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HALEAKALA NATIONAL PARK CRATER DISTRICT RESOURCES BASIC INVENTORY

38. CONIFERS AND FLOWERING PLANTS

by L. Stemmermann, P. K. Higashino, and C. W. Smith

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July 1981

UNIVERSITY OF HAWAII AT MANOA

NATIONAL PARK SERVICE Contract No. CX 8000 7 0003

Contribution Numbers CPSU/UH 011/21
011/22

HALEAKALA NATIONAL PARK CRATER DISTRICT RESOURCES BASIC INVENTORY: CONIFERS AND FLOWERING PLANTS

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ABSTRACT

This report lists all the conifers and flowering plants occurring in the Crater District of Haleakala National Park. Two hundred and five species and varieties were recorded of which 120 are endemic, 11 are indigenous, and 119 are exotic. Thirty-eight of the species are unique to Haleakalā Crater and its environs. At least six species previously found in the area are now absent; three of the six species are now extinct. There are 15 weed species in the area which are potentially serious pests; five of the species are on the State of Hawaii list of noxious weeds. Four resource management recommendations are made to promote the survival of the native flora.

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RECOMMENDATIONS

The Crater District of Haleakala National Park is one of the few easily accessible examples of a tropical alpine ecosystem in the United States. Thirty-eight taxa, of which 23 are varieties of plants found elsewhere, are unique to the Crater or its immediate environs (Table 1). The area is, therefore, a significant biological resource which must be protected from further degradation. With the above in mind the following recommendations are made:

1. The most significant management action that can be taken is the immediate and permanent elimination of all feral herbivores from the area. Apart from the direct damage to plants by consumption, the physical disturbance of the environment, and the degradation of the water cycle, feral herbivores (especially goats and pigs) are the major factor in the introduction and establishment of exotic species. They further interfere with the natural processes of succession and indirectly affect the destiny of the total native biota in the area. Species driven to extinction cannot be replaced. It is essential that a public agency whose major charge is the preservation of the natural environment carry out that responsibility. The longer these feral herbivores remain in the area, the greater the probability that more unique endemic species will become extinct.

2. If the following possibly extinct species are found, they should be propagated:

Argyroxiphium virescens var. *virescens*
Clermontia haleakalensis
Tetramolopium arbusculum

3. The following species should be considered for reintroduction into the Park in the areas indicated:

Pu'unianiau	*Argyroxiphium virescens* var. *virescens* *Clermontia haleakalensis* *Phytolacca sandwicensis* var. *puberulenta* *Stenogyne haliakalae* *Tetramolopium arbusculum*
East Kaupō Gap in damp, protected areas below 5000 feet	*Hillebrandia sandwicensis*

4. The following species should be controlled or continue to be controlled. This list does not include species that are widespread and probably beyond control:

Cirsium vulgare	
Eucalyptus spp.	particularly in areas other than those planted by Hosmer
*Eupatorium adenophorum	
*Eupatorium riparium	
*Lantana camara	
Pennisetum clandestinum	
Pinus spp.	particularly in areas other than those planted by Hosmer
Ricinus communis	
*Rubus penetrans	
Rubus rosaefolius	
Schinus terebinthifolius	
*Ulex europaeus	

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* Species on the State of Hawaii list of noxious weeds.

INTRODUCTION

Cook, in his voyage to Hawai'i in 1778, did not visit Maui; therefore, neither he nor any of his crew ascended Haleakalā to collect the vegetation of the mountain. Although many of the early explorers visited West Maui, with occasional botanical collections being made in the mountains behind Lahaina, no ascents of Haleakalā were made by foreign travellers until 1828, when a missionary team climbed the mountain. The first of the early naturalists to visit Haleakalā were Messrs. Brackenridge, Drayton, and Pickering of the U. S. Exploring Expedition (USEE) under the command of Captain Charles Wilkes. They spent several days on an excursion to the summit of Haleakalā in February 1841, and descended into the Crater proper, prior to returning to Waikau. They made observations on the geological formations of the Crater and commented that its floor was "entirely bare of vegetation." Even at that time they reported the presence of goats, bullocks, and dogs, so no observations of the vegetation of the Crater were ever recorded by visiting naturalists prior to the establishment of feral mammals in the area.

Only a few plants were noted in the narrative of the Expedition*, including "two species of Pelargonium [Geranium], one with dark crimson, the other with lilac flowers; the Argyroziphium (sic) began to disappear as they ascended, and its place was taken up by the silky species, which is only found at high altitudes. From the cave to the summit they found shrubby plants, consisting of Epacaris [Styphelia], Vaccinium, Edwardsia [Sophora], Compositae, and various rubiaceous plants." They made note also of some sandalwood bushes.

