYCOPODIACEAE

Lycopodium carinatum Desv.

Epiphytic herb with dimorphic leaves densely arranged around the stems, with the lanceolate sterile leaves gradually passing into the smaller ovate fertile leaves. Uncommon in lowland forest, reported from near sea level to 400 m elevation.

Indigenous, ranging from India to Polynesia.

TA'U: Yuncker 9073.

Lycopodium cernuum L.

Terrestrial herb with much-branched stems, linear-subulate leaves 2—3 mm long, and numerous strobili solitary on the tips of the branchlets. Uncommon in sunny places and summit scrub, reported from ca. 10 m to high elevation.

Indigenous, pantropic in distribution.

TA'U: Garber 751; Whistler 7828, 7901.

Lycopodium phlegmaria L.

Epiphytic herb with dimorphic leaves abruptly differing from each other, the sterile leaves 2—4 mm wide, the tiny fertile leaves arranged in long, slender, forked spikes. Uncommon in lowland to montane forest, reported from 30 to 800 m elevation.

Indigenous, widespread in the Old World tropics.

TA'U: Garber 631, 640, 728; Yuncker 9071, 9074; Whistler 3584, 7525.

Lycopodium squarrosum Forst. f.

Epiphytic herb with stems branched 2—4 times, sterile leaves narrowly lanceolate, 1—2 cm long, and passing imperceptibly into the upper, fertile leaves. Uncommon in lowland to montane forest, reported from 50 m to high elevation.

Indigenous, ranging from tropical Asia to Polynesia.

TA'U: Garber 732; Yuncker 9072, 9247; Whistler 3573, 3721, 8013.

PSILOTACEAE

Psilotum complanatum Sw.

Leafless, pendulous, epiphytic herb with a short-creeping rhizome, flattened branches 2—3.5 mm wide, and small yellow sporangia. Uncommon in lowland forest, reported from near sea level to 400 m elevation.

Indigenous, pantropic in distribution.

TA'U: Garber 626, 716; Yuncker 9016, 9075; Harris 117, 158; Whistler 7891.

SELAGINELLACEAE

Selaginella laxa Spring

Tiny terrestrial herb with prostrate stems, tiny dimorphic leaves, and dimorphic sporophylls. Uncommon in sunny places, reported from near sea level to 500 m elevation.

Indigenous, ranging from Fiji to Tahiti.

TA'U: Whistler 7568, 7915.

Selaginella whitmeei Baker

Erect, terrestrial herb with ovate, acuminate leaves on the main stem, ovate to lanceolate lateral leaves, and spores born in tetragonous strobili. Occasional in lowland to montane forest and in rocky stream beds, reported from 180 m to high elevation. This species appears to be identical to *S. reineckei*.

Endemic.

TA'U: Powell 38 (n.s.); Garber 618, 625, 713; Yuncker 9030, 9069, 9151, 9159; Whistler 3566, 7622, 7854.

DICOTYLEDONAE

ACANTHACEAE

Blechnum brownei Juss.

Herb with opposite leaves and small white, campanulate flowers borne among ovate bracts in terminal spikes. Uncommon in disturbed areas.

A modern introduction, native to tropical America.

TA'U: Whistler 7694.

Hemigraphis alternata (Burm. f.) T. Anders.

Prostrate herb with purple-colored, opposite leaves and small white, sympetalous flowers in short, bract-bearing spikes. Locally abundant in a few localities in disturbed forest and on roadsides, originally an escape from cultivation.

A modern introduction, native to tropical Asia.

TA'U: Yuncker 9215; Whistler 1353, 7670.

Justicia procumbens L.

Small herb with opposite leaves and tiny lavender, bilabiate flowers in dense, ovoid, bract-bearing terminal spikes. Common in disturbed places.

A modern introduction, native to tropical Asia.

TA'U: Whistler 7644.

Ruellia prostrata Poir.

vaouli

Herb with opposite leaves, solitary, axillary, lavender, campanulate flowers, and a club-shaped capsule. Common in disturbed areas.

A modern introduction, native to the Old World tropics.

TA'U: Whistler 7772.

Ruellia tuberosa L.

Tough-stemmed herb with opposite leaves, large, lavender, campanulate flowers solitary in the leaf axils, and a club-shaped capsule. Uncommon as a weed in villages.

A modern introduction, native to the Old World tropics.

TA'U: Whistler 7689. Seen only in Si'ufaga, and probably not occurring within the park boundaries.

AIZOACEAE

Sesuvium portulacastrum (L.) L.

Prostrate succulent herb with alternate leaves and white to lavender flowers bearing numerous stamens. Uncommon on coastal rocks.

Indigenous, widespread in the Pacific.

TA'U: Whistler 3223, 3317, 7549.

AMARANTHACEAE

Achyranthes aspera L.

tamatama

Subshrub with opposite leaves, tiny purple flowers, and sharp, grass-like fruits in terminal spikes. Occasional in coastal areas and sometimes weedy.

Probably a Polynesian introduction to Samoa, widespread in the tropics.

TA'U: Garber 563, 568; Harris 322; Whistler 3221, 7577.

Alternanthera sessilis (L.) R. Br. ex DC.

Creeping herb with opposite leaves and inconspicuous flowers in white, sessile, axillary, globose clusters. Occasional to common in disturbed places, particularly in wetland crops such as taro.

A modern introduction, possibly native to southern China.

TA'U: Yuncker 9172, 9275; Harris 8, 236 (n.s.), 321 (n.s.), 363; Whistler 1366, 7663.

Amaranthus viridis L.

[slender amaranth]

Red-stemmed herb with alternate leaves notched at the tip, and terminal and axillary spike-like panicles of tiny inconspicuous, green flowers. Uncommon in croplands and waste places.

Possibly a Polynesian introduction, now pantropic in distribution.

TA'U: Yuncker 9197; Harris 9, 262; Whistler 1374.

Cyathula prostrata (L.) Bl.

Low, weak-stemmed herb with opposite leaves, tiny green, inconspicuous flowers in narrow, long-stalked terminal spikes, and bur-like fruits. Uncommon in disturbed places including secondary forest.

A Polynesian introduction now becoming rare in the area, native to the Old World tropics.

TA'U: Garber 592, 669; Yuncker 9170; Harris 215 (n.s.), 373; Whistler 7942.

ANACARDIACEAE

Rhus taitensis Guillemain

tavai

Large tree with alternate, pinnately compound leaves, tiny white flowers, and small, purple, fleshy fruits. Com-

mon to abundant in lowland and especially secondary forest, reported from 10 to 700 m.

Indigenous, ranging from Futuna to Tahiti.

TA'U: Yuncker 9245.

ANNONACEAE

Cananga odorata (Lam.) [ilangilang] moso'oi
Hook. f. & Thoms.

Straight, medium-sized tree with the leaves in one plane, yellow, fragrant, apocarpus flowers, and black, subglobose fruits. Occasional to common in disturbed forest, reported from 15 to 600 m elevation.

Probably a Polynesian introduction, but appearing native, widespread westward to south Asia.

TA'U: Garber 650; Yuncker 9178; Whistler 7887.

APIACEAE

Centella asiatica (L.) Urb. [Asiatic pennywort] togo

Low herb with creeping stems rooting at the nodes, alternate, kidney-shaped leaves, and tiny green, inconspicuous, axillary flowers. Occasional to common in pastures and sunny disturbed places.

Probably a Polynesian introduction, native to tropical Asia.

TA'U: Yuncker 9113; Harris 344; Whistler 3313, 7656.

APOCYNACEAE

Alyxia bracteolosa Rich lau maile, lau mai'e

Vine with milky sap, shiny, opposite leaves, tiny cream-colored flowers, and bluish-black, globose fruits. Common in lowland to montane forest, reported from 10 m to high elevation.

Indigenous, also found in Fiji, Wallis and Futuna, and Tonga.

TA'U: Garber 577; Yuncker 9021; Cox 112; Whistler 7698.

Alyxia stellata (J. R. & G. Forst.) nau
Roemer & Schultes

Scandent shrub with small, shiny, opposite leaves, milky sap, tiny cream-colored flowers, and small subglobose to ellipsoid fruits sometimes constricted between the seeds. Common in open forest and on ridges, reported from 20 m to high elevation.

Indigenous, ranging from New Caledonia to the Marquesas.

TA'U: Yuncker 9199, 9227. Both collections were made in Si'ufaga and appear to be from cultivated individuals, so the plant may be restricted to cultivation on the island.

Cerbera manghas L. leva

Medium-sized tree with glossy leaves appearing whorled, milky sap, showy white flowers with a red throat, and a large, reddish, ellipsoid fruit. Occasional in littoral forest and sometimes cultivated and persisting in secondary forest, reported from sea level to 650 m elevation.

Indigenous, ranging from Malaysia to the Marquesas.

TA'U: Garber 546; Yuncker 9134; Whistler 7895, 7923. Seen only at the northwest corner of the island, and possibly not found within the park boundaries.

ARALIACEAE

Meryta macrophylla (Rich) Seem. fagufagu

Small dioecious tree with large oblanceolate leaves, thick, compact male inflorescences, and large, green compound fruits. Occasional in coastal to montane forest, reported from 15 to 800 m elevation.

Indigenous to Samoa, also found in Tonga.

TA'U: Garber 622; Yuncker 9162; Cox 312, 313; Whistler 3204, 3218, 7808.

Polyscias samoensis (A. Gray) Harms

Small tree with alternate, pinnately compound leaves, small white flowers in panicles of umbels, and flattened-globose, longitudinally ridged fruits. Uncommon in coastal forest, reported from 20 to 400 m elevation.

Endemic.

TA'U: Whistler 7573.

Reynoldsia lanutoensis Hochreut.

Large tree with pinnately compound leaves, flowers in umbels, and green compressed-globose fruits. Common in montane forest, reported from 600 m to high elevation.

Endemic.

TA'U: Garber 752; Whistler 3184.

ASCLEPIADACEAE

Hoya australis R. Br. in Traill fue selela

Vine with fleshy, opposite leaves, milky sap, pubescent petioles, white flowers usually marked with red at the corolla base, and long follicles bearing comose seeds. Occasional from littoral to montane forest, reported from 10 to 580 m elevation.

Indigenous, ranging from Australia to Samoa.

TA'U: Garber 556, 566, 615; Yuncker 9012; Whistler 1350, 7693, 7730.

Hoya pottsii Traill fue selela

Vine with opposite leaves 3—5-palmately veined from the base, white waxy flowers in umbels, and long follicles bearing comose seeds. Occasional in coastal to lowland forest, reported from 10 to 600 m elevation.

Indigenous, ranging from Hainan Island to Samoa.

TA'U: Harris 248, 421; Whistler 1297, 3692.

Hoya sp. fue selela

Vine with opposite, thick, mostly lanceolate leaves, milky sap, white, waxy flowers, and long follicles bearing comose seeds. Occasional in lowland to montane forest, reported from 200 to 750 m elevation.

Endemic?

TA'U: Whistler 3139, 7605, 7989.

ASTERACEAE

Adenostemma viscosum J. R. & G. Forst.

Herb with alternate leaves and a panicle of small white disc flowers arranged in heads. Uncommon in forest clearings and along forest trails, reported from 150 m to high elevation.

Probably a Polynesian introduction, widespread in the tropics.

TA'U: Garber 593.

Ageratum conyzoides L. [ageratum]

Erect herb with coarse, opposite, fragrant leaves and lavender disc florets in heads arranged in terminal panicles. Common as a weed in sunny, disturbed places and croplands.

A modern introduction, native to tropical America.

TA'U: Yuncker 9124; Harris 145, 194 (n.s.), 330, 379; Whistler 1364, 7704.

Bidens alba (L.) DC. [beggar's-tick]

Herb with pinnately lobed or compound, opposite leaves, yellow disc florets, white, spreading ray florets, and small, cylindrical, barbed achenes. Common in disturbed areas, apparently displacing the following species.

A modern introduction, native to tropical America.

TA'U: Whistler 7641.

Bidens pilosa L. [beggar's tick]

Herb with pinnately lobed or compound, opposite leaves, yellow disc florets in heads, and small, cylindrical,

barbed achenes. Common in dry, sunny disturbed places.

A modern introduction, native to tropical America.

TA'U: Yuncker 9278; Harris 198; Whistler 1380, 7653.

Crassocephalum crepidioides (Benth.) fua lele
S. Moore

Tall herb with toothed or lobed, alternate leaves, drooping heads of disc florets red-brown at the tips, and plumed achenes. Common to abundant in disturbed places, especially in taro fields. Noteworthy for its rapid spread throughout the Pacific islands.

A modern introduction, native to tropical Africa.

TA'U: Whistler 1362, 7753.

Eclipta prostrata (L.) L. [false daisy]

Small herb with opposite leaves and small, aster-like heads of white ray and disc florets. Uncommon in disturbed places, mostly in wet soil.

A modern introduction, pantropic in distribution.

TA'U: Whistler 7580. Probably not found within the park boundaries.

Emilia sonchifolia (L.) DC. fua lele

Erect herb with alternate, sessile, variously shaped leaves with clasping auricles, a panicle of several heads of lavender disc florets, and plumed achenes. Common in sunny disturbed places.

A modern introduction, native to the Old World tropics.

TA'U: Yuncker 9107, 9123 (n.s.); Harris 242, 367; Whistler 1390, 7657.

Erechtites valerianifolia (Wolf) DC. fua lele

Tall, erect herb with alternate, deeply pinnately lobed leaves, pink disc florets in heads arranged in terminal panicles, and plumed achenes. Occasional to common in open, disturbed places.

A modern introduction, native to tropical America.

TA'U: Yuncker 9029; Harris 197; Whistler 7838.

Mikania micrantha [mile-a-minute vine] fue saina
H. B. K.

Herbaceous vine with opposite leaves, white disc florets in heads arranged in panicles, and plumed achenes. Common to abundant in disturbed places. It is the most common weed in Samoa, but flowers only in mid-year.

A modern introduction to Samoa, native to tropical America.

TA'U: Whistler 7975.

Pseudelephantopus spicatus vao malini Indigenous, ranging from tropical Asia to the Austral Islands.
(Juss. ex Aubl.) C. F. Baker

Wiry, deep-rooted herb with alternate leaves and purple to white disk florets in heads arranged in a narrow, spike-like inflorescence. Occasional in lawns and disturbed places. Called *Elephantopus spicatus* in Hawai'i.

A modern introduction, native to tropical America.

TA'U: Whistler 7864.

Sigesbeckia orientalis L. 'a'ami'a

Erect herb with opposite, toothed, deltoid leaves, yellow disc and ray florets in heads arranged in paniculate clusters, and sticky achenes. Uncommon in disturbed places.

A Polynesian introduction, native to the Old World tropics.

TA'U: Garber 604. Not collected in Samoa since 1931, and becoming rare in Polynesia. Possibly not found within the park boundaries, if still present on Ta'u.

Synedrella nodiflora (L.) Gaertn. tae'oti

Coarse herb with opposite leaves and yellow disc florets arranged in sessile, axillary heads. Common in disturbed places.

A modern introduction, native to tropical America.

TA'U: Garber 549; Yuncker 9111; Harris 18, 27 (n.s.), 37 (n.s.), 106 (n.s.), 241 (n.s.), 331 (n.s.), 380; Whistler 1363, 7770.

Tridax procumbens L. [coatbuttons]

Ascending herb with opposite, toothed leaves and solitary, long-stalked heads of white ray and yellow disc florets. Uncommon in disturbed places.

A modern introduction, native to tropical America.

TA'U: Whistler 7581. Not yet reported from within the park boundaries.

Vernonia cinerea (L.) Less. [ironweed]

Small herb with alternate leaves, purple disc florets in heads arranged in loose terminal cymes, and plumed achenes. Occasional to common in disturbed places.

A modern introduction, native to tropical Asia.

TA'U: Yuncker 9116; Harris 17, 89; Whistler 1367, 7758.

Wollastonia biflora (L.) DC. ateate

Prostrate to erect subshrub with opposite leaves and daisy-like composite heads of yellow disc and ray florets arranged in panicles. Common to abundant in sunny coastal areas, sometimes extending inland in coconut plantations.

Indigenous, ranging from tropical Asia to the Austral Islands.

TA'U: Garber 547; Yuncker 9054; Whistler 7534.

BARRINGTONIACEAE

Barringtonia asiatica (L.) Kurz futu

Huge tree with large, alternate, obovate leaves, large flowers with numerous long white and pink stamens, and large top-shaped fruits. Common to abundant in littoral forest and sometimes inland on steep coastal slopes.

Indigenous, ranging from Madagascar to the Marquesas.

TA'U: Garber 564; Yuncker 9098; Whistler 7639.

Barringtonia samoensis A. Gray falaga

Medium-sized tree with flowers in long, hanging racemes, numerous showy red stamens, and top-shaped fruits. Occasional in lowland to montane forest, reported from 5 to 600 m elevation.

Indigenous, ranging westward to Indonesia.

TA'U: Garber 543; Yuncker 9082, 9173; Whistler 1296, 3577, 7633.

BORAGINACEAE

Cordia aspera Forst. f. tou

Small to medium-sized tree with rough, alternate leaves, short cymes of small white flowers, and small ovoid fruits. Rare in lowland forest.

Indigenous, also found in Fiji and Tonga.

TA'U: (not collected). Reported by reliable sources to occur on the island, but possibly not within the park boundaries.

Heliotropium procumbens Mill.

Low herb with narrow, pubescent, alternate leaves and tiny white sympetalous flowers in scorpioid cymes. Uncommon in disturbed places.

A modern introduction, native to tropical America.

TA'U: Whistler 7954. Known from Ta'u only on the west side of the island, and probably not found within the park boundaries.

Tournefortia argentea L. f. tausuni

Small tree with silvery leaves, small white flowers in compound, scorpeoid cymes, and small, green, globose fruits. Occasional on the seaward edge of littoral forest.

Indigenous, ranging from Mauritius to southeastern Polynesia.

TA'U: Garber 639; Whistler 3214, 7768.

BRASSICACEAE

Rorippa sarmentosa (DC.) Macbr. a'atasi

Small herb with alternate or basal, pinnately lobed leaves, tiny white flowers in terminal racemes, and small linear siliques. Occasional as a weed in sunny undisturbed habitats from near sea level to high elevation.

Indigenous, or perhaps a Polynesian introduction, ranging from New Caledonia to Hawai'i.

TA'U: Garber 762; Yuncker 9171; Harris 81 (n.s.), 100 (n.s.), 325; Whistler 7664, 7673.

BURSERACEAE

Canarium vitiense A. Gray ma'ali

Large tree with fragrant resin, pinnately compound leaves bearing 7–13 elliptic leaflets, small, white, 3-lobed flowers in axillary panicles, and ellipsoid to ovoid fruits. Occasional in coastal to montane forest, reported from 10 to 700 m elevation.

Indigenous, also found in Fiji and Tonga.

TA'U: Whistler 7571.

Garuga floribunda Decne. vivao

Large tree with pubescent, pinnately compound leaves, small white flowers in axillary panicles, and globose fruits. Occasional in coastal to lowland forest, reported from 10 to 230 m elevation.

Indigenous, ranging westward to the Philippines.

TA'U: Whistler 7611, 7733.

CAPPARACEAE

Capparis cordifolia Lam.

Prostrate shrub with alternate, oblong leaves, large, showy white flowers bearing numerous flowers, and a stalked capsule. Uncommon on coastal rocks.

Indigenous, ranging from Palau to southeastern Polynesia.

TA'U: Whistler 3222, 3315, 7686, 7871.

CARICACEAE

Carica papaya L. [papaya] esi

Scarcely branching dioecious tree with large, alternate, palmately lobed leaves, cream-colored, salverform male flowers in pendulous racemes, solitary, axillary, cream-colored female flowers, and a large edible fruit orange at maturity. Common in disturbed places and cultivated in villages.

A modern introduction, native to tropical America.

TA'U: Whistler 7762.

CASSYTHACEAE

Cassytha filiformis L. fetai?

Leafless, green to orange, string-like parasitic vine with small white flowers and globose fruits. Occasional in open littoral areas, mostly from near sea level, but rarely up to 300 m elevation.

Indigenous, pantropic in distribution.

TA'U: Whistler 7539.

CHLORANTHACEAE

Ascarina diffusa A. C. Smith afia

Small to medium-sized tree with toothed, opposite leaves and hanging spikes of green, inconspicuous flowers. Occasional in montane forest, reported from above 680 m elevation.

Indigenous, ranging from the Solomon Islands to Rarotonga.

TA'U: Whistler 3190, 7859.

CHRYSOBALANACEAE

Atuna racemosa Raf. ififi

Medium-sized tree with large, alternate leaves, small white flowers in racemes, and a large, brown, compressed-globose, hard-shelled fruit. Uncommon in lowland forest, reported from near sea level to 450 m elevation.

A Polynesian introduction, semi-naturalized and persisting in old forest, ranging from tropical Asia to western Polynesia.

TA'U: (not collected). Not seen on the island, but reliable sources reported it to be present.

CLUSIACEAE

Calophyllum inophyllum L. fetau

Large tree with fissured bark, glossy, finely veined, opposite leaves, showy yellow and white flowers, and a green subglobose fruit. Uncommon on rocky shores.

Indigenous, ranging from tropical Africa to eastern Polynesia.

TA'U: Garber 704; Yuncker 9194.

Calophyllum neo-ebudicum Guillaumin tamanu

Large tree with fissured bark, glossy, finely veined, opposite leaves, showy white and yellow flowers, and a

subglobose purple drupe. Occasional to common in lowland to montane forest, reported from 25 to 650 m elevation.

Indigenous, ranging from New Britain to Niue.

TA'U: Whistler 3166, 7894.

Garcinia myrtifolia A. C. Smith

Medium-sized tree with opposite, coriaceous leaves, flowers with white petals and numerous yellow stamens, and an ellipsoid fruit. Uncommon to occasional in lowland to montane forest, reported from 320 to 650 m elevation.

Indigenous, also found in Tonga and Fiji.

TA'U: Whistler 3175, 8005.

COMBRETACEAE

Terminalia catappa L.

talie

Large tree with subsessile, obovate leaves having a subcordate base, spikes of small white flowers, and large, conspicuously winged fruits. Occasional in littoral forest and sometimes cultivated in villages. Probably indigenous to Samoa, but the large-fruited type may be an early European introduction.

TA'U: Whistler 7956.

Terminalia richii A. Gray

malili

Large tree with small, alternate, elliptic leaves, tiny white flowers in racemes, and small flattened-ellipsoid fruits. Occasional in lowland to montane forest, reported from 5 to 600 m elevation.

Indigenous, also found in Fiji and Niue.

TA'U: Whistler 3164, 7528, 7745, 7788.

CONNARACEAE

Rouria minor (Gaertn.) Alston in Trimen

Woody climbing vine with alternate, pinnately compound leaves with several leaflets, white flowers bearing numerous stamens, and a legume-like fruit that opens to expose the red seed. Occasional in lowland to montane forest, reported from 120 to 500 m elevation.

Indigenous to Samoa, ranging from India to Niue.

TA'U: Whistler 7572.

CONVOLVULACEAE

Ipomoea littoralis Bl.

Scrambling herbaceous vine with milky sap, alternate, cordate leaves, and purple, funnel-shaped flowers. Occasional in sunny coastal and lowland areas, and some-

times weedy in plantations, reported from near sea level to 120 m elevation.

Indigenous, widespread throughout the Pacific.

TA'U: Garber 688; Yuncker 9006, 9234; Harris 35 (n.s.), 108, 327; Whistler 1359, 7721, 7874.

Ipomoea macrantha Roemer & Schultes.

Sprawling or climbing vine with milky sap, alternate, cordate leaves, and showy white, salverform flowers with a long tube. Occasional to common in sunny coastal areas and littoral forest.

Indigenous, widespread throughout the tropics.

TA'U: Yuncker 9097; Whistler 1349, 3213, 7538. Called *Ipomoea violacea* in Hawai'i.

Ipomoea pes-caprae (L.) R. Br.

fue moa

Prostrate vine with purple stems, milky sap, oval, alternate, bilobed leaves notched at the tip, and showy purple, funnel-shaped flowers. Common to abundant on rocky and sandy shores.

Indigenous, pantropic in distribution.

TA'U: Garber 765; Yuncker 9024; Whistler 3145, 7920.

Merremia peltata (L.) Merr.

fue lautetele

Sprawling or climbing vine with milky sap, large, alternate, peltate leaves and showy white, funnel-shaped flowers. Common in open forest and clearings in lowland to montane forest, reported from near sea level to 300 m elevation.

Indigenous, ranging from Africa to Tahiti.

TA'U: (not collected).

Operculina turpethum (L.) S. Manso

Prostrate or climbing vine with winged stems, alternate, cordate leaves with a mucronate tip, and a funnel-shaped corolla 2.5—4.5 cm long. Occasional in disturbed places in plantations and open forest, reported from 5 to 180 m elevation.

Indigenous, widespread in the Old World tropics.

TA'U: Yuncker 9097 (n.s.), 9289A; Harris 135.

Stictocardia tillifolia (Desr.) Hall. f.

Vine with large, alternate, cordate leaves finely black-dotted on the lower surface, and large, showy lavender, rotate flowers. Occasional climbing in low vegetation in disturbed places.

A modern introduction, native to southern Asia.

TA'U: (not collected).

CUCURBITACEAE

Cucumis melo L.

[melon] 'atiu

Prostrate vine with rough, alternate leaves, yellow unisexual flowers, and a small ovoid melon fruit. Uncommon in heavily disturbed places and probably formerly cultivated for its fruit.

A Polynesian introduction, native to the Old World tropics.

TA'U: Garber 702; Yuncker 9284; Whistler 7529, 7925. Probably not occurring within the park boundaries.

Luffa cylindrica(L.) Roemer

var. *insularum* (A. Gray) Cogn.

Prostrate or low-climbing vine with alternate, lobed leaves, large yellow flowers, and an ellipsoid fruit filled with a spongy material. Uncommon in sunny coastal areas and sometimes weedy in plantations, reported from 3 to 200 m elevation.

Indigenous or possibly a Polynesian introduction, widespread in the Pacific.

TA'U: Whistler 7681.

Zehneria grayana (Cogn.) Fosb. & Sachet

Herbaceous vine with thin, alternate, mostly deltoid leaves, tiny white axillary flowers, and orange, ellipsoid fruits. Occasional in forest clearings, reported from near sea level to high elevation. This and the following species are lumped by A. C. Smith in his *Flora Vitiensis nova* into a wide-ranging species, *Zehneria mucronata* (Bl.) Miq., but the two species recognized here are clearly distinct.

Indigenous, apparently ranging from New Caledonia to Tahiti.

TA'U: Yuncker 9287; Whistler 1403, 3678, 7547a, 7724, 7926.

Zehneria samoensis (A. Gray) Fosb. & Sachet

Prostrate herbaceous vine with scabrous, alternate, deltoid leaves, tiny white axillary flowers, and orange, fusiform to cylindrical fruits. Occasional in littoral to coastal forest, reported from 2 to ca. 200 m elevation.

Indigenous, also found in Tonga and Niue.

TA'U: Yuncker 9095, 9287 (n.s.); Harris 329; Whistler 1329, 3226, 7537, 7547, 7961.

CUNONIACEAE

Weinmannia affinis A. Gray

Small tree with broad, rounded, conspicuous stipules, opposite, simple or trifoliate leaves, racemes of tiny flowers, and small capusules bearing tiny, winged seeds.

Common in lowland to montane forest, reported from 300 m to high elevation.

Indigenous, also found in Fiji.

TA'U: Garber 720; Whistler 3203, 3589, 7800, 8000.

EBENACEAE

Diospyros elliptica (Forst.) P.S. Green 'amume

Small to medium-sized tree with alternate leaves, elliptic, 3-merous flowers, and red to yellow, ellipsoid fruits. Uncommon in littoral and coastal forest, reported from 10 to 300 m elevation.

Indigenous, ranging from the Lau Islands to Niue.

TA'U: Garber 773. The only collection is from the northwest corner of the island, and the tree may not be found within the park boundaries.

Diospyros samoensis A. Gray 'au'auli

Small to medium-sized tree with alternate leaves, small, white, campanulate, 4-merous flowers, and a globose fruit bearing a persistent calyx with four reflexed lobes. Common to abundant in coastal and lowland forest, (rarely in montane forest), reported from 10 to 600 m elevation.

Indigenous, ranging from the Lau Islands to Niue.

TA'U: Whistler 3219, 7543, 7878.

ELAEOCARPACEAE

Elaeocarpus tonganus Burkill a'arnati'e?

Medium-sized tree with alternate, ovate leaves, many-petaled white flowers, and blue, ellipsoid drupes. Occasional in lowland to montane forest, reported from 50 to 750 m elevation.

Indigenous, ranging from Tonga to the Austral Islands.

TA'U: Whistler 3126, 7814.

EUPHORBIACEAE

Acalypha lanceolata Willd. ogoogo

Erect herb with pubescent, alternate leaves and inconspicuous, green, unisexual, axillary flowers lacking a stalked terminal flower. Uncommon to occasional in disturbed places.

A Polynesian introduction, native to the Old World tropics.

TA'U: Yuncker 9280; Harris 7, 74; Whistler 1301, 1371, 7646.

- Aleurites moluccana** (L.) Willd. Iama
 Medium-sized to large tree with alternate, pale-green, palmately lobed leaves, small white flowers, and large green spherical fruits. Occasional in coastal and lowland forest, reported from 20 to 150 m elevation.
 A Polynesian introduction, widespread from Asia to Hawai'i.
 TA'U: Garber 777; Whistler 1293, 7640.
- Antidesma sphaerocarpum** Muell. Arg.
 Shrub or small dioecious tree with alternate leaves having the petiole swollen at both ends, tiny inconspicuous flowers in axillary racemes, and small, spherical, purple fruits. Uncommon in lowland forest on the south side of the island, reported from 20 to 350 m elevation.
 Indigenous, also found on Futuna, 'Uvea, and Rotuma.
 TA'U: Whistler 7701, 7727.
- Bischofia javanica** Bl. 'o'a
 Large tree with alternate, trifoliate leaves, tiny greenish flowers, and small, brown, spherical fruits. Occasional in disturbed places and undisturbed forest, reported from 10 to 850 m elevation.
 Indigenous or possibly a Polynesian introduction, ranging from India to Rarotonga.
 TA'U: Garber 613; Harris 288; Whistler 7981.
- Chamaesyce atoto** (Forst. f.) puhu tai
 Croizat in Degener
 Prostrate subshrub with opposite leaves, milky sap, greenish flowers in cyathia, and small, subglobose capsules. Uncommon in sunny littoral areas.
 Indigenous, ranging from Ceylon to the Tuamotus.
 TA'U: Yuncker 9112; Harris 84 (n.s.), 340; Whistler 1323, 7952.
- Chamaesyce hirta** (L.) [garden spurge] la'au fai moti
 Millsp.
 Small, pubescent herb with opposite, pubescent leaves, milky sap, and tiny greenish flowers in dense axillary cyathia. Common in disturbed places and croplands.
 A modern introduction, now pantropic in distribution.
 TA'U: Garber 691; Yuncker 9120; Harris 13 (n.s.), 14, 23 (n.s.), 83 (n.s.), 85 (n.s.), 103 (n.s.), 237, 341; Whistler 1313, 1368, 7760.
- Chamaesyce hypericifolia** (L.) Millsp.
 Erect herb with glabrous, opposite leaves, milky sap, and tiny white flowers in axillary cyathia. Occasional on roadsides and other disturbed places.
- Chamaesyce prostrata** (Ait.) Small [prostrate spurge]
 Small prostrate herb with tiny opposite leaves, milky sap, purple, nearly glabrous stems, and inconspicuous axillary flowers in cyathia. Occasional around houses and in other sunny disturbed places.
 A modern introduction, native to tropical America.
 TA'U: Yuncker 9166 (9116 in Yuncker); Harris 86 (n.s.), 342; Whistler 7761.
- Chamaesyce thymifolia** (L.) [thyme-leaved spurge]
 Millsp.
 Prostrate herb with tiny opposite leaves, pink, pubescent stems, milky sap, and inconspicuous flowers in axillary cyathia. Occasional around houses and in disturbed areas.
 A modern introduction, native to tropical America.
 TA'U: Whistler 7583.
- Euphorbia cyathophora** Murray [Mexican fire-plant]
 Erect herb with alternate leaves notched on the sides and red-based floral bracts below the green, apetalous flowers arranged in cyathia. Occasional in disturbed places.
 A modern introduction, native to tropical America.
 TA'U: Whistler 7688. Noted only from Ta'u Village, and possibly not found within the park boundaries.
- Flueggea flexuosa** Muell. Arg. poumuli
 Medium-size tree with a straight trunk, alternate leaves having a reddish petiole, tiny greenish flowers, and a small, globose fruit. Commonly cultivated in villages, sometimes escaping into adjacent forests.
 A modern introduction, native to the Philippines and Melanesia.
 TA'U: Yuncker 9196; Whistler 7792.
- Glochidion ramiflorum** Forst. masame
 Small to medium-sized tree with alternate, glabrous leaves, tiny yellow flowers, and wheel-like capsules containing red seeds. Common in open and secondary forest, reported from 10 m to high elevation.
 Indigenous, ranging from Melanesia to eastern Polynesia.
 TA'U: Whistler 3741, 7619.

Macaranga harveyana (Muell. Arg.) lau pata; pata
Muell. Arg.

Small to medium-sized dioecious tree with alternate, peltate leaves, tiny green flowers in widely branching panicles, and soft-spiny, subglobose capsules. Common in disturbed places and early secondary forest, reported from 10 to 400 m elevation.

Indigenous, ranging from Fiji to Tahiti.

TA'U: Garber 614; Yuncker 9037; Whistler 1352, 7541, 7666.

Macaranga stipulosa Muell. Arg. lau fatu; patafatu

Medium-sized tree with huge, alternate, peltate leaves, tiny green flowers in widely branching panicles, and small, lobed, spineless fruits. Occasional in lowland to montane forest, often in clearings, reported from 75 to 700 m elevation.

Endemic.

TA'U: Garber 636.

Omalanthus nutans foga mamala; fanua mamala
(Forst. f.) Guillemin

Small tree with alternate, glaucous, deltoid leaves, milky sap, tiny white male flowers in racemes, solitary female flowers with two conspicuous stigmas, and bilobed capsules. Occasional in open forest and disturbed places, reported from 25 m to high elevation.

Indigenous, ranging from New Caledonia and the Caroline Islands to Tahiti.

TA'U: Garber 553; Yuncker 9045; Whistler 1355, 7594.

Phyllanthus amarus Sch. & Thon.

Erect herb with spirally arranged branches bearing small alternate, elliptic, round-tipped leaves arranged in one plane, and tiny green flowers and schizocarps on the lower side of the branches at the axils. Common in disturbed places and croplands.

A modern introduction, native to tropical America.

TA'U: Yuncker 9188; Harris 15, 24, 87, 104, 343; Whistler 1312, 7759.

Phyllanthus urinaria L.

Low herb with spirally arranged branches bearing small, alternate leaves arranged in one plane, reddish stems, tiny green, solitary, axillary flowers on the lower side of the branches, and a tiny globose schizocarp. Occasional in lawns and other disturbed places.

A modern introduction, native to tropical America.

TA'U: Whistler 7665.

Phyllanthus virgatus Forst. f. moemoe?

Erect herb with branches appearing like pinnately compound leaves, small, alternate, simple leaves, tiny green flowers, and tiny green, globose schizocarps, uncommon in sunny or disturbed places in the forest, reported from 40 to 250 m elevation.

Indigenous or a Polynesian introduction, ranging from Asia to eastern Polynesia.

TA'U: Garber 693; Yuncker 9133; Whistler 7632.

FABACEAE

Abrus precatorius L. matamoso

Climbing vine with alternate, pinnately compound leaves, lavender papilionaceous flowers, and red and black seeds in pods, uncommon in disturbed places at low elevations.

Indigenous or possibly a Polynesian introduction, widespread in the tropics.

TA'U: Whistler 7714. Noted only from the northeast corner of the island, and not reported from within the park boundaries.

Adenanthera pavonina L. lopa

Medium-sized tree with alternate, pinnately compound leaves, small yellow flowers in spikes, and red seeds in twisted pods. Occasional in disturbed forest, reported from near sea level to 200 m elevation.

A modern introduction, widespread in cultivation in the tropics.

TA'U: Whistler 3152, 3738.

Alysicarpus vaginalis (L.) DC.

Prostrate herb with simple, alternate, oval leaves, red flowers in racemes, and narrow, cylindrical pods. Common in lawns and sunny disturbed places.

A modern introduction, native to the Old World tropics.

TA'U: Whistler 7879.

Caesalpinia major (Medic.) 'anaoso; se'u pe'a
Dandy and Exell

Scandent shrub with thorny stems, alternate, bipinnately compound leaves, distinct stipules, yellow flowers, and grayish yellow seeds in spiny pods. Occasional in littoral habitats to montane forest, reported from sea level to 650 m elevation.

Indigenous, pantropic in distribution.

TA'U: (not collected). Not seen, but reported by reliable sources to occur on the island, although possibly not within the park boundaries.

Canavalia cathartica Thou.

Creeping or climbing vine with alternate, trifoliolate, acute-tipped leaves, mauve, papilionaceous flowers, and a flattened pod. Common in coastal and littoral forest. Occasionally weedy farther inland.

Indigenous, widespread in the tropics.

TA'U: Whistler 1333, 7879.

Canavalia rosea (Sw.) DC. fue fai va'a

Creeping vine with alternate, trifoliolate, notched or round-tipped leaves, mauve, papilionaceous flowers, and a flattened pod. Occasional on sandy beaches.

Indigenous, widespread in the tropics.

TA'U: Garber 763; Whistler 3144, 7921. Not reported from within the park boundaries.

Crotalaria retusa L.

Somewhat woody, scarcely branching herb with simple, alternate, oblanceolate leaves, yellow and reddish papilionaceous flowers, and inflated pods, uncommon in disturbed places.

A modern introduction, native to Asia.

TA'U: Whistler 1383, 3309, 7690. Noted only from Ta'u Village, and probably not occurring within the park boundaries.

Dendrolobium umbellatum (L.) Benth. lala

Shrub with alternate, trifoliolate leaves, small white papilionaceous flowers, and small, jointed, several-seeded pods. Common in sunny littoral places.

Indigenous, ranging from Mauritius to Niue.

TA'U: Yuncker 9121, 9139; Garber 692; Whistler 7588. Reported only from the northwest corner of the island, and possibly not found within the park boundaries.

Derris trifoliata Lour. fue o'ona

Climbing woody vine with alternate, trifoliolate or odd-pinnately compound leaves, small, mauve, papilionaceous flowers, and a flattened, suborbicular pod. Occasional in littoral to coastal and lowland forest, reported from near sea level to 250 m elevation.

Indigenous, widespread in the Pacific as far east as the Austral Islands.

TA'U: Whistler 7552, 7726.

Desmodium heterocarpon (L.) DC.

Small shrub with alternate, trifoliolate leaves, lavender papilionaceous flowers, and jointed fuzzy pods. Occasional in sunny disturbed areas and fernlands, reported from 10 to 175 m elevation.

A Polynesian introduction or perhaps indigenous, somewhat weedy but now uncommon.

TA'U: Garber 603, 634, 645a; Yuncker 9083; Whistler 1391, 7797, 7886. Possibly not found within the park boundaries.

Desmodium incanum DC. [Spanish clover]

Herb with alternate, trifoliolate leaves, variegated, oblong leaflets, mauve papilionaceous flowers, and fuzzy, jointed pods. Occasional to common in lawns and sunny disturbed areas.

A modern introduction, native to tropical America.

TA'U: Whistler 7862.

Desmodium tortuosum (Sw.) DC.

Tall, erect, somewhat woody herb with alternate trifoliolate leaves, mauve papilionaceous flowers, and twisted, jointed pods. Occasional in disturbed places.

A modern introduction, native to tropical America.

TA'U: Whistler 7905.

Desmodium triflorum (L.) DC. [three-flowered beggarweed]

Prostrate herb with alternate trifoliolate leaves, a short raceme of mauve, papilionaceous flowers, and a papery, jointed pod. Occasional in disturbed places.

A modern introduction, native to the Old World tropics.

TA'U: Whistler 7774.

Entada phaseoloides (L.) Merr. fue inu

Thick-stemmed, high-climbing liana with alternate, bipinnately compound leaves, small white flowers in long spikes, and large woody pods containing large, brown, flattened seeds. Uncommon in littoral to lowland forest, reported from near sea level to ca. 200 m elevation.

Indigenous, ranging from east Africa to the Austral Islands and possibly Hawai'i.

TA'U: Whistler 7685. Reported only from the southwest corner of the island, and possibly not found within the park boundaries.

Erythrina variegata L. gatae
var. *orientalis* (L.) Merr.

Large, thorny tree with alternate, trifoliolate leaves, broadly ovate leaflets, large, showy red, papilionaceous flowers in racemes, and black, narrowly cylindrical pods. Occasional in littoral to lowland forest, reported from near sea level to 125 m elevation.

Indigenous, ranging from tropical Asia to the Marquesas.

TA'U: Garber 581; Yuncker 9143; Whistler 7912.