Brackenridge, himself, described a few taxa from this excursion including Amauropelta globulifera (Brack.) Holttum, and Polystichum haleakalensis Brack. Several of the USEE collections were examined and described by A. Gray including, among others, Artemisia mauiense (Gray) Skottsberg, Geranium arboreum Gray, Plantago pachyphylla Gray, Raillardia (sic) menziesii Gray, Stenogyne crenata Gray, and S. rotundifolia Gray. Other collections of the USEE were described by later authors, especially by Hillebrand who had examined Gray's unpublished manuscript on the USEE collections.

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* The narrative of the United States Exploring Expedition was written by Wilkes (1845) who did not ascend the mountain. Apparently this excerpt was taken from the journals of Brackenridge or Pickering. The parentheses and brackets are the present authors.

Subsequent to the Wilkes expedition many noted botanists have visited Haleakalā and have made collections of the vegetation in the area. Included in the list of botanists, with dates of some of their visits taken from dates on herbarium specimens made during visits to the Crater, are the following:

W. Hillebrand	date not known
W. T. Brigham, T. Anderson, and R. Hosmer	1909
H. L. Lyon	1909
J. F. Rock	1910, 1911, 1918
C. N. Forbes	1910, 1919, 1920
A. S. Hitchcock	1916
G. C. Munro	1918, 1928
C. Skottsberg	1922
E. L. Caum	1922
O. Degener (with others, including, at times, A. Greenwell, W. Flemming, Hatheway, Salucop, Ordonez, and I. Degener)	1927, 1939, 1948, 1950, 1954, 1959
D. D. Keck	1933
F. R. Fosberg	1933, 1936
H. St. John	1936, 1945
E. Y. Hosaka	1937
L. Cranwell, O. Selling, and C. Skottsberg (Hawaiian Bog Survey)	1938
G. Webster and R. L. Wilber	1948
A. Chock	1951
S. Carlquist	1953, 1966
S. Sohmer	1969
R. Vogel and J. Hendrickson	1969
D. Herbst	1970
Present study, RBI	1975, 1976, 1977

Although this cannot be considered an exhaustive list, it does indicate the attention the Crater's flora has received in the last century. Several research projects have occurred adjacent to the Park and within the Kīpahulu section of the Park, including S. Forehand's (1970) study of the Kalapawili grasslands; two NSF-Student originated projects--the Upper Hāna Rain Forest Project, 1973 (Yoshinaga, in prep.) and the Manawainui Project, 1976 (Peterson 1976); and The Nature Conservancy-sponsored study of Kīpahulu Valley, 1967 (Warner 1967).

RESULTS

The following Provisional List of the Conifers and Flowering Plants of the Crater District of Haleakala National Park (Appendix I) was compiled as the result of observations made during approximately 30 field days in the Park by the authors and numerous other collectors working as part of the Resources Basic Inventory (RBI) program during the summers of 1975, 1976, and 1977. Collections were made of most of the listed taxa which have been incorporated in the herbaria of Haleakala National Park, the University of Hawaii (HAW), and the B. P. Bishop Museum (BISH), Honolulu. The taxonomy follows that of St. John (1973); Hawaiian names are from Porter (1972) and St. John (1973). The rare or endangered status of the species was checked in Fosberg and Herbst (1975), and U. S. Fish and Wildlife Service (USFWS) (Anon. 1976, 1980). The List includes only those taxa noted within the Crater District of the Park during the RBI investigations. For each, the following information is provided:

1. Name (in regular type). As accepted in St. John (1973) or in subsequent publications.

2. Status. Endemic species are those restricted to one or more of the Hawaiian Islands. Indigenous species (varieties, etc.) are native to Hawai'i but are also found outside of the Hawaiian Islands.

3. Comments. These may be of a general distributional, ecological, morphological, or historical nature and are self-explanatory. Generalized distribution in the Hawaiian Islands of all species is also given.

For each species and variety, a map showing distribution within the Crater District is provided in Appendix II. Previous records have been included when they were clearly identified as having been collected within the Crater. Unfortunately, most of the earlier collections were simply labeled "Haleakala" without any further information. The List does not include taxa presently known only from Kipahulu, the Upper Hāna Rain Forest, Waikau, or Ke'anae (Ko'olau) Gap outside the 1979 boundaries of the Park.

This List has undoubtedly overlooked the occurrence of some plants in the Park, as will become evident as it is used. Records of forestry plantings in the Park made by Hosmer and others include many species of conifers and eucalypts. Many of the plantings did not survive but a few have been shown to invade areas where they were not planted. The U. S. Forest Service irregularly monitors the growth of those plantings. This survey has not thoroughly investigated any of the areas that clearly have been planted such as the forestry plantations at 8500 feet, at Hosmer Grove, or at the garden areas near the living quarters of Park personnel. Species that have escaped into the Park are recorded.

The Abundance Ratings of species naturalized throughout Haleakala National Park are as follows:

DOMINANT	The characteristic species of a widespread vegetation type; occurring in large numbers with greater than 75% cover
ABUNDANT	Occurring locally in large numbers with greater than 75% cover, but not a characteristic species of a widespread vegetation type
COMMON	Of widespread occurrence in the Park with up to 75% cover in some areas
OCCASIONAL	Occurring throughout the Park in many vegetation types but with less than 25% cover
UNCOMMON	Occurring in low numbers in several areas, or with several individuals in only one or two localities
RARE	Restricted in distribution within the Park to only one or two localities, and occurring there in low numbers

No attempt has been made to interpret the distribution of species into communities, etc., in this report as this analysis was incorporated into the supporting documentation of Whiteaker's (1980) vegetation map of the Crater District.

The plants of Haleakalā Crater and its immediate environs are well known. For example, to most people silverswords are almost synonymous with Haleakalā. In fact, 38 taxa are unique to the area (Table 1); 17 have been proposed for endangered status on the Federal Register List (Table 1; Anon. 1976); and Fosberg and Herbst (Table 1; 1975) consider a further six species need protection.

Forty-six percent of the species in the Crater District are exotic (Table 2). This percentage is probably low because it includes 12 of 45 unverified species recorded by Mitchell (1945) but not seen during the RBI. If Mitchell's unverified species were to be excluded from the overall figures, the percentage of exotic species would increase to 51.

Several of the species listed by Mitchell were undoubtedly present, having been recorded by previous workers including Degener (1933-present) and Rock (1913). Those species are:

* *Argyroxiphium virescens* var. *virescens*	Greensword
* *Clermontia haleakalensis*	Haleakala clermontia
Hillebrandia sandwicensis	Pua-maka-nui
Phytolacca sandwicensis var. *puberulenta*	Pōpolo-ku-mai
Stenogyne haliakalae	Haleakala stenogyne
* *Tetramolopium arbusculum*	

The loss of those species from the Crater District is a matter of some concern and their reintroduction where possible should be a significant management goal. Three of those species (*) are believed to be extinct; however, they may still be present on the north face of the mountain outside Park boundaries.

On the other hand, some of the species listed by Mitchell may have been collected outside the Crater District proper. A number of them may have been misidentified because of the confused state of their taxonomy. However, whatever the status of the uncertain species on Mitchell's (1945) list they were not encountered during the RBI. The majority of those species are endemic (31, plus 2 indigenous, 11 exotic, and 1 not known). Of the 31 endemic species, 11 are on the Federal Register's list of endangered species. The presence and/or uncertain status of the taxonomy of those species in the Park does not preclude the fact that the Park, in its pristine condition, may have been a marginal environment for many of them. The destruction of the habitat and opening of the vegetation cover by feral herbivores may have resulted in changes in the microhabitats to the point that those species may no longer have been able to establish themselves. Consequently, once the original stock died the species were lost.

The genus *Railliardia* presents a special problem. At least five of the species described are hybrids. In the pristine environment the hybrids probably did not become established. The parents were also probably isolated by a number of ecological factors. However, the gross disturbance of the environment by feral herbivores has resulted in the breakdown of the barriers to reproduction and the consequent establishment of hybrids. Similar situations have occurred elsewhere (e.g., see Epling 1947 and Chase & Raven 1975).

If grasses are excluded, the monocotyledon flora is almost totally native (Table 2). Most of the grasses were probably introduced to improve the pasture years ago when cattle were grazed in the Crater. The large number of exotic dicotyledons were probably introduced at the same time. Many of those species are quite typical members of pasturelands in north temperate regions. Many of those species will always remain in the Park; however, some may be crowded or shaded out if the native vegetation is allowed to recover in the absence of feral pigs and goats.