- Indigofera suffruticosa** Miller [indigo] common in lowland to montane forest, reported from 300 m to high elevation. Widely branching shrub with alternate, pinnately compound leaves, small, salmon-colored, papilionaceous flowers, and short cylindrical pods. Occasional in disturbed places, fallow land, and roadsides. Endemic.
TA'U: Whistler 3157.
- Pueraria lobata** (Willd.) Ohwi [kudzu] a'a Hairy vine with large, alternate, lobed, trifoliolate leaves, violet papilionaceous flowers with a blotch of yellow, and a long, hairy pod. Occasional in disturbed places climbing over low vegetation. A Polynesian introduction formerly cultivated for its edible root, native to southeast Asia.
TA'U: Garber 651; Whistler 1377, 7642.
- Senna tora** (L.) Roxb. [peanut weed] vao pinati Subshrub with alternate, pinnately compound leaves having obovate leaflets, yellow flowers, and long, linear pods. Common in pastures and disturbed places in Ta'u Village. A modern introduction, native to the Old World tropics.
TA'U: Whistler 7691. Not reported from within the park boundaries.
- Tephrosia purpurea** (L.) Pers. 'avasa Subshrub with alternate, pinnately compound leaves, small white papilionaceous flowers, and small, narrow, flattened, papery pods, uncommon in sunny coastal areas, reported from near sea level to 200 m elevation. Indigenous or a Polynesian introduction, ranging from tropical Africa to Hawai'i.
TA'U: Yuncker 9229. Reported only from the west side of the island, and possibly not found within the park boundaries.
- Uraria lagopodoides** (L.) Desv. Low, somewhat woody herb with alternate, trifoliolate leaves and purple, papilionaceous flowers in dense, hairy, terminal racemes, uncommon to occasional in lawns and disturbed places. A Polynesian introduction, native to southern Asia. Uncommon now in Samoa.
TA'U: Garber 645b. Reported only from the northwest corner of the island, and possibly not found within the park boundaries.
- Vigna marina** (Burm.) Merr. [beach pea] fue sina Prostrate vine with alternate, trifoliolate leaves, yellow, papilionaceous flowers, and black cylindrical pods. Common to abundant in sunny littoral areas, and occasionally inland in plantations, reported from sea level to ca. 200 m elevation.
- Indigofera suffruticosa** Miller [indigo] common in lowland to montane forest, reported from 300 m to high elevation. Widely branching shrub with alternate, pinnately compound leaves, small, salmon-colored, papilionaceous flowers, and short cylindrical pods. Occasional in disturbed places, fallow land, and roadsides. Endemic.
TA'U: Garber 550; Yuncker 9053, 9127; Harris 271; Whistler 1382, 7885.
- Inocarpus fagifer** (Parkinson) Fosb. ifi Large tree with a fluted trunk, large, simple, alternate leaves, tiny white flowers, and a large, thick-shelled pod containing a large edible seed. Occasional to common in lowland forest and plantations, reported from near sea level to 350 m elevation. A Polynesian introduction, ranging from tropical Asia to the Marquesas.
TA'U: Garber 661; Yuncker 9130; Whistler 7978.
- Leucaena leucocephala** [wild tamarind] fua pepe (Lam.) de Wit Shrub or small tree with alternate, bipinnately compound leaves, white flowers in globose heads, and large flattened pods. Occasional to locally abundant in dry disturbed places, sometimes forming dense thickets. A modern introduction, native to tropical America.
TA'U: Yuncker 9108; Whistler 7861.
- Mimosa pudica** L. vao fefe Herb with tough, thorny stems, alternate, bipinnately compound leaves, and pink flowers in dense, globose heads, uncommon in disturbed places. An early, modern introduction to Samoa, native to tropical America.
TA'U: (not collected). Not seen, but reported by reliable sources to occur on the island, although possibly not within the park boundaries.
- Mucuna gigantea** (Willd.) DC. High-climbing woody vine with alternate, trifoliolate leaves, greenish white papilionaceous flowers in hanging, subumbellate racemes, and smooth pods. Occasional to common in littoral to lowland forest, reported from near sea level to 200 m elevation. Indigenous, ranging from India to Hawai'i.
TA'U: Whistler 7637, 7779.
- Mucuna glabra** (Rein.) Wilmot-Dear High-climbing woody vine with alternate, trifoliolate leaves, greenish white papilionaceous flowers in hanging racemes, and pods with transverse ridges. Occasional to

Indigenous, pantropic in distribution.

TA'U: Garber 684, 700; Yuncker 9101; Whistler 1325, 3143, 3321, 7784.

FLACOURTIACEAE

Flacourtia rukam Zoll. & Mor. ex Mor. filimoto

Medium-sized tree with alternate, ovate leaves, toothed leaf margins, small, cream-colored, unisexual, apetalous flowers, male flowers with numerous stamens, and an edible, red, spherical berry. Occasional in lowland to montane forest, reported from ca. 50 to 500 m elevation.

Indigenous, ranging westward to Indonesia.

TA'U: Garber 646, 776; Yuncker 9062, 9063, 9163; Whistler 1376, 7626, 7889.

GESNERIACEAE

Cyrtandra angustivenosa Rechinger

Unbranched shrub with opposite leaves, white sympetalous flowers in axillary clusters, and flesh-colored berries. Occasional in montane forest and summit scrub, reported from 675 to 910 m elevation.

Endemic.

TA'U: Whistler 7856.

Cyrtandra pulchella A. Gray

Shrub with opposite, elliptic to falcate, glabrous leaves, 1—7-flowered cymes with very small bracteoles, large, showy white flowers, and flesh-colored berries. Occasional in lowland to montane forest, reported from 200 to 800 m elevation.

Endemic to American Samoa.

TA'U: Garber 633; Yuncker 9253; Whistler 1414, 3191, 3474, 7507, 7734, 7857.

Cyrtandra samoensis A. Gray

Shrub with large, opposite, elliptic to ovate leaves, small white flowers in many-flowered, axillary cymes, and flesh-colored berries. Occasional in littoral to montane forest, reported from 2 to 850 m elevation.

Indigenous, also found in Tonga and Niue.

TA'U: Garber 551; Cox 303; Whistler 1292, 3125, 7613.

Cyrtandra sp. nova

Unbranched shrub with opposite leaves, small white sympetalous flowers in short axillary clusters, and orange berries. Occasional in montane forest, reported from 450 to 600 m elevation.

Endemic.

TA'U: Whistler 1413, 3179, 7740, 7844.

GOODENIACEAE

Scaevola taccada (Roxb.) Gaertn. to'ito'i

Shrub with waxy, opposite, spatulate leaves, white, one-sided flowers, and white fleshy fruits, abundant on the seaward margin of littoral forest.

Indigenous, widespread throughout the tropical Pacific.

TA'U: Yuncker 9025; Whistler 7720.

HERNANDIACEAE

Hernandia moerenhoutiana Guillemain pipi

Large, soft-wooded tree with small white flowers and a reddish, lantern-like fruit enclosing the single black seed. Occasional in lowland to montane forest, reported from 150 m to high elevation.

Indigenous, ranging from the Solomon Islands to the Society Islands.

TA'U: Whistler 3206.

Hernandia nymphaeifolia (Presl) Kub. pu'a

Large, spreading tree with alternate, peltate leaves, small white flowers, and a green to white or pink, lantern-like fruit enclosing a single, black, marble-like seed. Common in littoral forest.

Indigenous, ranging from east Africa to the Marquesas.

TA'U: Garber 676; Whistler 1327, 7667.

ICACINACEAE

Citronella samoensis (A. Gray) Howard

Small tree with alternate, oblong leaves, small white flowers in racemes, and large, ellipsoid fruits. Occasional in lowland to montane forest, reported from near sea level to 600 m elevation.

Indigenous, also found in Tonga.

TA'U: (not collected).

Medusanthera samoensis matamo
(Reinecke) Howard

Small to medium-sized tree with alternate, oblong leaves, white flowers with hairy, protruding stamens and a flattened-ellipsoid fruit fleshy and pink on one side. Occasional in lowland to montane forest, reported from 60 m to high elevation.

Endemic.

TA'U: Whistler 3198, 3700.

LAMIACEAE

Leucas decemdentata (Forst. f.) Sm.

Herb with opposite, ovate leaves having toothed margins, white flowers in axillary whorls, and 4 black nutlets enclosed within the persistent, campanulate calyx. Uncommon in rocky coastal areas.

Indigenous or a Polynesian introduction, ranging from tropical Asia to the Society Islands, probably weedy in pre-European times but now rare because of its inability to compete with more-recently introduced weeds.

TA'U: Garber 594; Yuncker 9028; Harris 36 (n.s.), 93, 378 (n.s.); Whistler 7705, 7910.

LAURACEAE

Endiandra elaeocarpa Gillespie

Large tree with subopposite, glossy green leaves, small inconspicuous flowers, and a black, long-ellipsoid fruit. Occasional in lowland to montane forest, reported from 85 to 900 m elevation.

Probably a modern introduction, also found in Fiji.

TA'U: Whistler 3560, 7931.

LOGANIACEAE

Fagraea berteriana A. Gray

pua lulu

Large tree with opposite leaves, conspicuous swellings in the axils, large, showy, tubular, white to pale orange flowers, and a large orange fruit containing many black seeds. Common in lowland to montane forest, reported from ca. 50 m to high elevation.

Indigenous, ranging from Fiji to the Marquesas.

TA'U: Garber 580; Yuncker 9176, 9263; Whistler 3205, 7936, 7948.

Geniostoma rupestre Forst. taipoipo; lau mafatifati

Small tree with opposite leaves, tiny white flowers in short axillary cymes, and a small greenish capsule containing red seeds. Common in coastal to montane forest, reported from near sea level to high elevation.

Indigenous, ranging from Taiwan to eastern Polynesia.

TA'U: Garber 755; Yuncker 9005, 9192; Whistler 3142, 7602.

MALVACEAE

Hibiscus abelmoschus L.

fau Tagaloa

Small hairy shrub with alternate, palmately lobed leaves, large showy yellow, monadelphous flowers with purple

at the base, and a hairy ovoid capsule. Uncommon to occasional in disturbed places and plantations.

A Polynesian introduction, probably native to tropical Asia.

TA'U: Judd s.n.; Garber 601; Yuncker 9035, 9298; Whistler 1418, 7867, 7922.

Hibiscus tiliaceus L.

fau

Medium-sized, scrambling tree with cordate leaves, yellow flowers purple at the base, and a subglobose capsule. Common to abundant in littoral, lowland, and disturbed forests, reported from near sea level to 650 m elevation.

Indigenous, pantropic in distribution.

TA'U: Garber 583; Yuncker 9094; Whistler 1342, 7902a, 7906.

Sida rhombifolia L.

[Cuba jute] maufufu

Erect herb with alternate ovate leaves, pale orange, monadelphous flowers on long axillary pedicels, and a beaked, wheel-shaped, 9–12-parted schizocarp. Common in disturbed areas, plantations, and on roadsides.

A Polynesian introduction, now pantropic in distribution.

TA'U: Garber 548; Yuncker 9144; Harris 16, 88 (n.s.), 195 (n.s.); Whistler 1381, 7873.

Sida samoensis Rech.

maufufu

Prostrate, somewhat woody herb with alternate leaves and pale orange, monadelphous flowers. Uncommon in coastal villages and sunny disturbed places near the coast.

Possibly indigenous, also found in Fiji, Toga, and Niue.

TA'U: Yuncker 9167. Reported only from Si'ufaga, and possibly not found within the park boundaries.

Thespesia populnea (L.) Sol. ex Corr.

milu

Medium-sized tree with glossy cordate leaves, yellow flowers purple at the base, and a subglobose, non-splitting capsule. Occasional to common in littoral forest.

Indigenous, ranging from tropical Africa to eastern Polynesia.

TA'U: Garber 683; Whistler 7896.

Urena lobata L.

maufufu

Erect shrub with alternate leaves, pink monadelphous flowers, and a subglobose, bur-like fruit. Uncommon in disturbed places.

A Polynesian introduction, probably native to tropical Asia.

TA'U: Garber 545; Yuncker 9142; Whistler 7722.

MELASTOMACEAE

Astronidium pickeringii (A. Gray) Christoph.

Small tree with opposite leaves 3—5-veined from the base, entire to shallowly lobed calyx, 5-merous white flowers, and a subglobose capsule. Occasional to common in lowland to montane forest, reported from 130 to 800 m elevation.

Endemic.

TA'U: Yuncker 9252; Garber 721, 746; Whistler 1415, 3697, 3734, 7798, 7937.

Clidemia hirta (L.) D. Don [Koster's curse]

Shrub with opposite, hispid leaves palmately veined from the base, small white flowers in axillary clusters, and purple fruits. Common to abundant in sunny disturbed places and native scrubby vegetation up to the summit of the island.

A modern introduction, native to tropical America.

TA'U: Whistler 7749, 7841

Medinilla samoensis (Hochreut.) Christoph.

Woody climber with opposite leaves 3—5-veined from the base, pink flowers, and a subglobose capsule. Occasional in lowland to montane forest, reported from 350 to 700 m elevation.

Indigenous, probably also found on Futuna.

TA'U: Whistler 3136, 7990.

Melastoma denticulatum Labill. fua lolo

Shrub with opposite, pubescent leaves 3—5-veined from the base, white flowers, and a scaly fruit opening to expose the red pulp. Common in forest clearings and disturbed places, reported from near sea level to 900 m elevation.

Indigenous, ranging from New Caledonia to Tahiti.

TA'U: Garber 635; Yuncker 9058, 9232; Whistler 1392, 7624, 7855.

MELIACEAE

Aglaiia samoensis A. Gray laga'ali

Small tree with alternate, pinnately compound leaves, tiny fragrant, yellow flowers in long panicles, and an ellipsoid drupe. Occasional in lowland to montane forest, reported from 20 m to high elevation.

Endemic.

TA'U: Whistler 7504.

Dysoxylum huntii Merr. maota

Large tree with alternate, pinnately compound leaves with 4—6 pairs of leaflets, white tubular flowers in short panicles, and subglobose fruits containing 4 red seeds. Common to abundant in lowland to montane forest, reported from 150 m to high elevation.

Endemic.

TA'U: Whistler 3725.

Dysoxylum samoense A. Gray maota; tufaso

Large tree with bark smelling like garlic, alternate, pinnately compound leaves, more than 6 pairs of leaflets, white tubular flowers, and brown, subglobose fruits containing four red seeds. Common to abundant in lowland to montane forest, reported from near sea level to 750 m elevation.

Endemic.

TA'U: Yuncker 9183; Whistler 7924.

MORACEAE

Ficus godeffroyi Warb. mati

Small to medium-sized tree with milky sap, alternate, glabrous leaves having 6—8 lateral veins and a rounded base, and fig-like fruits often in clusters on the trunk. Occasional in lowland to montane forest, reported from 100 m to high elevation.

Endemic.

TA'U: Whistler 1411, 3194, 3581, 7813, 8001.

Ficus obliqua Forst. f. aoa

Large banyan tree with milky sap, alternate, lanceolate leaves, and a subglobose fruit subtended by early-falling bracts. Occasional to common in lowland to montane forest, reported from 30 to 700 m elevation.

Indigenous, ranging from Australia and the Celebes to Samoa.

TA'U: Whistler 3742, 7751.

Ficus prolixa Forst. f. aoa

Large banyan tree with milky sap, alternate, lanceolate leaves, and a subglobose fruit with persistent bracts. Occasional to common in lowland forest, reported from 20 to 150 m elevation.

Indigenous, ranging from New Caledonia to the Marquesas.

TA'U: Yuncker 9180. Not reported from within the park boundaries, but there is no reason why it shouldn't be found there.

Ficus scabra Forst. f. mati; matiata
Small to medium-sized tree with milky sap, alternate, cordate, scabrous leaves, and fig-like fruits. Common to abundant in littoral forest, less so in lowland forest, reported from near sea level to 300 m elevation.

Indigenous, ranging, from New Caledonia to Niue.

TA'U: Swezey 13; Yuncker 9033, 9145, 9242; Whistler 1358, 7668.

Ficus tinctoria Forst. f. mati
Small tree with milky sap, alternate, elliptic, glossy leaves, bracts at the base of the peduncle, and red, subglobose fruits. Common in lowland to montane forest, reported from 30 to 600 m elevation.

Indigenous, ranging from India to the Marquesas.

TA'U: Garber 544; Yuncker 9052; Whistler 7872.

Streblus anthropogorum (Seem.) Corner
Small to medium-sized tree with milky sap, alternate leaves, yellow male flowers in hanging catkins, and shiny red berries on axillary spikes. Occasional in lowland to montane forest, reported from 310 m to high elevation.

Indigenous, ranging from Fiji to the Society Islands.

TA'U: Whistler 3186, 3737.

MYRISTICACEAE

Myristica fatua Houtt. 'atone
Medium-sized tree with alternate leaves gray-green on the lower surface, tiny yellow flowers, and a tan, ellipsoid fruit containing a large seed surrounded by a red aril. Common to abundant in lowland to montane forest, reported from 10 to 600 m elevation.

Indigenous, ranging from Vanuatu to Samoa.

TA'U: Garber 609; Yuncker 9161, 9182; Whistler 7723.

MYRSINACEAE

Embelia vaupelii Mez
Woody climber with conspicuous lenticels on the stems, alternate, ovate leaves, and small white flowers. Occasional in lowland to montane forest, reported from near sea level to high elevation.

Indigenous, also found in Tonga.

TA'U: Whistler 7735.

Maesa tabacifolia Mez
Shrub with conspicuous lenticels, alternate, ovate leaves, tiny white flowers in axillary racemes or panicles, and small, flesh-colored fruits. Occasional in lowland to

montane forest, reported from near sea level to high elevation.

Indigenous, also found in Tonga and Fiji.

TA'U: Garber 686; Yuncker 9105; Whistler 1330, 1345, 3137, 7699, 7898.

MYRTACEAE

Psidium guajava L. [guava] kuava
Small tree with flaky bark, opposite leaves, white flowers bearing many stamens, and a yellow, pink-fleshed, many-seeded fruit. Occasional in disturbed places.

A modern introduction, native to tropical America.

TA'U: Yuncker 9293; Whistler 3147, 7884.

Syzygium carolinense (Koidz.) Kosokawa
Small to medium-sized tree with opposite leaves and loosely branching panicles of small white flowers bearing many stamens. Uncommon in lowland to montane forest, reported from 100 to 700 m elevation.

Indigenous, also found in Micronesia.

TA'U: Whistler 3129.

Syzygium clusiifolium (A. Gray) C. Muell. asi vai
Medium-sized tree with finely veined, opposite leaves, widely branching cauliflorous inflorescences of white flowers, and purple, ellipsoid fruits. Common to abundant in coastal forest, reported from near sea level to 200 m elevation.

Indigenous, also found in Tonga, Niue, Wallis, and the Horn Islands.

TA'U: Whistler 3679, 7913. Reported only from the north side of the island, and possibly not found within the park boundaries.

Syzygium dealatum (Burkill) A. C. Smith
Medium-sized tree with opposite leaves, terminal inflorescences of white flowers bearing many stamens, and glossy, dark purple, ovoid fruits. Occasional in coastal forest, reported from near sea level to 150 m elevation.

Indigenous, also found in Tonga, Niue, and Uvea.

TA'U: Whistler 3220, 3680, 7700.

Syzygium inophylloides (A. Gray) C. Muell. asi
Large tree with finely veined, opposite leaves having a twisted attenuate tip, terminal panicles of white flowers bearing numerous stamens, and a large fruit oblong in outline. Common and often dominant in lowland to montane forest, reported from 10 to 750 m elevation.

Indigenous, also found on Niue and Futuna.

TA'U: Garber 637; Whistler 7606, 7982.

Syzygium samarangense (Bl.)

nomu vao?

Merr. & Perry

Small to medium-sized tree with opposite, subsessile leaves, showy white flowers with numerous stamens, and large red fruits. Common in coastal to montane forest, reported from 20 m to high elevation.

Probably recently introduced and naturalized as it is on Niue, possibly native to Indonesia or Malaysia.

TA'U: Whistler 3156, 3210, 7977.

Syzygium samoense (Burkill) Whistler fena vao?

Medium-sized tree with opposite leaves, terminal panicles with small bracts, white flowers bearing numerous stamens, and ovoid fruits. Occasional to common in lowland to montane forest, reported from 300 m to high elevation.

Endemic.

TA'U: Whistler 3731.

NYCTAGINACEAE

Boerhavia repens L.

ufi atuli

Prostrate herb with alternate, elliptic leaves, tiny pink flowers in stalked clusters, and tiny sticky seeds. Occasional as a weed in coastal areas and uncommon in littoral habitats.

Indigenous or possibly a Polynesian introduction, widespread in the Pacific.

TA'U: Garber 586; Yuncker 9281; Harris 10, 76, 96 (n.s.); Whistler 7576.

Pisonia grandis R. Br.

pu'a vai

Large tree often with a massive white trunk, leaves appearing whorled, small white flowers in terminal clusters, and sticky cylindrical fruits. Common on undisturbed sandy shores.

Indigenous, ranging from Madagascar to Hawai'i.

TA'U: Whistler 3215, 7781.

Pisonia umbellifera (Forst.) Seem.

Small tree with leaves somewhat whorled, pink or white flowers, and sticky, long-cylindrical fruits. Occasional to common in lowland to montane forest, reported from 10 to 900 m elevation.

Indigenous, ranging from Madagascar to Hawai'i.

TA'U: Garber 574, 761; Yuncker 9002, 9064; Whistler 3154, 3207, 7636, 7979.

OLEACEAE

Jasminum didymum Forst. f.

Thin climbing vine with opposite, trifoliate leaves, white flowers with two stamens, and a black, subglobose fruit. Occasional in coastal to montane forest, reported from near sea level to high elevation.

Indigenous, ranging from Australia to the Society Islands.

TA'U: (seen but not collected).

ONAGRACEAE

Ludwigia hyssopifolia (G. Don) Exell

Erect, red-stemmed herb with alternate leaves, small, yellow, 4-merous flowers, and a linear, longitudinally ribbed capsule. Occasional in wet places.

A modern introduction, now pantropic in distribution.

TA'U: Whistler 7967. Probably not found within the park boundaries, for lack of suitable habitat.

Ludwigia octovalvis (Jacq.) Raven [willow primrose]

Tall, erect herb with alternate leaves, 4-parted flowers with yellow, notched petals, and a many-seeded, linear, longitudinally ribbed capsule. Common in disturbed places and croplands, particularly in wet soil.

A modern introduction, now pantropic in distribution.

TA'U: Yuncker 9294; Whistler 7966. Probably not found within the park boundaries, for lack of suitable habitat.

OXALIDACEAE

Oxalis barrelieri L.

Erect herb with opposite or alternate, trifoliate leaves, long-stalked axillary inflorescences of pink, 5-merous flowers, and a green, many-seeded capsule. Occasional in disturbed places.

A modern introduction, native to tropical America.

TA'U: Whistler 7647.

Oxalis corniculata L.

[wood sorrel]

Low, often prostrate herb with alternate, long-petioled trifoliate leaves having obcordate leaflets, yellow, 5-merous flowers, and a capsule that bursts open to expel the seeds. Occasional in lawns, pastures, and other sunny, disturbed places.

A Polynesian introduction, cosmopolitan in distribution.

TA'U: Harris 34, 82; Whistler 7648.

PASSIFLORACEAE

- Passiflora foetida* L. [love-in-a-mist] pasio vao
Hairy, herbaceous vine with alternate, palmately 3-lobed leaves, coiled tendrils, showy white flowers, and a small, globose, edible fruit surrounded by branching calyx lobes. Common in disturbed places.
A modern introduction, native to tropical America.
TA'U: Whistler 3184, 7756.

PIPERACEAE

- Macropiper puberulum* Benth. 'ava'avaaitu
Dioecious shrub with alternate, cordate leaves, solitary, axillary spikes of white male flowers, or solitary, axillary female spikes bearing numerous tiny red fruits at maturity. Occasional in lowland to montane forest, reported from 20 m to high elevation.
Indigenous, ranging from Fiji and Futuna to Rapa.
TA'U: Garber 638; Yuncker 9118; Whistler 1331, 3178, 7793, 7796.
- Macropiper timothianum* A.C. Smith 'ava'avaaitu
Dioecious shrub with alternate cordate leaves, fascicles of white male spikes, or female spikes that bear tiny red fruits at maturity. Common in montane forest, reported from 550 to high elevation.
Indigenous, also found in Fiji.
TA'U: Whistler 3189, 3726. This species and the previous one are indistinguishable when sterile, and it is possible that *M. timothianum* is just a high-elevation form of *M. puberulum*.

- Peperomia leptostachya* Hooker & Arn.
Small terrestrial, puberulent herb with opposite leaves and long terminal spikes of minute, green, apetalous flowers. Occasional in coastal forest, reported mostly near sea level.
Indigenous, widespread from Australia to Hawai'i.
TA'U: Garber 596, 599. It has only been collected inland from Fiti'uta at 160 m, and may not be found within the park boundaries.

- Peperomia pellucida* (L.) Kunth
Weak-stemmed herb with alternate, cordate or ovate leaves and minute, green, apetalous flowers in terminal spikes. Occasional in croplands and disturbed places.
A modern introduction, native to tropical America.
TA'U: Whistler 7652.

Peperomia reineckei C. DC.

- Epiphytic or terrestrial, glabrous herb with alternate leaves, axillary spikes usually in pairs, and minute, green, apetalous flowers. Occasional in montane forest, reported from 400 m to high elevation.
Endemic.
TA'U: Whistler 3174, 3702, 7812.

Peperomia tutuilana Yuncker

- Small glabrous herb with alternate leaves and minute, green, apetalous flowers on solitary spikes in the upper leaf axils. Occasional on rocks or trees in coastal to lowland forest, reported from near sea level to 400 m elevation.
Indigenous, also found in Tonga.

TA'U: Yuncker 9031; Whistler 1321, 3216, 7548.

- Piper graeffei* Warb. fue manogi; 'ava'avaaitu sosolo
Climbing vine with alternate, palmately veined leaves, long, hanging, unisexual spikes, and tiny red fruits. Common to abundant in littoral to montane forest, reported from 10 to 600 m elevation.

- Indigenous, also found on Futuna.
TA'U: Garber 711; Yuncker 9013, 9040, 9042, 9048; Harris 257, 262, 355; Whistler 7732, 7794.

POLYGALACEAE

- Polygala paniculata* L. pulunamulole
Small herb with fragrant roots, alternate leaves, and tiny white flowers in terminal and axillary racemes. Occasional in disturbed places and roadsides.
A modern introduction, native to tropical America.
TA'U: Yuncker 9175; Whistler 1315, 7650.

PORTULACACEAE

- Portulaca lutea* Sol. ex Forst. f. tamole
Prostrate succulent herb with glabrous, spirally arranged leaves, large, showy yellow, solitary flowers, and a capsule opening by the top splitting off. Uncommon on coastal rocks.
Indigenous, ranging from New Caledonia to Pitcairn Island.
TA'U: Whistler 7687.
- Portulaca oleracea* L.
Succulent prostrate to ascending herb with glabrous, spirally arranged leaves, yellow flowers in terminal clusters, and a capsule opening by the top splitting off.

Common on rocky and sandy shores, and as a weed in lowlands.

An early European or Polynesian introduction, cosmopolitan as a weed.

TA'U: Yuncker 9279; Harris 79, 99, 266, 267, 323, s. n.; Whistler 7765.

Portulaca quadrifida L.

Tiny prostrate herb with opposite leaves, small yellow, 4-merous flowers, and a capsule opening by the top splitting off. Uncommon in sandy areas of villages.

A Polynesian weed or perhaps indigenous, pantropic in distribution.

TA'U: Harris 77, 98; Whistler 7593. Found mostly in villages, and possibly not within the park boundaries.

Portulaca samoensis Poelln.

Prostrate, hairy herb with small, spirally arranged leaves, small, yellow, 5-merous flowers, and a capsule opening by the top splitting off. Occasional on coastal rocks and sometimes in disturbed places.

Indigenous, ranging from New Guinea to Niue.

TA'U: Garber 697; Yuncker 9122; Harris 78 (n.s.), 80, 97, 264; Whistler 7553.

RHAMNACEAE

Alphitonia zizyphoides (Spreng.) A. Gray toi

Tall tree with alternate, lanceolate leaves gray beneath, clusters of small white flowers, and purple, globose fruits. Common in secondary forest and lowland to montane forest, reported from 10 to 700 m elevation.

Indigenous, ranging from southeast Asia to eastern Polynesia.

TA'U: Garber 559; Whistler 3155, 7817.

Colubrina asiatica (L.) Brongn. fisoa

Spreading shrub with alternate, glossy leaves, small white flowers, and green globose fruits. Occasional to common on the seaward margins of littoral forest and sometimes in it as a scandent shrub.

Indigenous, ranging from tropical east Africa to the Marquesas.

TA'U: Garber 687; Bryan 1380; Yuncker 9126; Whistler 7877.

RUBIACEAE

Canthium merrillii (Setchell) Christoph. ola; ola sina

Medium-sized tree with opposite leaves, white flowers, and laterally compressed, subglobose fruits in axillary

clusters. Occasional in coastal to montane forest, reported from 20 to 700 m elevation.

Indigenous, also found in Tonga (the Niuas).

TA'U: Whistler 1416, 7741.

Geophila repens (L.) I. M. Johnston togo

Prostrate herb with kidney-shaped leaves, small white flowers, and a red globose fruit. Occasional in coastal to montane forest, reported from 10 to 700 m elevation.

Indigenous, pantropic in distribution.

TA'U: Garber 567; Yuncker 9148, 9291; Harris 252; Whistler 3568, 7566, 7787.

Guettarda speciosa L. puapua

Medium-sized tree with opposite, obovate leaves, showy white, long-tubed, fragrant flowers, and a brown, globose fruit. Common in littoral forest, and sometimes inland in coastal and lowland forest.

Indigenous, ranging from east Africa to the Marquesas.

TA'U: Whistler 3212, 7782.

Gynochtodes epiphytica

(Rechinger) A. C. Smith & S. Darwin

Woody climber with opposite leaves, small axillary flowers, and greenish, subglobose fruits. Uncommon in coastal to montane forest, reported from 20 to 400 m elevation.

Indigenous, also found in Fiji, Niue, and Tonga.

TA'U: Whistler 3208, 7980.

Hedyotis biflora (L.) Lam.

Small herb with opposite leaves, tiny white flowers in terminal panicles, and a papery, subglobose capsule. Occasional on coastal rocks and inland in rocky streambeds, reported from near sea level to 350 m elevation.

Indigenous, ranging from Mauritius to the Cook Islands.

TA'U: Garber 698; Yuncker 9119; Harris 328; Whistler 7615.

Hedyotis foetida (Forst. f.) J. E. Smith

Small shrub with opposite, foetid leaves, small white flowers in terminal panicles, and a papery, globose capsule. Uncommon to occasional on coastal rocks.

Indigenous, ranging from New Caledonia to the Austral Islands.

TA'U: Garber 701; Whistler 3318, 7569.

Morinda citrifolia L. nonu

Shrub or small tree with large, dark green, glossy leaves, small white flowers, and a large, yellowish, irregularly shaped, fleshy, compound fruit. Common in coastal to

montane forest, as well as in disturbed places, reported from near sea level to 500 m elevation.

A Polynesian introduction, ranging from India to Hawai'i.

TA'U: Garber 771; Yuncker 9032; Cox 315; Whistler 1306, 7711.

Morinda myrtifolia A. Gray

Vine with opposite leaves, small white, 5-lobed flowers, and a small, humpy, compound fruit. Uncommon in lowland forest, reported from near sea level to 200 m elevation.

Indigenous, ranging from New Caledonia to the Marquesas.

TA'U: Whistler 7630.

Mussaenda raiateensis J. W. Moore aloalo vao

Terrestrial or epiphytic shrub with opposite leaves, yellow flowers each subtended by a white, leaf-like bract, and a brown, ovoid fruit spotted white. Occasional in lowland to montane forest, reported from near sea level to 700 m elevation.

Indigenous, ranging from Vanuatu to the Society Islands.

TA'U: Garber 562 (n.s.), 610; Yuncker 9043; Whistler 1290, 3151, 7638.

Neonauclea forsteri (Seem. ex Havil.) Merr. afa

Large tree with opposite leaves, conspicuous oval stipules on the terminal bud, and white flowers in a globose terminal head. Common in lowland to montane forest, reported from 15 m to high elevation.

Indigenous, ranging from the Solomon Islands to Tahiti.

TA'U: Garber 672; Yuncker 9179; Whistler 1336, 3683, 7692, 7947.

Psychotria garberiana Christoph.

Small tree with opposite leaves, notched stipules, showy white flowers, and ovoid to subglobose, orange to pink pyrenes. Common in lowland to montane forest, reported from 300 to 800 m elevation.

Endemic to Manu'a.

TA'U: Garber 754; Whistler 1412, 3134, 3197, 7509, 7858.

Psychotria insularum A. Gray matalafi

Small tree with opposite leaves, small white flowers, and red, globose pyrenes. Common in coastal to montane forest, reported from near sea level to high elevation.

Indigenous, also found in Tonga, Futuna, Uvea, Rotuma, and Niue.

TA'U: Garber 555, 573, 768; Yuncker 9008, 9060; Cox 310; Whistler 1398, 7710, 7757.

Sarcopygme pacifica (Reinecke)

u'uru

Setchell & Christoph.

Medium-sized, scarcely branching tree with large opposite leaves, long showy white flowers in globose heads, and a large, pendulous, compound fruit. Common in lowland to montane forest, reported from 50 m to high elevation.

Endemic.

TA'U: Garber 760; Yuncker 9254; Whistler 7949.

Spermacoce assurgens Ruiz & Pavon

Erect herb with opposite, lanceolate to narrowly elliptic leaves, unwinged stems, and tiny white flowers in sessile, axillary clusters. Common in croplands and disturbed places.

A modern introduction, native to tropical America.

TA'U: Whistler 1308, 7766.

Tarennia sambucina (Forst. f.)

ma'anumu

Durand in Drake

Small tree with opposite leaves, dense panicles of white flowers with exerted stamens, and small globose fruits. Occasional in open forest and disturbed places, reported from near sea level to ca. 300 m elevation.

Indigenous, ranging from Vanuatu to the Marquesas.

TA'U: Garber 778; Yuncker 9184; Whistler 1294, 3150, 3681, 7595.

RUTACEAE

Acronychia heterophylla A. Gray

Shrub or small tree with simple or trifoliate leaves, small white flowers, and a 4-lobed capsule containing 4 shiny black seeds. Occasional in lowland to montane forest, reported from 100 to 800 m elevation.

Endemic to American Samoa.

TA'U: Whistler 3181, 3202, 7801.

Acronychia retusa A. Gray

Shrub or small tree with simple, notch-tipped leaves, small white flowers, and a 4-lobed capsule containing 4 shiny black seeds. Uncommon in coastal to lowland forest, reported from near sea level to 180 m elevation.

Indigenous, also found on Alofi.

TA'U: Whistler 3225, 3689, 7550, 7575.

Citrus macroptera Montr.

moli u'u

Small to medium-sized tree with opposite leaves, thorns, small white flowers, and small sour oranges. Uncommon in coastal to lowland forest.

A Polynesian introduction, widespread in the Pacific.

TA'U: Garber 569; Whistler 3153.

Euodia samoensis Christoph. so'opine

Small tree with opposite, trifoliolate leaves, small white flowers, and a 4-lobed fruit splitting to release 4 shiny black seeds. Occasional in lowland to montane forest, reported from 10 to 550 m elevation.

Endemic.

TA'U: Garber 617; Yuncker 9193; Whistler 1399, 7506, 7671.

Micromelum minutum (Forst. f.) Seem. talafalu

Small tree with alternate, pinnately compound leaves, small white flowers in dense panicles, and red, succulent fruits. Occasional in coastal to lowland forest, reported from near sea level to 300 m elevation.

Indigenous, ranging from the Philippines to Niue.

TA'U: Garber 668; Whistler 7914.

SAPINDACEAE

Allophylus timoriensis (DC.) Bl.

Small to medium-sized tree with alternate, trifoliolate leaves, small white flowers in racemes, and red, globose fruits. Occasional in littoral to coastal forest, reported from near sea level to 70 m elevation.

Indigenous, ranging from Malaysia to the Marquesas.

TA'U: Whistler 7542.

Elastostachys falcata (A.Gray) Radlk. tapumatau

Medium-sized to large tree with alternate, pinnately compound leaves, inconspicuous flowers with red stamens, and small, 3-lobed capsules. Occasional in lowland to montane forest, reported from 30 m to high elevation.

Indigenous, also found in Fiji, Tonga, and Niue.

TA'U: Whistler 3131.

Pometia pinnata Forst. tava

Large buttressed tree with pinnately compound leaves, dense panicles of apetalous flowers, and a large, subglobose fruit. Occasional in lowland forest on Ta'u, reported from 25 to 500 m elevation.

Indigenous, ranging from Ceylon to Samoa.

TA'U: Whistler 3739.

SAPOTACEAE

Palaquium stehlinii Christoph. gasu

Large tree with milky sap, alternate ovate leaves, small flowers with at least twice as many stamens as petals, and a large, single-seeded, curved-oblong fruit. Occasional

in lowland to montane forest, reported from 300 to 750 m elevation.

Endemic.

TA'U: Whistler 3169, 3580.

Planchonella garberi Christoph. 'ala'a

Medium-sized to large tree with alternate, lanceolate leaves, small axillary flowers, and a subglobose fruit red to black at maturity that contains one or more shiny black seeds. Occasional in coastal to montane forest, reported from near sea level to 500 m in elevation.

Indigenous, ranging from Fiji to Niue.

TA'U: Whistler 3168.

SCROPHULARIACEAE

Limnophila fragrans (Forst. f.) Seem.

Prostrate herb with fragrant, opposite leaves, small, white, axillary flowers, and an ovoid fruit, rare in wet places such as taro patches, streambeds, and crater lake margins, reported from near sea level to 650 m elevation.

Indigenous, ranging from Australia and Melanesia to the Society Islands.

TA'U: Whistler 1317, 3305, 7968. Probably not found within the park boundaries because of lack of suitable habitat.

Lindernia crustacea (L.) F. Muell.

Small herb with opposite leaves, purple-blue flowers, and a tiny, many-seeded capsule. Occasional in wet places such as streambeds, reported from 100 to 600 m elevation.

Indigenous, pantropic in distribution.

TA'U: Garber 600, 623; Yuncker 9147; Harris 324; Whistler 3177, 7616, 7888.

SOLANACEAE

Physalis angulata L. [wild capegooseberry] vi vao

Erect herb with alternate leaves, pale yellow, rotate flowers, and a bladder-like calyx surrounding a small edible berry. Common in croplands and disturbed places.

Possibly a Polynesian introduction, native to tropical America.

TA'U: Whistler 1300, 3330, 7754.

Solanum americanum [black nightshade] magalo Mill.

Erect branching shrub with alternate leaves, small white flowers bearing reflexed petals and exerted yellow an-

thers, and shiny black berries. Uncommon in sunny disturbed places and croplands.

A Polynesian introduction or native, possibly pantropic in distribution.

TA'U: Garber 597; Whistler 7778.

STERCULIACEAE

Kleinhovia hospita L. fu'afu'a
Medium-sized tree with alternate cordate leaves, pink flowers, and an inflated capsule. Common in disturbed places and secondary forest, reported from near sea level to 500 m elevation.

Indigenous, ranging from tropical Asia to western Polynesia.

TA'U: Garber 565; Whistler 7900. Not seen within the park boundaries.

Melochia aristata A. Gray ma'o
Small to medium-sized tree with alternate, cordate leaves, pink flowers, and a small capsule pointed at the top. Occasional in disturbed places and secondary forest, reported from near sea level to 700 m elevation.

Indigenous, also found in Tonga and the Tuamotus.

TA'U: Whistler 3146, 7599, 7927.

Sterculia fanaibo Setchell fana'io
Medium-sized tree with alternate leaves having the blade angled to the petiole, small reddish flowers, and a large reddish-brown capsule containing a few large seeds. Occasional in coastal to montane forest, reported from near sea level to 600 m elevation.

Indigenous, also found in Tonga, Niue, Rotuma, and Futuna.

TA'U: Garber 775; Whistler 1354, 7574.

THYMELAEACEAE

Phaleria disperma (Forst. f.) Baill. suni
Shrub or small tree with opposite leaves, fragrant, long, white, tubular flowers, and red subglobose fruits. Occasional in littoral and coastal forest, reported from near sea level to 100 m elevation.

Indigenous, also found in Fiji, Tonga, and the Home Islands.

TA'U: Garber 772. Collected only once, on the north coast, and perhaps not found within the park boundaries.

TILIACEAE

Grewia crenata (Forst.) Schinz & Guill. faui
Small tree with alternate leaves, white, 5-merous flowers with many stamens, and a lobed capsule. Uncommon in coastal forest.

Indigenous, ranging from New Caledonia to the Society Islands.

TA'U: Whistler 7876. Collected only on the northwest corner of the island, and perhaps not found within the park boundaries.

Trichospermum richii (A. Gray) Seem. ma'o sina
Medium-sized tree with alternate leaves having a tiny pair of appendages at the base, stellate pubescence, white flowers with many stamens, and a flattened and winged, obovate fruit. Occasional in lowland to montane forest, reported from 100 to 900 m elevation.

Indigenous, also found in Fiji.

TA'U: Yuncker 9231.

Triumfetta procumbens Forst. f. ma'oufu tai
Prostrate shrub with alternate leaves, showy yellow flowers having numerous stamens, and a bur-like fruit. Uncommon on sandy beaches.

Indigenous, ranging from Malaysia to the Tuamotus.

TA'U: Garber 582, 764; Yuncker 9022; Whistler 1322, 7669.

Triumfetta rhomboidea Jacq. [bur bush] ma'oufu
Shrub with alternate, palmately lobed leaves, small, sessile, axillary, yellow flowers bearing many stamens, and a small globose, bur-like fruit. Occasional to common in disturbed places.