Fifteen of the species in the Crater District are weeds with a potential to become serious resource management problems in the future. Five species--Maui pā'makani (Eupatorium adenophorum), Hāmākua pamakani (E. riparium), lantana (Lantana camara), prickly Florida blackberry (Rubus penetrans), and gorse (Ulex europaeus) --are on the State of Hawaii list of noxious weeds. Two species --pines and eucalypts--are trees that have escaped into the Park. Five species--bull thistle (Cirsium vulgare), kikuyugrass (Pennisetum clandestinum), castor bean (Ricinus communis), thimbleberry (Rubus rosaefolius), and Christmas berry (Schinus terebinthifolius)--are presently established in the Park at manageable levels but could, if left uncontrolled, spread rapidly into adjacent areas, ultimately infesting significant portions of the Park. Finally, three species--prickly pear (Opuntia megacantha), white passionflower (Passiflora ?subpeltata), and Kentucky bluegrass (Poa pratensis)--have the potential to become serious pests and merit close surveillance.

ACKNOWLEDGMENTS

We thank the Superintendent and staff of Haleakala National Park for their cooperation and assistance during the field studies. We are especially appreciative of the generosity of the maintenance crew after the storm tore our basecamp to shreds at Paliku during the first year of the study.

The helpful review comments of this manuscript by Dr. Dennis Fenn, Dr. Charles Lamoureux, Mr. John Kjargaard, and Mr. Dave Dunatchik are appreciated. As usual, Ms. J. Saito's assistance in editing and producing the final manuscript were extremely helpful.

The study was sponsored by National Park Service Contract Number CX 8000 7 0003. Without their assistance the scope and detail of the study would not have been possible.

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TABLE 1. Species unique to the upper elevations of Haleakalā (*) and those species in the Crater District of Haleakala National Park listed as endangered either in Fosberg and Herbst (1975) or on the USFWS Federal Register List (Anon. 1976, 1980).

Species	F & H	USFWS 1976	USFWS 1980
* Argyroxiphium sandwicense var. macrocephalum	x	x	3B
* A. virescens var. virescens	x	x	1
* Artemisia mauiensis	-	-	-
* Bidens pentamera	-	-	-
* Chenopodium oahuense var. discospermum	-	-	-
Coprosma montana var. crassa	x	-	-
* Deschampsia australis f. haleakalensis	-	-	-
* D. australis subsp. nubigena var. tenuissima	-	-	-
* Geranium arboreum	x	x	1
* G. cuneatum var. tridens	-	-	-
* G. multiflorum	x	x	2
* Gouldia terminalis var. parviflora	x	-	-
* Metrosideros collina var. haleakalensis	-	-	-

* Panicum (new species or variety)	-	-	-
* Plantago pachyphylla	x	-	-
* P. princeps var. laxifolia	x	x	1
* Railliardia coriacea	-	-	-
* R. demissifolia var. demissifolia	-	-	-
* R. demissifolia var. verticillata	x	-	-
* R. x dolosa	-	-	-
* R. lonchophylla var. lonchophylla	x	x	3B
* R. lonchophylla var. stipitata	-	-	-
* R. montana var. longifolia	x	x	3B
* R. montana var. robustior	x	x	3B
* R. platyphylla var. trillioidea	-	-	-
* R. reticulata	x	x	1
* R. rockii	x	x	3B
* R. thrysiflora	x	x	3B
Sanicula sandwicensis	x	x	2
* Santalum haleakalae	x	-	-
* Schidea haleakalensis	-	-	-

TABLE 1--Continued.

Species	F & H	USFWS 1976	USFWS 1980
* *Silene hawaiiensis* var. *kaupoana*	x	x	1
* *Stenogyne crenata*	x	x	1
S. haliakalae	x	x	2
* *S. rotundifolia* var. *rotundifolia*	-	-	-
S. rotundifolia var. *oblonga*	x	x	1
* *S. sessilis* var. *hexanthoides*	x	-	-
* *Tetramolopium arbusculum*	x	x	1

Categories of plants listed in USFWS-1980:

1 USFWS presently has sufficient information on hand for the taxon to support the biological appropriateness of being listed as Endangered or Threatened species.

2 Probably appropriate for being listed but sufficient information not available.

3A No longer being considered. USFWS has persuasive evidence of extinction. If rediscovered, such plants will be given high priority for listing.

3B No longer being considered. On the basis of current taxonomic understanding these names do not represent species.

3C No longer being considered. Taxa which have proven to be more abundant or widespread than was previously believed OR those which are not subjected to any identifiable threat.

' Both Geranium multiflorum var. superbum & G. m. var. ovatifolium are listed in Fosberg & Herbst (1975), USFWS-1976, and in USFWS-1980 as '2'.