A modern introduction, native to the Old World tropics.

TA'U: Garber 602; Whistler 7868.

ULMACEAE

Celtis harperi Horne papaono?
Medium-sized tree with alternate, elliptic leaves 3-veined from the base, greenish, apetalous flowers, and subglobose drupes. Uncommon in lowland forest, reported from 200 to 300 m elevation.

Indigenous, ranging from Fiji to Niue.

TA'U: Whistler 3135, 7514, 7729.

Trema cannabina Lour. magele
Small tree with coarse lanceolate leaves, tiny greenish white flowers, and dense clusters of drupes. Occasional

in disturbed forest and clearings, reported from near sea level to 300 m elevation.

Indigenous, ranging from India to Niue and perhaps farther east.

TA'U: Garber 670; Yuncker 9046; Whistler 7620.

URTICACEAE

Cypholophus macrocephalus Wedd. faupata

Unbranched shrub with opposite, ovate, rugose leaves, tiny greenish flowers in dense, sessile, axillary clusters, and tiny orange drupes. Occasional in montane forest, reported from 450 to 900 m elevation.

Indigenous, ranging from Fiji to the Society Islands.

TA'U: Whistler 3187, 7748.

Dendrocnide harveyi (Seem.) Chew salato

Medium-sized, soft-wooded tree with alternate, ovate leaves 3—5-veined from the base, stinging hairs, tiny green flowers, and tiny green achenes. Occasional in coastal to lowland forest, reported from 10 m elevation at Amouli on the southwest corner of the island, and not within the park boundaries.

Indigenous to Samoa (but reportedly a historic Polynesian introduction to Ta'u), ranging from Fiji to Niue.

TA'U: Garber 780; Whistler 3854, 7965.

Elatostema cupreo-viride Rechinger

Large herb with leaves appearing alternate, leaf margins serrate, and tiny green flowers in axillary clusters. Uncommon to occasional in montane forest, reported from 340 m to high elevation.

Endemic.

TA'U: Whistler 3188, 3561.

Elatostema grandifolium Reinecke

Large herb with large leaves appearing alternate, crenate leaf margins, and tiny green to white flowers in axillary clusters. Occasional to common in montane forest, reported from 400 to 890 m elevation.

Endemic.

TA'U: Whistler 3171, 3574, 7831.

Elatostema scabriusculum Setchell

Small herb with leaves appearing alternate, long stipules, and tiny green flowers in axillary clusters. Uncommon in montane forest, reported from 400 to 600 m elevation.

Endemic to American Samoa.

TA'U: Yuncker 9081; Harris 190, 400; Whistler 1409, 3176, 3564, 7803, 7944.

Laportea interrupta (L.) Chew ogoogo

Erect herb with toothed, ovate, alternate leaves, mildly stinging hairs, and long, loose, axillary inflorescences of greenish apetalous flowers. Uncommon in disturbed places and around houses.

A Polynesian introduction, possibly native to southeast Asia.

TA'U: Garber 576; Harris 261, 320; Whistler 7682, 7725.

Mauotia australis Wedd.

Small tree with alternate leaves white beneath, serrate leaf margins, and tiny green flowers in widely branching axillary inflorescences. Occasional in lowland to montane forest, reported from 200 to 900 m elevation.

Indigenous, ranging from Fiji to the Society Islands.

TA'U: Garber 779; Whistler 3674, 7517, 7742, 7806, 7911.

Pilea microphylla (L.) Liebm. [rockweed]

Small, prostrate, somewhat succulent herb with tiny leaves and greenish, inconspicuous flowers. Occasional in sunny disturbed areas and on rock walls.

A modern introduction, native to tropical America.

TA'U: Whistler 1320, 7769.

Pipturus argenteus (Forst. f.) Wedd. sogā; fau sogā

Small tree with grayish, alternate leaves, tiny flowers in branching inflorescences, and white, fleshy, compound fruits. Common in disturbed places and early secondary forest, reported from near sea level to 700 m elevation.

Indigenous, ranging from Vanuatu to the Marquesas.

TA'U: Garber 585, 696 (n.s.); Yuncker 9185; Whistler 1341, 7540.

Procris pedunculata (Forst.) Wedd. fua lolo

Terrestrial or epiphytic herb with alternate leaves, tiny white male flowers in short axillary cymes, and red, strawberry-like, aggregate fruits. Occasional in littoral to montane forest, reported from near sea level to 700 m elevation.

Indigenous, ranging from Malaysia to the Marquesas.

TA'U: Garber 607; Yuncker 9051; Harris 255; Whistler 1340, 7618.

VERBENACEAE

Clerodendrum buchananii (Roxb.) Walp.

var. *fallax* (Lindl.) Bakh.

Shrub with large, opposite, finely pubescent, cordate leaves, bright red flowers with exerted stamens, and black fruits, sometimes cultivated as an ornamental, but occasionally weedy in plantations and disturbed areas.

A modern introduction, native to the Malaysian region.
TA'U: Garber 699; Yuncker 9059; Whistler 1295, 7904.

Clerodendrum chinense (Osb.) Mabb. aloalo
Large shrub with opposite cordate leaves and showy white flowers in dense clusters. Occasional in plantations and along roadsides, where it often forms dense thickets.

A modern introduction, probably native to south Asia.
TA'U: Whistler 7662.

Clerodendrum inerme (L.) Gaertn. aloalo tai
Sprawling shrub with opposite leaves, showy white flowers having exerted stamens, and a fruit breaking up into 4 nutlets. Common in sunny littoral areas, sometimes as a scandent shrub in littoral forest.

Indigenous, ranging from tropical Asia to Niue.
TA'U: Garber 584, 694; Yuncker 9096; Whistler 1332, 7695.

Faradaya amicornum (A. Gray) Seem. mamalupe
High-climbing vine with opposite leaves, white tubular flowers having 4 exerted stamens, and a large, red, curved-ellipsoid fruit. Common in lowland to montane forest, reported from 50 m to high elevation.

Endemic.
TA'U: Garber 552, 671; Yuncker 9174; Harris 200; Whistler 1291, 7503.

Premna serratifolia L. aloalo
Shrub or small tree with broad, opposite leaves usually marked by leaf-mining insects, tiny greenish flowers in dense corymbs, and a small black, globose fruit having a persistent calyx. Common in littoral strand and sometimes inland in forests, reported from near sea level to 500 m elevation.

Indigenous, ranging from tropical Asia to the Marquesas.
TA'U: Garber 708; Yuncker 9117; Whistler 1355a, 7522.

Stachytarpheta jamaicensis (L.) [Jamaica vervain]
Vahl

Low shrub with opposite leaves and lavender, bilabiate flowers in a long spikes having a thickened rachis. Uncommon in disturbed places.

A modern introduction, native to tropical America.
TA'U: Whistler 7865. Only one plant seen, at the airport in Fiti'uta.

Stachytarpheta urticifolia [blue rat's-tail] maufu
(Salisb.) Sims

Coarse shrub with opposite, rugose leaves and long, narrow, terminal spikes of purple sympetalous flowers. Common in plantations, pastures, and disturbed places.
A modern introduction, native to tropical America.
TA'U: Garber 656; Yuncker 9026; Whistler 7661, 7902.

Vitex trifolia L. namulega
Small tree with opposite, palmately compound leaves gray beneath, tiny purple flowers, and black, globose fruits. Occasional on littoral strand and coastal scrubby vegetation, reported only near sea level.

Indigenous, ranging from tropical east Africa to the Marquesas.
TA'U: Garber 611; Yuncker 9104; Whistler 1326, 7551, 7897.

VIOLACEAE

Meliccytus samoensis (Christoph.) A. C. Smith
Small to medium-sized tree with alternate, serrate leaves, small white flowers in axillary clusters, and globose, purplish fruits. Occasional in montane forest, reported from 400 to high elevation.

Indigenous, also found in Tonga.
TA'U: Whistler 3196, 3572.

VISCACEAE

Korthalsella horneanum V. Tieg.
Hemiparasitic shrub with leafless, jointed stems and tiny white, axillary flowers. Uncommon in lowland to montane forest, reported from 400 m elevation.

Indigenous, ranging from Fiji to Tahiti.
TA'U: Kuruc 14; Whistler 3597.

MONOCOTYLEDONAE

AGAVACEAE

Cordyline fruticosa (L.) Chev ti; lau ti

Shrub with parallel-veined leaves, pink flowers in branching panicles, and bright red berries. Common in cultivation and naturalized in lowland to montane forest, reported from near sea level to over 900 m elevation.

A Polynesian introduction, widespread from tropical Asia to Hawai'i.

TA'U: Garber 554; Yuncker 9047, 9128; Harris 136; Cox 308; Whistler 7713.

AMARYLLIDACEAE

Zephyrathes rosea (Spreng.) Lindl. [zephyr lily]

Stemless herb with strap-shaped leaves arising from an underground bulb, and showy pink, scapose flowers. Occasional in lawns.

A modern introduction, native to tropical America.

TA'U: Yuncker 9220 (cult.); Whistler 3322, 7863. Probably not found within the park boundaries, since it occurs mostly in villages.

ARACEAE

Amorphophallus paeoniifolius (Dennst.) teve
Nicholson

Stemless herb with large, deeply divided leaves arising from an underground rhizome, and a large, purple, bell-shaped spathe and spadix arising from a short stem. Uncommon in secondary forest and plantations.

A Polynesian introduction, widespread from tropical Asia to eastern Polynesia.

TA'U: Garber 774; Whistler 7505, 7564.

Epipremnum pinnatum (L.) Engl.

High-climbing vine with alternate, elliptic, fenestrate leaves, flowers in a spadix, and small drupes. Common in littoral to lowland forest, reported from near sea level to 200 m elevation.

Indigenous, widespread in the Pacific to eastern Polynesia.

TA'U: Garber 677; Yuncker 9288.

ARECACEAE

Cocos nucifera L. niu

Tall palm with long, pinnately compound fronds, unisexual flowers in long spikes enclosed within a woody,

deciduous spathe, and a large fruit (coconut). Common in littoral forest and inland in plantations and secondary forest, reported from near sea level to over 400 m elevation.

Indigenous, or possibly a Polynesian introduction to some parts of its range, now pantropic in distribution.

TA'U: Garber 703.

CANNACEAE

Canna indica L. [canna, Indian shot] fanamanu

Tall erect herb with large, ovate to lanceolate leaves, showy red flowers, and a soft-spiny fruit containing pea-like seeds. Occasional in wet places such as taro crops.

An early modern introduction, native to tropical America.

TA'U: Garber 781; Yuncker 9282; Whistler 1389, 3328, 7775.

COMMELINACEAE

Aneilima vitiense Seem.

Herb with alternate, lanceolate leaves, white flowers bearing 3 petals, and a small pubescent capsule. Occasional in littoral to montane forest, reported from near sea level to 750 m.

Indigenous, also found in Fiji and Tonga.

TA'U: Garber 588; Yuncker 9230, 9274; Whistler 7960.

Commelina diffusa Burm. f. mau'utoga

Weak-stemmed herb with lanceolate leaves and blue, 3-petaled flowers enclosed within a folded bract. Common to abundant in disturbed places and wetlands in Samoa.

A Polynesian introduction, apparently from Tonga, native to the Old World tropics.

TA'U: Yuncker 9273; Whistler 7771.

CYPERACEAE

Cyperus compressus L.

Small sedge with terminal, flattened, green spikelets surrounded by several linear bracts. Occasional in disturbed places.

A modern introduction, now pantropic in distribution.

TA'U: Garber 659; Harris 4 (n.s.); Whistler 7773.

- Cyperus rotundus L.** [nutsedge] A modern introduction, now pantropic in distribution.
Small sedge with basal leaves and terminal, flattened, red-brown spikelets on several rays. Common in croplands and disturbed places.
TA'U: Yuncker 9276; Harris 91 (n.s.); Whistler 1385, 7777.
- Cyperus stoloniferus Retz.** A modern introduction, now cosmopolitan in distribution.
TA'U: Whistler 1369, 7776.
- Eleocharis dulcis (Burm. f.) Hens.** 'utu'utu
Leafless sedge with striate, pith-filled stems, a terminal spike nearly as wide as the stems, and brown spikelets. Locally abundant in the coastal marsh in Ta'u Village.
Indigenous, ranging from West Africa to Samoa.
TA'U: Yuncker 9296; Whistler 1316, 7969. Probably not found within the park boundaries.
- Fimbristylis cymosa R. Br.**
Small, clump-forming sedge with linear leaves and brown spikelets borne atop a scape. Occasional on sunny, rocky shores.
Indigenous, occurring from Malaysia to Hawai'i.
TA'U: Garber 608; Whistler 7767.
- Fimbristylis dichotoma (L.) Vahl**
Thin-stemmed sedge with brown ellipsoid spikelets in panicles. Common in disturbed places such as roadsides and lawns.
A modern introduction, pantropic in distribution.
TA'U: Garber 648; Yuncker 9103, 9295; Whistler 1375, 3311, 3334, 7621, 7973.
- Gahnia vitiensis Rendle**
Tall sedge with long, linear-lanceolate leaves, long narrow panicles of brown spikelets, and a shiny brown, obovoid achene. Rare in the summit scrub of Ta'u, reported from 840 to 910 m elevation.
Indigenous, previously believed to be endemic to Fiji.
TA'U: Whistler 7835, 7860.
- Kyllinga brevifolia Rottb.** tuise
Small edge with creeping rhizomes, long narrow stems, and small green, globose, headlike clusters of spikelets subtended by 3 linear leaflike bracts. Common in lawns and other sunny, disturbed places.
- Kyllinga nemoralis (Forst.) Dandy ex Hutchc. & Dalziel**
Small sedge with creeping rhizomes and small white globose headlike clusters of spikelets subtended by 3 leaflike bracts. Common in lawns and other sunny disturbed places.
A Polynesian introduction, probably native to the Old World tropics.
TA'U: Yuncker 9186, Harris 5, 318 (n.s.), 362; Whistler 1370, 3333, 7645.
- Mapania macrocephala (Gaud.) K. Schum.**
Large sedge with linear-lanceolate leaves up to 2 m long and a large, lobed, subglobose inflorescence of brown spikelets. Occasional in lowland to montane forest, reported from near sea level to 800 m elevation.
Indigenous, ranging from the Philippines to Samoa, but not occurring in Fiji.
TA'U: Garber 739; Yuncker 9084; Whistler 1410, 3586 (n.s.), 7746, 8011.
- Mariscus cyperinus (Retz.) Vahl**
Erect sedge with green spikelets in a dense, head-like cluster surrounded by several leaf-like bracts. Uncommon to occasional in disturbed places.
Probably a modern introduction, possibly native to tropical Asia.
TA'U: Garber 649; Whistler 1404, 3599, 7881, 7940.
- Mariscus javanicus (Houtt.) Merr.** selesele & Metcalfe
Large sedge with narrow, sharp-edged, linear leaves and a dense inflorescence of dull brown spikelets. Occasional on rocky or sandy shores and in coastal taro patches.
Indigenous, widespread from tropical Africa to Hawai'i.
TA'U: Yuncker 9285; Whistler 7530.
- Mariscus seemannianus (Boeck.) Palla**
Medium-sized sedge with dense, terminal panicles of reddish brown spikelets perpendicular to the several terminal rays. Occasional in lowland to montane forest, reported from near sea level to 600 m elevation.
Indigenous, ranging from Fiji to the Society Islands.
TA'U: Garber 590 (n.s.), 657; Schultz 34; Harris 199, 319 (n.s.); Whistler 1304, 3180, 7617, 7672.

Mariscus sumatrensis (Retz.) Raynal

Medium-sized sedge with green spikelets in several cylindrical spikes subtended by several long, leaf-like bracts. Uncommon to occasional in disturbed places.

A modern introduction, native to the Old World tropics.

TA'U: Garber 647; Yuncker 9132; Harris 376; Whistler 1387, 1404, 3331, 7658, 7785.

Pycrus polystachyos (Rottb.) Beauv.

Small erect sedge with brown spikelets in irregular, head-like terminal clusters. Common on roadsides and disturbed places.

A modern introduction, now pantropic in distribution.

TA'U: Whistler 1386, 3312, 7532.

Rhynchospora corymbosa (L.) Britten selesele

Large, coarse sedge with linear-lanceolate, sharp-edged leaves and branching terminal panicles with reddish brown spikelets. Common in coastal and montane marshes, reported from near sea level to high elevation.

Indigenous, pantropic in distribution.

TA'U: Yuncker 9102, 9286; Whistler 1318, 7971.

Scleria lithosperma (L.) Sw.

Medium-sized sedge with linear leaves and few-flowered panicles bearing tiny, hard, white, globose fruits. Occasional in coastal to lowland forest, reported from near sea level to 300 m elevation.

Indigenous, pantropic in distribution.

TA'U: Garber 690; Yuncker 9080; Harris 214; Whistler 7612, 7899.

Scleria polycarpa Boeck.

Large, coarse sedge with triangular stems, sharp-edged leaves, and branching inflorescences bearing tiny, hard, white globose fruits. Occasional in lowland to montane forest, reported from near sea level to 650 m elevation.

Indigenous, ranging from Australia to Samoa.

TA'U: Garber 644; Yuncker 9004, 9106; Cox 307; Whistler 7510.

Scleria terrestris (L.) Fass.

Slender sedge with triangular stems, linear leaves, and narrow branches bearing tiny, hard, white, globose fruits. Uncommon in coastal wetlands, reported from near sea level.

A modern introduction, or possibly indigenous, native to India.

TA'U: Whistler 3308.

Torulinium odoratum (L.) S. Hooper

Medium-sized sedge with linear-lanceolate leaves and a variable, terminal inflorescence with numerous, narrow, brown spikelets. Occasional in coastal marshes, and sometimes in disturbed littoral areas, reported from near sea level to high elevation.

Indigenous, pantropic in distribution.

TA'U: Yuncker 9041; Whistler 1305, 3314 (n.s.), 7643.

DIOSCOREACEAE

Dioscorea bulbifera L. soi

Vine with alternate, cordate leaves, aerial bulbils, tiny flowers in hanging racemes, and a winged capsule. Common in disturbed places and secondary forest, reported from sea level to 400 m elevation.

A Polynesian introduction, widespread from Africa to Hawai'i.

TA'U: Yuncker 9181; Whistler 7752.

Dioscorea pentaphylla L. pilita

Vine with alternate, palmately divided leaves and tiny flowers in hanging racemes. Uncommon in disturbed places and secondary forest, reported from near sea level to 350 m elevation.

A Polynesian introduction, widespread from tropical Asia to Hawai'i.

TA'U: Yuncker 9155; Whistler 1351, 7518, 7957.

HELICONIACEAE

Heliconia laurfao Kress laurfao

Banana-like plant with orange flowers borne in a large, thick, orange bract, and orange fruit. Uncommon in the lowland to montane forest, reported from near sea level to 750 m elevation.

Endemic.

TA'U: Whistler 7709.

ORCHIDACEAE

Agrostophyllum megalurum Reichenb. f.

Coarse epiphytic orchid with white flowers in a terminal raceme. Uncommon in lowland to montane forest, reported from 200 to 600 m elevation.

Indigenous, also found in Fiji.

TA'U: Yuncker 9246.

***Appendicula bracteosa* Reichenb. f.**

Small epiphytic orchid with small white flowers in a pendulous, terminal raceme. Occasional in lowland to montane forest, reported from 300 m to high elevation. Indigenous, also found in Fiji.

TA'U: Garber 714, 730; Yuncker 9267; Whistler 1397, 3170, 7804, 7951, 7999.

***Bulbophyllum betchei* F. Muell.**

Small, creeping, epiphytic orchid with bulbous leaf bases, small elliptic leaves, and tiny solitary, reddish flowers. Occasional in montane forest, reported from 400 to 750 m elevation.

Indigenous, ranging from New Caledonia to Samoa.

TA'U: Whistler 3727.

***Bulbophyllum longiscapum* Rolfe**

Epiphytic orchid with bulbous leaf bases, acute-tipped leaves, and a long scape bearing showy, greenish and maroon flowers. Occasional in coastal to montane forest, reported from near sea level to 500 m elevation.

Indigenous, ranging from the Solomon Islands to Tonga, Niue, Wallis, and Samoa.

TA'U: Yuncker 9076; Whistler 7997.

***Bulbophyllum pachyanthum* Schlechter**

Epiphytic orchid with bulbous leaf bases, thick, succulent leaves, and white flowers mottled red and borne on a long scape. Uncommon in lowland to montane forest, reported from 300 to 600 m elevation.

Indigenous, ranging from New Caledonia to Samoa.

TA'U: Yuncker 9250. The specimen is sterile and could possibly be something else.

***Bulbophyllum samoanum* Schlechter**

Small epiphytic orchid with bulbous leaf bases, elliptic leaves, and solitary, reddish flowers on a long scape. Occasional in lowland to montane forest, reported from 300 to 800 m elevation.

Indigenous, ranging from New Caledonia to Samoa.

TA'U: Yuncker 9153, 9249; Whistler 3736, 7984.

***Bulbophyllum savaiiense* Schlechter**

Tiny epiphytic orchid with bulbous leaf bases, elliptic leaves, and tiny white flowers on a filiform rachis. Uncommon in lowland to montane forest, reported from 300 to 600 m elevation.

Endemic.

TA'U: Yuncker 9272; Whistler 3735.

***Calanthe hololeuca* Reichenb. f.**

Medium-sized ground orchid with plicate leaves and showy white flowers in long racemes. Occasional in lowland to montane forest, reported from 300 m to high elevation.

Indigenous, ranging from New Caledonia to Tonga, the Horn Islands, and Samoa.

TA'U: Yuncker 9248; Whistler 1406, 3159, 7824, 8009.

***Calanthe triplicata* (Wille. f.) Ames**

Large ground orchid with plicate leaves and showy white flowers marked with yellow. Uncommon in lowland to montane forest, reported from 10 m to high elevation.

Indigenous, ranging from southern China to the Marquesas.

TA'U: Yuncker 9149.

***Coelogyne lycastoides* F. Muell. and Kraenzl.**

Large epiphytic orchid with bulbous leaf bases, large plicate leaves, and a few-flowered raceme bearing cream-colored flowers marked with brown. Occasional in lowland to montane forest, reported from 300 m to high elevation.

Indigenous, ranging from New Caledonia to Samoa.

TA'U: Whistler 1400.

***Cryptostylis arachnites* (Bl.) Hassk.**

Medium-sized ground orchid with a few-flowered raceme bearing long-tepaled flowers. Uncommon in montane forest, reported from 500 m to high elevation.

Indigenous, ranging from India to Fiji and Samoa.

TA'U: Whistler 3199, 3728.

***Dendrobium biflorum* (Forst. f.) Sw.**

Epiphytic orchid with stiff stems bearing grass-like leaves and white flowers with long-attenuate tepals. Common in lowland to montane forest, reported from near sea level to 600 m elevation.

Indigenous, ranging from Vanuatu to the Society Islands.

TA'U: Garber 575; Yuncker 9067; Whistler 1335, 7995.

***Dendrobium dactylodes* Reichenb. f.**

Epiphytic orchid with lanceolate leaves, and paired, axillary, pale orange to white flowers. Common to abundant in lowland to montane forest, reported from near sea level to ca. 800 m elevation.

Indigenous, ranging from Vanuatu to Samoa.

TA'U: Garber 557; Yuncker 9067 (n.s.); Whistler 3201, 7608, 7983.

Dendrobium glomeriflorum Kraenzl.

Small epiphytic orchid with thick, ridged stems bearing spaced leaves, and clusters of white or pink flowers usually borne on leafless stems. Uncommon in montane forest, reported from 350 to 500 m elevation.

Indigenous, ranging from Samoa to the Solomon Islands.
TA'U: Whistler 3183a, 7985.

Dendrobium samoense Cribb

Epiphytic orchid with thick leaves often with purple margins, and showy creme-colored flowers in a terminal raceme. Occasional in littoral to montane forest, reported from near sea level to 600 m elevation.

Endemic.

TA'U: Garber 619; Yuncker 9066.

Dendrobium sladei J. J. Wood & Cribb

Epiphytic orchid with thick leaves borne somewhat erect along the stem and showy cream-colored and maroon flowers. Uncommon in lowland to montane forest, reported from 150 to 550 m elevation.

Indigenous, ranging from Vanuatu to Samoa.

TA'U: Garber 655, 571; Yuncker 9160; Whistler 7998.

Didymoplexis micradenia (Reichenb. f.) Hemsley

Leafless ground orchid with purplish stems and 1 to several terminal, white flowers. Occasional in lowland to montane forest, reported from 10 to 450 m elevation.

Indigenous, ranging from New Caledonia to Niue.

TA'U: Whistler 3133.

Diplocaulobium fililobum (F. Muell.) Kraenzl.

Epiphytic orchid with long stems bearing a single terminal leaf, and whitish, solitary, long-pedicellate flowers bearing filiform tepals. Occasional in montane forest, reported from 400 m to high elevation.

Endemic.

TA'U: Yuncker 9264; Whistler 3161, 8002.

Epiblastus sciadanthus (F. Muell.) Schlechter

Epiphytic orchid with long, linear-lanceolate leaves and a cluster of pink flowers red inside. Uncommon in montane forest, reported from 600 m to high elevation.

Indigenous, also found in Vanuatu and Fiji.

TA'U: Whistler 3693, 7950.

Erythrodes oxyglossa Schlechter

Small ground orchid with ovate leaves, a pubescent rachis, and a terminal raceme of pubescent, yellowish flowers. Occasional in lowland to montane forest, reported from 300 m to high elevation.

Indigenous, ranging from New Caledonia to Tonga and Samoa.

TA'U: Whistler 7799, 8012.

Erythrodes parvula Kores

Small ground orchid with white flowers. Uncommon in lowland to montane forest, reported from 300 to 890 m elevation.

Indigenous, also found in Fiji and Tonga.

TA'U: Yuncker 9265; Whistler 3598, 3713.

Flickingeria comata (Bl.) A. Hawkes

Epiphytic orchid with large thick oval leaves and white flowers mottled red and bearing a yellow "beard". Occasional in lowland to montane forest, reported from sea level to 500 m elevation.

Indigenous, ranging from Taiwan to Samoa.

TA'U: Whistler 3162, 7994.

Glomera montana Reichenb. f.

Long-stemmed epiphytic orchid with a dense cluster of subsessile white flowers red inside. Occasional to common in lowland to montane forest, reported from 50 m to high elevation.

Endemic.

TA'U: Garber 748; Whistler 3182, 7852.

Habenaria vaupelii Schlechter

Large ground orchid with lanceolate leaves and a terminal raceme of greenish flowers. Uncommon in montane forest, reported from 500 to 800 m elevation.

Endemic.

TA'U: Whistler 3729.

Hetaeria oblongifolia Bl.

Small, erect, narrow ground orchid with small white flowers. Occasional in lowland to montane forest, reported from 250 to 500 m elevation.

Indigenous, ranging from the Philippines to Samoa, Tonga, and Niue.

TA'U: Whistler 3165.

Hetaeria whitmeei Reichenb. f.

Small ground orchid with pubescent, cream-colored flowers in a terminal raceme. Uncommon in lowland to montane forest, reported from 200 to 650 m.

Indigenous, ranging from New Caledonia to Tonga and Samoa.

TA'U: Whistler 3696.

Liparis condylobulbon Reichenb. f.

Medium-sized epiphytic orchid with stems swollen at the base and several racemes of small white flowers. Occasional to common in lowland to montane forest, reported from near sea level to 700 m elevation.

Indigenous, ranging from southeast Asia to Samoa.

TA'U: Cox 306; Whistler 7893.

Liparis mataanensis J. J. Sm.

Small ground orchid with ovate leaves and a raceme of small maroon flowers having attenuate tepals. Occasional in montane forest, reported from 500 m to high elevation.

Indigenous, also occurring in Fiji.

TA'U: Whistler 3192, 3695, 7830.

Malaxis resupinata (Forst. f.) Kuntze

Medium-sized ground orchid with ovate, plicate leaves and dark maroon flowers with a fringed, upper tepal. Occasional in lowland to montane forest, reported from 250 to 500 m elevation.

Indigenous, ranging from Vanuatu to the Society Islands.

TA'U: Whistler 7597, 7928, 7930.

Malaxis samoensis (Schlechter) Whistler

Small ground orchid with subfalcate leaves and a raceme of small cream-colored flowers having a fringed, upper tepal. Occasional in lowland to montane forest, reported from 300 to 800 m elevation.

Endemic.

TA'U: Garber 753; Yuncker 9266; Whistler 3193, 3730, 7731, 7929.

Malaxis sp.

Small epiphytic or ground orchid with ovate leaves and a terminal raceme of dark pink flowers. Uncommon in lowland to montane forest, reported from 300 to 800 m elevation.

Endemic?

TA'U: Garber 753; Whistler 1405, 3193b, 3711.

Moerenhoutia heteromorpha

(Reichenb. f.) Benth. & Hook. f.

Medium-sized ground orchid with elliptic leaves and a raceme of pubescent white flowers. Occasional in lowland to montane forest, reported from 300 to 750 m elevation.

Endemic.

TA'U: Whistler 3172, 3583, 8014.

Peristylus tradescantifolius (Reichenb. f.) Kores

Small erect ground orchid with lanceolate leaves and small greenish flowers in a terminal raceme. Occasional in lowland to montane forest, reported from 200 m to high elevation.

Indigenous, also found in Fiji and Tonga.

TA'U: Yuncker 9000a, 9150; Whistler 3163, 3745.

Phaius graeffei Reichenb. f.

Large ground orchid with plicate leaves and a long raceme of large, showy white flowers yellow inside. Occasional in lowland to montane forest, reported from 200 to 800 m elevation.

Indigenous, also found in Fiji.

TA'U: Cox 305; Whistler 3132.

Phaius tankarvilleae (Banks ex L'Her.) Bl.

Large ground orchid with plicate leaves and a tall raceme of large, purplish, brown, and white flowers. Occasional in lowland to montane forest, reported from 200 to 700 m elevation.

Indigenous but possibly a recent arrival, ranging from southern China to Samoa, and naturalized in Tahiti and Rarotonga.

TA'U: Yuncker 9261; Whistler 3185, 7807.

Phreatia micrantha (A. Rich.) Schlechter

Medium-sized, laterally compressed epiphytic orchid with several basal racemes of tiny white flowers. Common in lowland to montane forest, reported from near sea level to high elevation.

Indigenous, also found in Fiji and Tonga.

TA'U: Garber 745; Whistler 3160, 8003.

Phreatia neocaledonica Schlechter

Small, laterally compressed orchid with linear leaves 2—4 mm wide and several basal, short-pedunculate racemes bearing tiny white flowers. Common in lowland to montane forest, reported from near sea level to 800 m elevation.

Indigenous, ranging from New Caledonia to Samoa and Niue.

TA'U: Garber 629; Yuncker 9000; Whistler 3209, 7716, 7747.

Pseuderia ramosa L. O. Williams

Widely branching epiphytic orchid with greenish flowers. Occasional in lowland to montane forest, reported from 300 to 700 m elevation.

Indigenous, also found on Futuna.

TA'U: Garber 717; Yuncker 9251; Whistler 3183, 7988.

Spathoglottis plicata Bl.

Large ground orchid with plicate leaves and showy pink flowers on a long scape. Common in disturbed sunny places and fernlands, reported from 100 to 700 m elevation.

Indigenous, ranging from Vanuatu to Samoa.

TA'U: Garber 710, 712; Yuncker 9007, 9007a (n.s.); Whistler 7576.

Taeniophyllum sp.

Tiny leafless and stemless epiphytic orchid consisting of flattened, photosynthetic roots, short racemes of tiny white flowers, and an oblong fruit. Uncommon in lowland forest, reported from 150 m elevation above Fiti'uta.

Probably indigenous, range not known.

TA'U: Garber 641.

Thrixspermum graeffei Reichenb. f.

Small epiphytic orchid with numerous, long scapes bearing small white flowers marked with yellow. Occasional in montane forest, reported from 400 to 725 m elevation.

Indigenous, also found in Fiji.

TA'U: Yuncker 9271.

Vrydagzenea samoana Schlechter

Small ground orchid with small white flowers in a terminal raceme. Uncommon in montane forest, reported from 500 to 650 m elevation.

Indigenous, also found in Fiji.

TA'U: Garber 630.

Vrydagzenea vitiensis Reichenb. f.

Small ground orchid with ovate leaves bearing a silvery median strip, and small white flowers in a terminal raceme. Occasional in lowland to montane forest, reported from 175 to 700 m elevation.

Indigenous, also found in Vanuatu, Tonga, and Fiji.

TA'U: Yuncker 9269; Whistler 3553.

PANDANACEAE

Freycinetia reinecke Warb.

'ie'ie

Coarse climber with pandanus-like leaves 2.5—5 cm wide, unisexual inflorescences, ovaries with 2 stigmas, and large oblong, compound fruits 5.5—11 cm long with numerous tiny fruitlets up to 13 mm long. Common in lowland to montane forest, reported from 180 m to high elevation.

Endemic.

TA'U: Yuncker 9092; Whistler 3594, 7515, 7515a, 7628.

Freycinetia storckii Seem.

'ie'ie

Coarse climber with pandanus-like leaves 1.8—2.8 cm wide, unisexual inflorescences, ovaries with 4—6 stigmas, and a large cylindrical compound fruit 4—7 cm long and 1.5—2.3 cm wide. Common to abundant in lowland to montane forest, reported from near sea level to high elevation.

Indigenous, also occurring in Fiji.

TA'U: Garber 750; Whistler 3698, 7516. Also, probably young sterile individuals of Harris 65, 139, 210, 219, 351, and s.n.

Pandanus tectorius Parkinson [screwpine] fasa

Dioecious tree with prop roots, spinulose leaf margins and midrib, and compound fruits having keys variable in size and shape. Common on exposed shores, reported from near sea level to 100 m elevation.

Indigenous, widespread throughout the tropical Pacific.

TA'U: Garber 984, 662, 665; Whistler 3319, 3320, 3687, 3688.

POACEAE

Axonopus fissifolius (Raddi) Kuhl. [carpet grass]

Mostly prostrate, mat-forming grass with narrow inflorescences bearing 3 spikes (a terminal pair and a lower one). Common in lawns and sunny, disturbed places.

A modern introduction, native to tropical America.

TA'U: Whistler 3325, 7659.

Brachiaria mutica (Forssk.) [California grass]

Stapf

Large, soft-hairy grass with a branching inflorescence bearing awnless spikelets with conspicuous black stigmas. Uncommon, but locally abundant.

A modern introduction, probably native to northern Africa but now pantropic in distribution.

TA'U: Whistler 7880. Seen only near the microwave tower between Faleasao and Ta'u Village outside the park boundaries.

Brachiaria paspaloides (Presl) C. E. Hubb.

Erect, medium-sized grass with branching inflorescences of green, awnless spikelets. Occasional in disturbed places.

Probably a Polynesian introduction, native to somewhere in the Old World tropics.

TA'U: Whistler 1384, 3331a, 7654.

Brachiaria subquadrifera (Trin.) Hitchc.

Low grass with awnless, obvoid spikelets on several spreading branches of the rachis. Occasional in lawns and other disturbed places.

A modern introduction, native to somewhere in the Old World tropics.

TA'U: (not collected).

Cenchrus echinatus L. [sand bur] vao tuitui

Medium-sized grass with unbranched spikes of bur-like fruits with hard spines. Common in disturbed coastal areas.

A modern introduction, native to tropical America.

TA'U: Yuncker 9110; A. Harris 70 (n.s.); Harris 19, 307 (n.s.), 335; Whistler 7764.

Centosteca lappacea (L.) Desv. sefa

Erect grass with broad, slightly rippled leaves and tiny awnless spikelets in a spreading panicle. Common in shady disturbed places and along forest trails, reported from near sea level to 650 m elevation.

A Polynesian introduction, ranging from tropical Africa to the Marquesas.

TA'U: Garber 589; Yuncker 9100, 9135; Harris 120 (n.s.), 201, 213 (n.s.), 220 (n.s.); Whistler 7623, 7791.

Chloris barbata (L.) Sw. [swollen fingergrass]

Erect grass with digitately arranged panicle branches of awned, purplish spikelets. Common in dry, coastal areas.

A modern introduction, native to tropical America.

TA'U: Whistler 3600, 7696.

Chrysopogon aciculatus [golden beardgrass] (Retz.) Trin.

Low, mat-forming grass with awned, purplish spikelets borne on erect, scapose panicles. Common in lawns and in dry, sunny, disturbed places.

Probably a Polynesian introduction, native to the Old World tropics.

TA'U: Whistler 3324, 7634.

Coix lacryma-jobi L. [Job's tears] sagasaga

Tall, robust grass with large leaves and spikelets that form white to gray, beadlike fruits. Occasional to common in wet disturbed places.

A Polynesian introduction, native to Asia.

TA'U: Yuncker 9283; Whistler 1361, 3310, 7970. Reported only from the Ta'u Village area, and probably not found within the park boundaries because of lack of appropriate habitat.

Cynodon dactylon (L.) Pers. [Bermuda grass]

Prostrate, mat-forming grass with erect inflorescences usually bearing 4 digitately arranged, spicate branches. Common in lawns and sunny, disturbed places near the coast.

Probably an early modern introduction, possibly native to tropical Africa.

TA'U: Harris 336; Whistler 7907.

Cyrtococcum oxyphyllum Stapf

Medium-sized grass with awnless spikelets in a narrow panicle. Common in shady forest areas and disturbed places, reported from near sea level to 750 m elevation.

Indigenous or a Polynesian introduction, occurring from Malaysia to Niue.

TA'U: Harris 166; Whistler 1393, 7708.

Cyrtococcum trigonum (Retz.) A. Camus

Small grass similar to the above species, but with smaller leaves, shorter inflorescences, and hairy spikelets. Occasional in disturbed places.

A modern introduction, native to southeast Asia.

TA'U: Yuncker 9114; Harris 334 (n.s.); Whistler 7890.

Dactyloctenium aegyptium (L.) Willd. [beach wiregrass]

Low grass with a short inflorescence stalk bearing 1—5 thick, digitately arranged branches of purplish, bristly spikelets. Occasional in disturbed places, particularly in dry coastal areas.

A modern introduction, native to the Old World tropics.

TA'U: Whistler 3686, 7697.

Digitaria ciliaris (Retz.) Koel. [crab grass]

Medium-sized to tall grass with multiple whorls of digitately arranged panicle branches bearing awnless spikelets. Common in plantations and waste places.

A modern introduction, native to Asia.

TA'U: Whistler 3327, 7763.

Digitaria horizontalis Willd.

Erect grass with awnless spikelets in digitately arranged panicle branches bearing scattered hairs. Occasional in disturbed places.

A modern introduction, native to tropical America.

TA'U: Whistler 7651.

Digitaria radicata (Presl) Miq.

Small grass with awnless spikelets in 2—4 digitately arranged panicle branches. Occasional in disturbed places, especially in coastal areas. A specimen from

- Ta'u was identified as *D. nuda* Schum. (Veldcamp, pers. comm.), but appears indistinguishable from *D. radicata*. A Polynesian introduction, probably native to tropical Asia.
TA'U: Harris 30 (n.s.), 353 (n.s.), 317 (n.s.); Whistler 1314, 3326, 7870, 7953.
- Digitaria setigera* Roth ex Roemer & Schultes**
Medium-sized grass with paired spikelets on long branches arranged subdigitately and spreading little at maturity. Common along the coast and in sunny disturbed places.
A Polynesian introduction or indigenous, ranging from India to Hawai'i.
TA'U: Yuncker 9125; Harris 317; Whistler 1388, 7665.
- Echinochloa colona* (L.) Link** [jungle rice]
Erect grass with awnless spikelets closely packed on several short panicle branches. Common in sunny disturbed places and croplands.
A modern introduction, native to the Old World tropics.
TA'U: Whistler 1348, 3323, 7875.
- Eleusine indica* (L.) Gaertn.** [goose grass] ta'ata'a
Medium-sized grass with shortly awned spikelets in thick panicle branches (usually 2 or 3 of them terminal with one lower). Common in sunny disturbed places and roadsides.
A Polynesian introduction, native to the Old World tropics.
TA'U: Yuncker 9115, 9136; Harris 2, 251 (n.s.); A. Harris 72 (n.s.); Whistler 1311, 7755.
- Eragrostis tenella* (L.) Beauv.** [love grass]
ex Roemer & Schultes
Delicate grass with narrow panicle branches bearing tiny flattened spikelets. Common in lawns and in sunny, disturbed places.
A modern introduction, native to the Old World tropics.
TA'U: Yuncker 9169; Harris 3, 339 (n.s.); Whistler 1379, 7908.
- Eriochloa procera* (Retz.) C. E. Hubb.**
Narrow grass with a panicle of small, awnless spikelets having a conspicuous purple ring at the base. Occasional in disturbed places.
A modern introduction, native to the Old World tropics.
TA'U: Whistler 7587.
- Imperata conferta* (Presl) Ohwi**
Erect grass with a long, white, plumose panicle. Uncommon in disturbed areas.
Indigenous, perhaps a natural recent arrival, native to southeast Asia.
TA'U: Whistler 7892, 7909. Not reported from within the park boundaries.
- Ischaemum murinum* Forst. f.**
Small clump-forming grass with awned, yellowish spikelets in thick, paired spikes that do not separate at maturity. Uncommon on rocky coasts.
Indigenous, also found in Tonga and Niue.
TA'U: Whistler 3316, 7567, 7684.
- Lepturus repens* (Forst. f.) R. Br.**
Small grass with narrow leaves, and spikelets embedded in a long, narrow, jointed rachis. Common on rocky and sandy sea coasts.
Indigenous, ranging from Ceylon to Hawai'i.
TA'U: Whistler 1356, 7545.
- Miscanthus floridulus* (Labill.) Warb.**
Tall grass or reed with a large, plumose inflorescence having silky spikelets. Common in sunny places in the lowlands and on fernlands, reported from near sea level to 100 m.
Indigenous, ranging from Micronesia to eastern Polynesia.
TA'U: Garber 705; Whistler 7883.
- Oplismenus compositus* (L.) Beauv.**
Medium-sized grass with awned spikelets on several branches arising on the rachis. Common in disturbed shady places, reported from near sea level to high elevation.
Probably a Polynesian introduction, pantropic in distribution.
TA'U: Whistler 3224, 7590.
- Oplismenus hirtellus* (L.) Beauv.**
Small-leaved grass with awned spikelets in sessile clusters on the rachis. Occasional in sunny places and sometimes in native coastal forest, reported from near sea level to 250 m elevation.
A modern introduction, perhaps native from Australia to southeast Asia.
TA'U: Harris 374; Whistler 1402, 3565.

- Paspalum conjugatum** Bergius [t-grass] vao lima
 Creeping grass with flat, round spikelets on a pair of spreading, terminal inflorescence branches. Common to abundant in croplands, pastures, and sunny disturbed places.
 A modern introduction, native to tropical America.
 TA'U: Yuncker 9233; Harris 95, 354; Whistler 3306, 7531.
- Paspalum fimbriatum** Kunth [fimbriate paspalum]
 Medium-sized grass with several panicle branches bearing two rows of flattened spikelets with fringed margins. Occasional on roadsides and in disturbed places.
 A modern introduction, native to tropical America.
 TA'U: Whistler 7955. Seen only in Ta'u Village, and possibly not found within the park boundaries.
- Paspalum orbiculare** Forst. f.
 Medium-sized grass with the rachis bearing several spreading branches of flattened spikelets. Common in wet places, reported from near sea level to high elevation.
 Indigenous, widespread from southeast Asia to Hawai'i.
 TA'U: Whistler 1365, 1395, 3307, 7635, 7976.
- Paspalum setaceum** Michx.
 Grass with a solitary inflorescence branch on the apex of the rachis, and round, flattened spikelets. Occasional in disturbed places.
 A modern introduction, native to North America.
 TA'U: Whistler 7584.
- Paspalum urvillei** Steudel [Vasey grass]
 Tall grass with several long panicle branches bearing flattened, hairy, round spikelets. Uncommon in disturbed places.
 A modern introduction, native to tropical America.
 TA'U: Whistler 7578. Seen only near the small boat harbor at Si'ufaga (Ta'u Village), and probably not occurring within the park boundaries.
- Paspalum vaginatum** Sw.
 Clump-forming grass with the rachis bearing two terminal branches, but flowering infrequently. Common along estuaries and on rocky or sandy shores.
 Probably an early European introduction, pantropic in distribution.
 TA'U: Harris 73, 305; Whistler 1360, 7570.
- Setaria glauca** (L.) Beauv. [yellow foxtail]
 Small grass with a dense, yellow cylindrical inflorescence bearing spikelets subtended by basal bristles. Occasional in disturbed places.
 A modern introduction, native to the Old World tropics.
 TA'U: Whistler 3691, 7582. Seen only in Ta'u Village, and possibly not yet found within the park boundaries.
- Sorghum sudanense** (Piper) Stapf
 Tall, erect, annual grass with leaves spotted with purple, and large, brown, awned (or sometimes awnless) spikelets. Uncommon in disturbed places.
 A modern introduction, possibly native to the Mediterranean area.
 TA'U: Whistler 7579. Seen only in Si'ufaga, and probably not found within the park boundaries.
- Sporobolus diander** (Retz.) P. Beauv. [dropseed]
 Clumped grass with linear leaves and a narrow cylindrical panicle having short ascending branches bearing awnless spikelets from which the brown seeds drop. Common in lawns and disturbed places.
 A modern introduction, native to tropical America.
 TA'U: Whistler 3329, 7974.
- Stenotaphrum micranthum** (Desv.) C. E. Hubb.
 Medium-sized grass with lanceolate leaves and spikelets embedded in a thickened unjointed rachis. Uncommon on sandy shores.
 Indigenous, widespread from southeast Asia to the Society Islands.
 TA'U: Yuncker 9109; Whistler 7544.
- Thuarea involuta** (Forst. f.) Roemer & Schultes
 Prostrate grass with pubescent, lanceolate leaves and a fruit which at maturity is enclosed within the subtending bract. Occasional on sandy shores.
 Indigenous, widespread from southeast Asia to the Tuamotus.
 TA'U: Whistler 1324, 7546.
- Zoysia tenuifolia** Willd. ex Trin. [temple grass]
 Small, mat-forming grass with narrow, involute leaves and a short spike bearing tiny awnless spikelets. Commonly forming lawns in villages and becoming naturalized in coastal areas.
 A modern introduction, native to Asia.
 TA'U: Whistler 7535.

TACCACEAE

Tacca leontopetaloides (L.) Kuntze

masoa

Erect stemless herb with tall, deeply dissected basal leaves and green flowers and fruits borne atop a long, longitudinally grooved scape. Common in littoral to lowland forest, reported from near sea level to 200 m elevation.

A Polynesian introduction or possibly indigenous, ranging from India to Hawai'i.

TA'U: Garber 653; Yuncker 9027; Whistler 7780.

ZINGIBERACEAE

Geanthus cervuga (Seem.) Loes.

Tall ginger with red stems, alternate lanceolate leaves, and short flowering stalks bearing red bracts and orange

flowers. Uncommon in lowland to montane forest, reported from 250 to 800 m elevation.

TA'U: Whistler 7935.

Zingiber zerumbet (L.) J. E. Smith

'avapui

Medium-sized ginger with separate leafy and flowering stalks, the latter with red terminal bracts subtending fragrant white flowers. Occasional in secondary forest and plantations, reported from near sea level to 600 m elevation.

A Polynesian introduction, widespread from tropical Asia to Hawai'i.

TA'U: Garber 689; Whistler 1334, 1401, 7603.

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Endiandra elaeocarpa (LAURACEAE)	53	Flickingeria comata (ORCHIDACEAE)	68
Entada phaseoloides (FABACEAE)	50	Flueggea flexuosa (EUPHORBIACEAE)	48
Epiblastus sciadanthus (ORCHIDACEAE)	68	Freycinetia reineckeii (PANDANACEAE)	70
Epipremnum pinnatum (ARACEAE)	64	Freycinetia storckii (PANDANACEAE)	70
Eragrostis tenella (POACEAE)	72	Gahnia vitiensis (CYPERACEAE)	65
Erechtites valerianifolia (ASTERACEAE)	43	Garcinia myrtifolia (CLUSIACEAE)	46
Eriochloa procera (POACEAE)	72	Garuga floribunda (BURSERACEAE)	45
Erythrina variegata (FABACEAE)	50	Geanthus cervuga (ZINGIBERACEAE)	74
Erythrodes oxyglossa (ORCHIDACEAE)	68	Geniostoma rupestre (LOGANIACEAE)	53
Erythrodes parvula (ORCHIDACEAE)	68	Geophila repens (RUBIACEAE)	58
Euodia samoensis (RUTACEAE)	60	Glochidion ramiflorum (EUPHORBIACEAE)	48
Euphorbia cyathophora (EUPHORBIACEAE)	48	Glomera montana (ORCHIDACEAE)	68
Fagraea berteriana (LOGANIACEAE)	53	Grammitis conformis (POLYPODIACEAE)	37
Faradaya amicornum (VERBENACEAE)	63	Grammitis hookeri (POLYPODIACEAE)	37
Ficus godeffroyi (MORACEAE)	54	Grewia crenata (TILIACEAE)	61
Ficus obliqua (MORACEAE)	54	Guettarda speciosa (RUBIACEAE)	58
Ficus prolixa (MORACEAE)	54	Gynochtodes epiphytica (RUBIACEAE)	58
Ficus scabra (MORACEAE)	55	Habenaria vaupelii (ORCHIDACEAE)	68
Ficus tinctoria (MORACEAE)	55	Hedyotis biflora (RUBIACEAE)	58
Fimbristylis cymosa (CYPERACEAE)	65	Hedyotis foetida (RUBIACEAE)	58
Fimbristylis dichotoma (CYPERACEAE)	65	Heliconia laufao (HELICONIACEAE)	66
Flacourtia rukam (FLACOURTIACEAE)	52	Heliotropium procumbens (BORAGINACEAE)	44

Hemigraphis alternata (ACANTHACEAE)	41	Jasminum didymum (OLEACEAE)	56
Hernandia moerenhoutiana (HERNANDIACEAE)	52	Justicia procumbens (ACANTHACEAE)	41
Hernandia nymphæifolia (HERNANDIACEAE)	52	Kleinhovia hospita (STERCULIACEAE)	61
Hetaeria oblongifolia (ORCHIDACEAE)	68	Korthalsella horneanum (VISCACEAE)	63
Hetaeria whitmeei (ORCHIDACEAE)	68	Kyllinga brevifolia (CYPERACEAE)	65
Hibiscus abelmoschus (MALVACEAE)	53	Kyllinga nemoralis (CYPERACEAE)	65
Hibiscus tiliaceus (MALVACEAE)	53	Laportea interrupta (URTICACEAE)	62
Hoya australis (ASCLEPIADACEAE)	42	Lastreopsis davalloides (ASPIDIACEAE)	30
Hoya pottsii (ASCLEPIADACEAE)	43	Lepturus repens (POACEAE)	72
Hoya sp. (ASCLEPIADACEAE)	43	Leucaena leucocephala (FABACEAE)	51
Humata heterophylla (DAVALLIACEAE)	34	Leucas decemdentata (LAMIACEAE)	53
Humata polypodioides (DAVALLIACEAE)	34	Leucostegia pallida (DAVALLIACEAE)	34
Hymenophyllum imbricatum (HYMENOPHYLLACEAE)	34	Limnophila fragrans (SCROPHULARIACEAE)	60
Hymenophyllum polyanthos (HYMENOPHYLLACEAE)	34	Lindernia crustacea (SCROPHULARIACEAE)	60
Hypolepis aspidioides (HYPOLEPIDACEAE)	36	Lindsaea harveyi (LINDSAEACEAE)	36
Imperata conferta (POACEAE)	72	Lindsaea pacifica (LINDSAEACEAE)	36
Indigofera suffruticosa (FABACEAE)	51	Lindsaea pulchra (LINDSAEACEAE)	36
Inocarpus fagifer (FABACEAE)	51	Lindsaea repens (LINDSAEACEAE)	36
Ipomoea littoralis (CONVOLVULACEAE)	46	Liparis condylobulbon (ORCHIDACEAE)	69
Ipomoea macrantha (CONVOLVULACEAE)	46	Liparis mataanensis (ORCHIDACEAE)	69
Ipomoea pes-caprae (CONVOLVULACEAE)	46	Lomagramma cordipinna (LOMARIOPSIDACEAE)	36
Ischaemum murinum (POACEAE)	72	Ludwigia hyssopifolia (ONAGRACEAE)	56

Ludwigia octovalvis (ONAGRACEAE)	56	Mauotia australis (URTICACEAE)	62
Luffa cylindrica (CUCURBITACEAE)	47	Medinilla samoensis (MELASTOMACEAE)	54
Lunathyrium japonicum (ATHYRIACEAE)	33	Medusanthera samoensis (ICACINACEAE)	52
Lycopodium carinatum (LYCOPODIACEAE)	40	Melastoma denticulatum (MELASTOMACEAE)	54
Lycopodium cernuum (LYCOPODIACEAE)	40	Melicytus samoensis (VIOLACEAE)	63
Lycopodium phlegmaria (LYCOPODIACEAE)	40	Melochia aristata (STERCULIACEAE)	61
Lycopodium squarrosum (LYCOPODIACEAE)	40	Merremia peltata (CONVOLVULACEAE)	46
Macaranga harveyana (EUPHORBIACEAE)	49	Meryta macrophylla (ARALIACEAE)	42
Macaranga stipulosa (EUPHORBIACEAE)	49	Microlepidia speluncae (DENNSTAEDTIACEAE)	34
Macropiper puberulum (PIPERACEAE)	57	Micromelum minutum (RUTACEAE)	60
Macropiper timothianum (PIPERACEAE)	57	Microsorium sylvaticum (POLYPODIACEAE)	37
Macrothelypteris polypodioides (THELYPTERIDACEAE)	38	Mikania micrantha (ASTERACEAE)	43
Macrothelypteris torresiana (THELYPTERIDACEAE)	39	Mimosa pudica (FABACEAE)	51
Maesa tabacifolia (MYRSINACEAE)	55	Miscanthus floridulus (POACEAE)	72
Malaxis resupinata (ORCHIDACEAE)	69	Moerenhoutia heteromorpha (ORCHIDACEAE)	69
Malaxis samoensis (ORCHIDACEAE)	69	Morinda citrifolia (RUBIACEAE)	58
Malaxis sp. (ORCHIDACEAE)	69	Morinda myrtifolia (RUBIACEAE)	59
Mapania macrocephala (CYPERACEAE)	65	Mucuna gigantea (FABACEAE)	51
Mariscus cyperinus (CYPERACEAE)	65	Mucuna glabra (FABACEAE)	51
Mariscus javanicus (CYPERACEAE)	65	Mussaenda raiateensis (RUBIACEAE)	59
Mariscus seemannianus (CYPERACEAE)	65	Myristica fatua (MYRISTICACEAE)	55
Mariscus sumatrensis (CYPERACEAE)	66	Neonauclea forsteri (RUBIACEAE)	59

Nephrolepis biserrata (DAVALLIACEAE)	34	Peperomia reineckei (PIPERACEAE)	57
Nephrolepis hirsutula (DAVALLIACEAE)	34	Peperomia tutuilana (PIPERACEAE)	57
Oleandra neriiformis (DAVALLIACEAE)	34	Peristylus tradescantifolius (ORCHIDACEAE)	69
Omalanthus nutans (EUPHORBIACEAE)	49	Phaius graeffei (ORCHIDACEAE)	69
Operculina turpethum (CONVOLVULACEAE)	46	Phaius tankarvilleae (ORCHIDACEAE)	69
Ophioglossum pendulum (OPHIOGLOSSACEAE)	37	Phaleria disperma (THYMELAEACEAE)	61
Ophioglossum reticulatum (OPHIOGLOSSACEAE)	37	Phreatia micrantha (ORCHIDACEAE)	69
Oplismenus compositus (POACEAE)	72	Phreatia neocaledonica (ORCHIDACEAE)	69
Oplismenus hirtellus (POACEAE)	72	Phyllanthus amarus (EUPHORBIACEAE)	49
Oxalis barrelieri (OXALIDACEAE)	56	Phyllanthus urinaria (EUPHORBIACEAE)	49
Oxalis corniculata (OXALIDACEAE)	56	Phyllanthus virgatus (EUPHORBIACEAE)	49
Palaquium stehlinii (SAPOTACEAE)	60	Phymatosorus nigrescens (POLYPODIACEAE)	37
Pandanus tectorius (PANDANACEAE)	70	Phymatosorus scolopendria (POLYPODIACEAE)	37
Paspalum conjugatum (POACEAE)	73	Physalis angulata (SOLANACEAE)	60
Paspalum fimbriatum (POACEAE)	73	Pilea microphylla (URTICACEAE)	62
Paspalum orbiculare (POACEAE)	73	Piper graeffei (PIPERACEAE)	57
Paspalum setaceum (POACEAE)	73	Pipturus argenteus (URTICACEAE)	62
Paspalum urvillei (POACEAE)	73	Pisonia grandis (NYCTAGINACEAE)	56
Paspalum vaginatum (POACEAE)	73	Pisonia umbellifera (NYCTAGINACEAE)	56
Passiflora foetida (PASSIFLORACEAE)	57	Pityrogramma brackenridgei (ADIANTIACEAE)	29
Peperomia leptostachya (PIPERACEAE)	57	Planchonella garberi (SAPOTACEAE)	60
Peperomia pellucida (PIPERACEAE)	57	Pneumatopteris glandulifera (THELYPTERIDACEAE)	39

Pneumatopteris magnifica (THELYPTERIDACEAE)	39	Pteris tripartita (ADIANTACEAE)	30
Pneumatopteris sp. (THELYPTERIDACEAE)	39	Pteris vaupelii (ADIANTACEAE)	30
Polygala paniculata (POLYGALACEAE)	57	Pueraria lobata (FABACEAE)	51
Polypodium sp. (POLYPODIACEAE)	38	Pycneus polystachyos (CYPERACEAE)	66
Polyscias samoensis (ARALIACEAE)	42	Pyrrosia adnascens (POLYPODIACEAE)	38
Polystichum aculeatum (ASPIDIACEAE)	30	Reynoldsia lanutoensis (ARALIACEAE)	42
Pometia pinnata (SAPINDACEAE)	60	Rhus taitensis (ANACARDIACEAE)	41
Portulaca lutea (PORTULACACEAE)	57	Rhynchospora corymbosa (CYPERACEAE)	66
Portulaca oleracea (PORTULACACEAE)	57	Rorippa sarmentosa (BRASSICACEAE)	45
Portulaca quadrifida (PORTULACACEAE)	58	Rouria minor (CONNARACEAE)	46
Portulaca samoensis (PORTULACACEAE)	58	Ruellia prostrata (ACANTHACEAE)	41
Premna serratifolia (VERBENACEAE)	63	Ruellia tuberosa (ACANTHACEAE)	41
Procris pedunculata (URTICACEAE)	62	Sarcopygme pacifica (RUBIACEAE)	59
Pseudelephantopus spicatus (ASTERACEAE)	44	Scaevola taccada (GOODENIACEAE)	52
Pseuderia ramosa (ORCHIDACEAE)	69	Schizaea dichotoma (SCHIZAEACEAE)	38
Psidium guajava (MYRTACEAE)	55	Scleria lithosperma (CYPERACEAE)	66
Psilotum complanatum (PSILOTACEAE)	40	Scleria polycarpa (CYPERACEAE)	66
Psychotria garberiana (RUBIACEAE)	59	Scleria terrestris (CYPERACEAE)	66
Psychotria insularum (RUBIACEAE)	59	Selaginella laxa (SELAGINELLACEAE)	40
Pteris comans (ADIANTACEAE)	30	Selaginella whitmeei (SELAGINELLACEAE)	40
Pteris ensiformis (ADIANTACEAE)	30	Senna tora (FABACEAE)	51
Pteris pacifica (ADIANTACEAE)	30	Sesuvium portulacastrum (AIZOACEAE)	41

<i>Setaria glauca</i> (POACEAE)	73	<i>Syzygium inophylloides</i> (MYRTACEAE)	55
<i>Sida rhombifolia</i> (MALVACEAE)	53	<i>Syzygium samarangense</i> (MYRTACEAE)	56
<i>Sida samoensis</i> (MALVACEAE)	53	<i>Syzygium samoense</i> (MYRTACEAE)	56
<i>Sigesbeckia orientalis</i> (ASTERACEAE)	44	<i>Tacca leontopetaloides</i> (TACCACEAE)	74
<i>Solanum americanum</i> (SOLANACEAE)	60	<i>Taeniophyllum</i> sp. (ORCHIDACEAE)	70
<i>Sorghum sudanense</i> (POACEAE)	73	<i>Tarenna sambucina</i> (RUBIACEAE)	59
<i>Spathoglottis plicata</i> (ORCHIDACEAE)	70	<i>Tectaria chrysotricha</i> (ASPIDIACEAE)	30
<i>Spermacoce assurgens</i> (RUBIACEAE)	59	<i>Tectaria decurrens</i> (ASPIDIACEAE)	31
<i>Sphaerostephanos invisus</i> (THELYPTERIDACEAE)	39	<i>Tectaria setchellii</i> (ASPIDIACEAE)	31
<i>Sphaerostephanos reineckei</i> (THELYPTERIDACEAE)	39	<i>Tectaria stearnsii</i> (ASPIDIACEAE)	31
<i>Sphenomeris chinensis</i> (LINDSAEACEAE)	36	<i>Tephrosia purpurea</i> (FABACEAE)	51
<i>Sporobolus diander</i> (POACEAE)	73	<i>Terminalia catappa</i> (COMBRETACEAE)	46
<i>Stachytarpheta jamaicensis</i> (VERBENACEAE)	63	<i>Terminalia richii</i> (COMBRETACEAE)	46
<i>Stachytarpheta urticifolia</i> (VERBENACEAE)	63	<i>Thespesia populnea</i> (MALVACEAE)	53
<i>Stenotaphrum micranthum</i> (POACEAE)	73	<i>Thrixspermum graeffei</i> (ORCHIDACEAE)	70
<i>Sterculia fanaiho</i> (STERCULIACEAE)	61	<i>Thuarea involuta</i> (POACEAE)	73
<i>Stictocardia tiliifolia</i> (CONVOLVULACEAE)	46	<i>Torulinium odoratum</i> (CYPERACEAE)	66
<i>Streblus anthropophagorum</i> (MORACEAE)	55	<i>Tournefortia argentea</i> (BORAGINACEAE)	44
<i>Synedrella nodiflora</i> (ASTERACEAE)	44	<i>Trema cannabina</i> (ULMACEAE)	61
<i>Syzygium carolinense</i> (MYRTACEAE)	55	<i>Trichomanes apiifolium</i> (HYMENOPHYLLACEAE)	34
<i>Syzygium clusiifolium</i> (MYRTACEAE)	55	<i>Trichomanes asa-grayi</i> (HYMENOPHYLLACEAE)	35
<i>Syzygium dealatum</i> (MYRTACEAE)	55	<i>Trichomanes assimile</i> (HYMENOPHYLLACEAE)	35

Trichomanes bipunctatum (HYMENOPHYLLACEAE)	35	Vernonia cinerea (ASTERACEAE)	44
Trichomanes boryanum (HYMENOPHYLLACEAE)	35	Vigna marina (FABACEAE)	51
Trichomanes dentatum (HYMENOPHYLLACEAE)	35	Vitex trifolia (VERBENACEAE)	63
Trichomanes endlicherianum (HYMENOPHYLLACEAE)	35	Vittaria elongata (VITTARIACEAE)	39
Trichomanes humile (HYMENOPHYLLACEAE)	35	Vittaria scolopendrina (VITTARIACEAE)	39
Trichomanes intermedium (HYMENOPHYLLACEAE)	35	Vrydagzenea samoana (ORCHIDACEAE)	70
Trichomanes saxifragoides (HYMENOPHYLLACEAE)	35	Vrydagzenea vitiensis (ORCHIDACEAE)	70
Trichospermum richii (TILIACEAE)	61	Weinmannia affinis (CUNONIACEAE)	47
Tridax procumbens (ASTERACEAE)	44	Wollastonia biflora (ASTERACEAE)	44
Triumfetta procumbens (TILIACEAE)	61	Zehneria grayana (CUCURBITACEAE)	47
Triumfetta rhomboidea (TILIACEAE)	61	Zehneria samoensis (CUCURBITACEAE)	47
Uraria lagopodoides (FABACEAE)	51	Zephrynathes rosea (AMARYLLIDACEAE)	64
Urena lobata (MALVACEAE)	53	Zingiber zerumbet (ZINGIBERACEAE)	74
Vaginularia angustissima (VITTARIACEAE)	39	Zoysia tenuifolia (POACEAE)	74

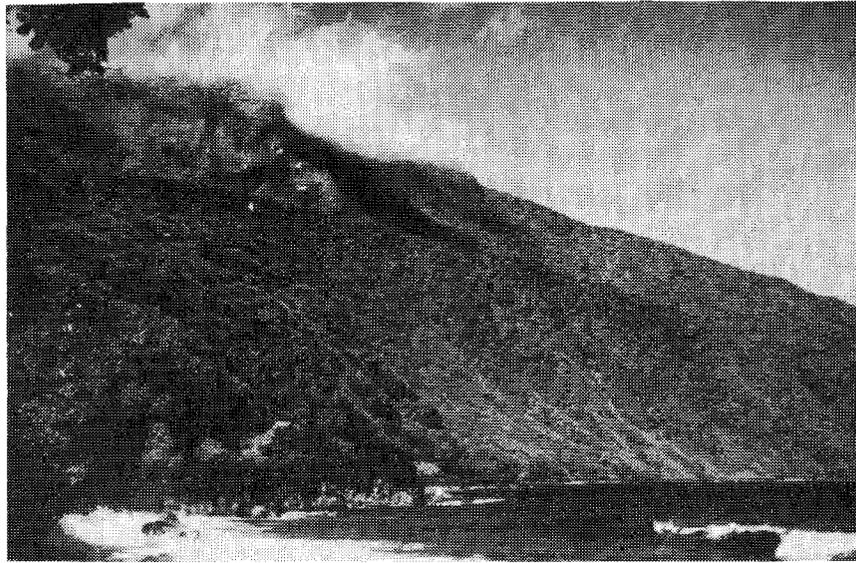


Figure 1. South Ta'u coast viewed from the southwest corner.



Figure 2. South Ta'u coast viewed from the southeast corner.

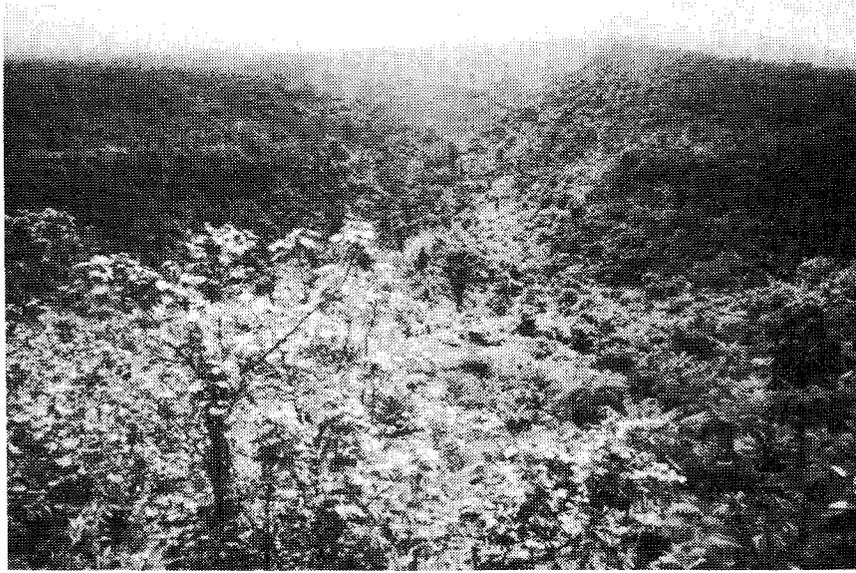


Figure 3. Laufuti terrace with spectacular Laufuti Canyon on the coast.



Figure 4. Luatele Crater at the northeast corner of the park.



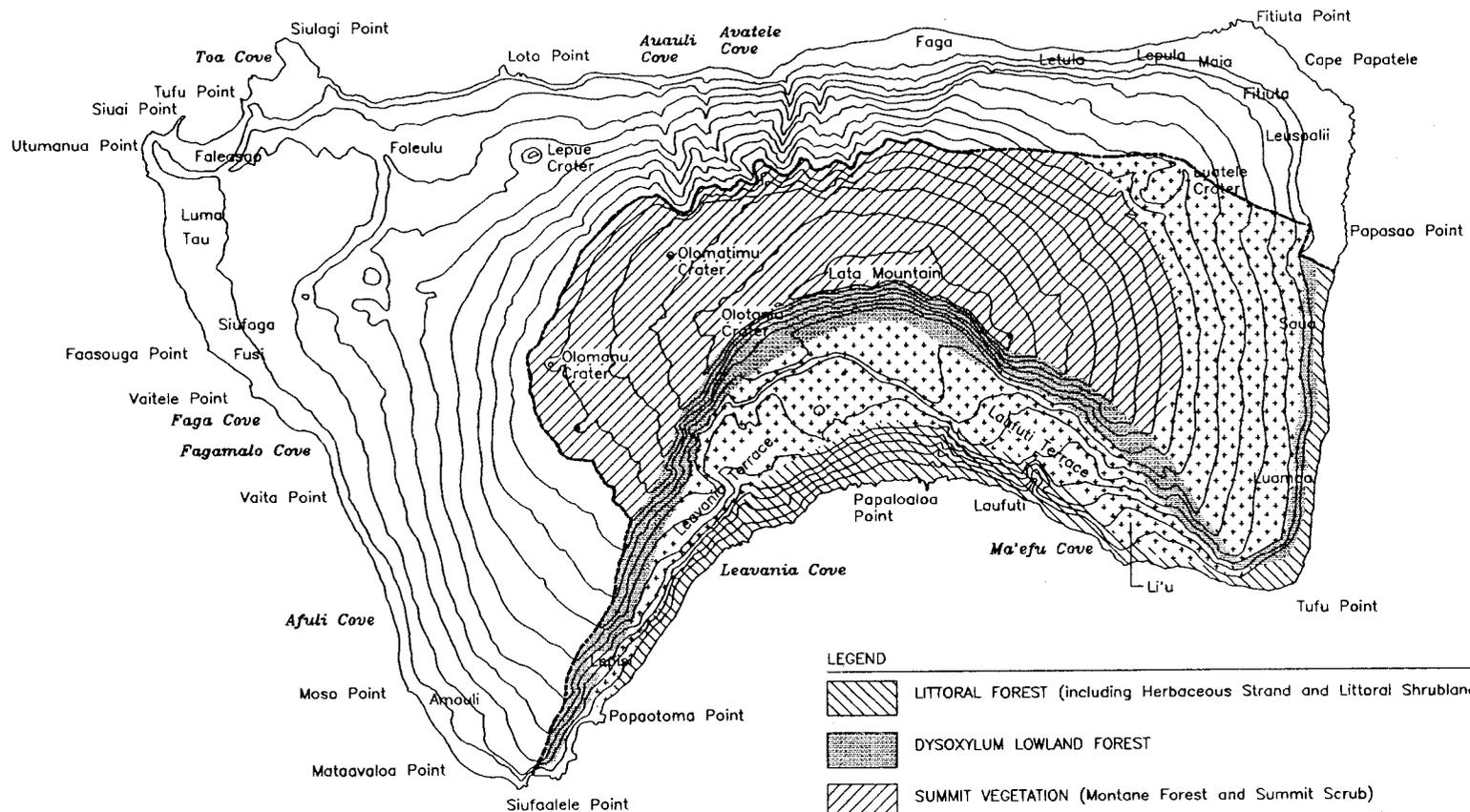
Figure 5. Volcanic cones east of Mt. Lata.



Figure 6. Majestic marine cliffs on the southeast corner of the island.

Figure 7
VEGETATION MAP
TA'U UNIT, MANU'A ISLANDS
NATIONAL PARK OF AMERICAN SAMOA

0 2000 4000 6000
 FEET
 Contour interval 200 feet



LEGEND

-  LITTORAL FOREST (including Herbaceous Strand and Littoral Shrubland)
-  DYSOXYLUM LOWLAND FOREST
-  SUMMIT VEGETATION (Montane Forest and Summit Scrub)
-  SECONDARY FOREST (and Scrub)
-  Proposed Park Unit Boundary

(Revised per 1991 Whistler fieldwork)
 PAAR/3-10-92/NASAR001.DWG



Figure 8. Coastal lava flow at the southwest corner of the island.

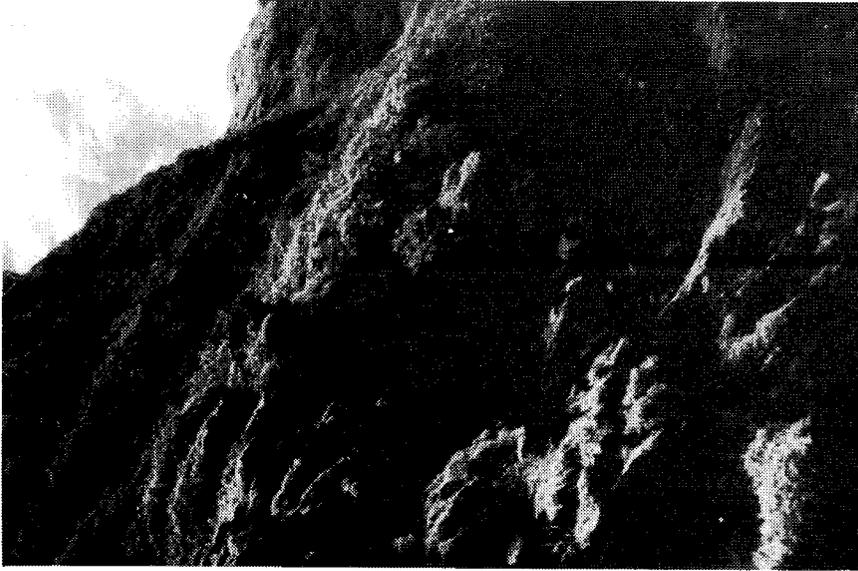


Figure 9. Cliffs at the southwest corner of the island.



Figure 10. Road through littoral forest on the east coast.



Figure 11. Coral-rubble beach on the east coast of the island.



Figure 12. Sandy beach on the northwest coast of the island (outside the park boundaries).



Figure 13. Talus slope covered with *Wollastonia biflora* at southeast corner of the island.

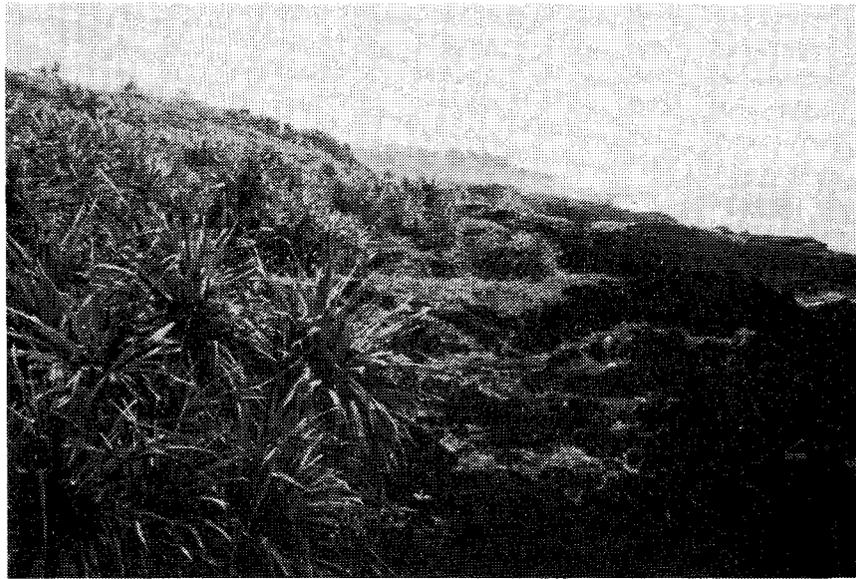


Figure 14. *Pandanus* thickets at north end of the east coast (outside the park boundaries).



Figure 15. *Barringtonia* littoral forest on the east coast of the island.



Figure 16. *Dysoxylum* lowland forest on the east coast of the island.

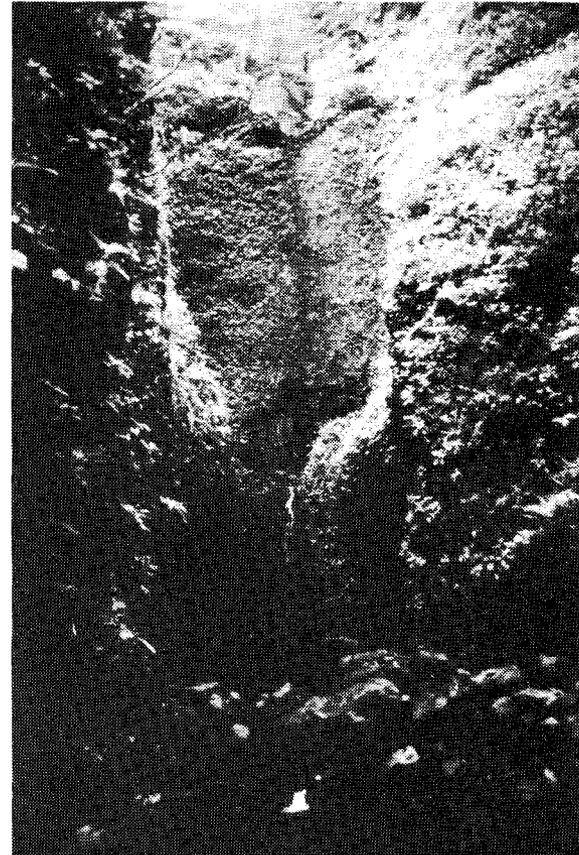


Figure 17. Laufuti Canyon with disclimax vegetation on the steep walls.



Figure 18. Storm damaged *Syzygium inophylloides* trees in lowland forest above Fale'ulu.

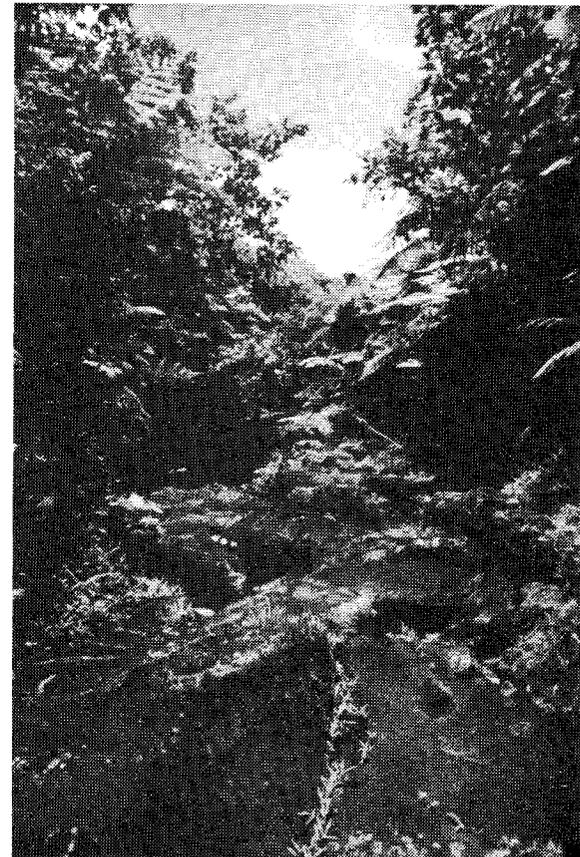


Figure 19. Streambed vegetation above Laufuti Falls at 300 m elevation.

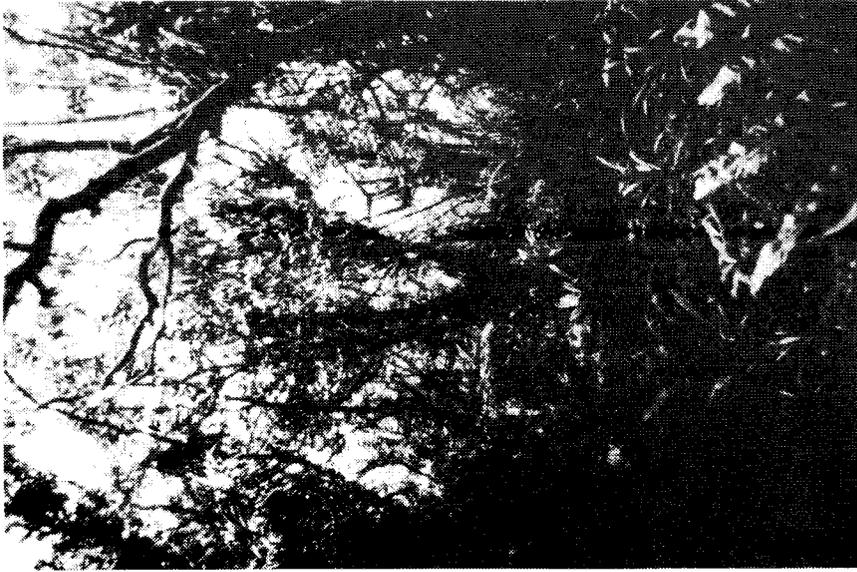


Figure 20. Montane forest on the west side of the park.



Figure 21. Ground cover in montane forest on west side of the park.



Figure 22. Summit scrub east of Mt. Lata, showing scattered trees.



Figure 24. Secondary forest on the south side of the island
near Li'u.

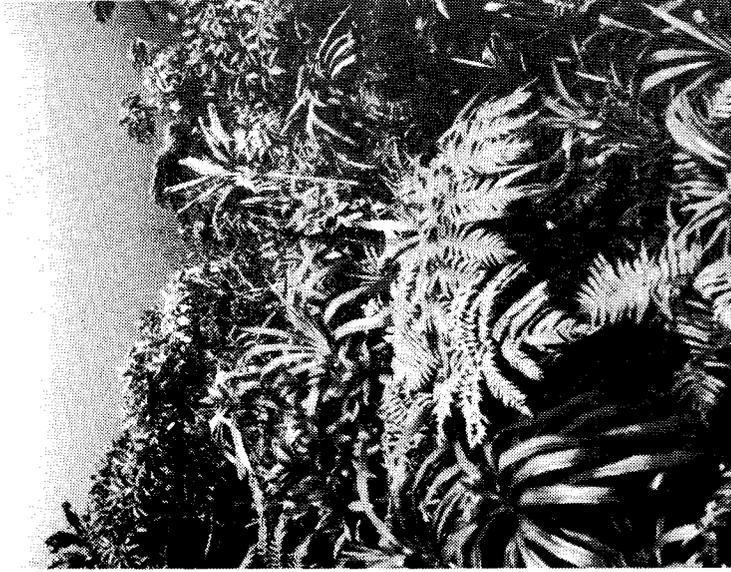


Figure 23. Summit scrub west of Mt. Lata.