' Only Dubautia lonchophylla (= Railliardia) is listed in Fosberg & Herbst (1975), USFWS-1976, and USFWS-1980, without regard to variety.

' Both Dubautia thyrsiflora (= Railliardia) var. cernua & D. t. var. thyrsiflora are listed in Fosberg & Herbst (1975), USFWS-1976, and in USFWS-1980 as '3B'.

' No variety listed in any of the three sources.

TABLE 2. The number and percentages of endemic, indigenous, and exotic monocotyledons and dicotyledons reported from the Crater District of Haleakala National Park.

	STATUS					
	Endemic		Indigenous		Exotic	
	#	%	#	%	#	%
Monocotyledons (excluding grasses)	12	(67)	5	(28)	1	(6)
Monocotyledons	17	(31)	5	(9)	32	(59)
Dicotyledons	103	(55)	6	(3)	79	(42)
TOTAL	120	(50)	11	(5)	111	(46)

APPENDIX I

A PROVISIONAL LIST OF THE CONIFERS AND FLOWERING PLANTS OF THE CRATER DISTRICT OF HALEAKALA NATIONAL PARK

GYMNOSPERMAE

Unidentified Gymnosperm spp.

ARAUCARIACEAE
(Araucaria Family)

Araucaria

bidwilii Hook.

Monkey puzzle

Exotic

Behind Research Center.

CUPRESSACEAE
(Cypress Family)

Cedrus

deodara (Lamb.) Loud.

Deodar cedar

Exotic

Confined to Hosmer Grove area.

Thuja

occidentalis L.

Eastern arborvitae

Exotic

Confined to Hosmer Grove area.

PINACEAE
(Pine Family)

Pinus

contorta
var. *latifolia* Engelm.

Lodgepole pine

Exotic

Confined to Hosmer Grove area.

radiata D. Don

Monterey pine

Exotic

Hosmer Grove, Research Center, and plantation at 8500 feet. Seeds distributed into Park at 7000 feet where they germinate. All trees should be cut down before they impact the native scrubland.

monticola Dougl.

Western white pine

Exotic

Confined to Hosmer Grove area.

Pseudotsuga

menziesii (Mirb.) Franco

Douglas fir

Exotic

Confined to Hosmer Grove area.

TAXODIACEAE
(Taxodium Family)

Cryptomeria

japonica (L. f.) D. Don.

Japanese cedar

Exotic

Confined to Hosmer Grove and planted area at 8500 feet.

FLOWERING PLANTS
MONOCOTYLEDONAE

CYPERACEAE
(Sedge Family)

Carex

alligata F. Boott

Hawaiian sedge

Endemic

Known only from Kuiki where it is found in wet spots in the forest. Listed as *C. sandwicensis* Boeck. by Mitchell (1945).

macloviana D'Urv.
var. *subfusca* (W. Boott) Kuek.

St. Malo's sedge

Indigenous

Occasional in mesic to exposed areas throughout the Crater District, more frequent in Palikū area.

meyenii Nees

Endemic

Occasional in wet forest between E. Kaupō Gap and Kuiki.

wahuensis C. A. Mey.

Endemic

Occasional throughout Crater and outer slopes.

Cladium

angustifolia

See *Machaerina angustifolia* (Gaud.) Koyama.

Cyperus

brevifolius (Rottb.) Hassk.

Kili'o'opu, kyllinga

Indigenous

Uncommon in lower E. Kaupō Gap.

neo-kunthianus Kuek.

Endemic

Listed by Mitchell (1945) but not seen during RBI.

Fimbristylis

dichotoma (L.) Vahl

Tall fringe rush

Indigenous

Occasional along trails, particularly at base of Halemau'u Trail.

Gahnia

gahniaeformis (Gaud.) Heller
See Machaerina gahniaeformis (Gaud.) Kern.

Machaerina

angustifolia (Gaud.) Koyama

Indigenous

Uncommon in exposed scrubby areas at Hosmer Grove. Listed under Cladium by Mitchell (1945).

gahniaeformis (Gaud.) Kern

Endemic

Widespread below 8000 feet particularly Hosmer Grove and E. Kaupō Gap. Listed under Gahnia by Mitchell (1945).

Oreobolus

furcatus Mann

Endemic

Known only from Kuiki in the Crater District.

Uncinia

uncinata (L. f.) Kuek.
var. uncinata

Indigenous

Occasional in damp shaded protected areas throughout the Crater District.

GRAMINEAE
(Grass Family)

Agrostis

alba L.

Redtop, herdgrass

Exotic

Common in introduced grasslands at Hosmer Grove and below Palikū.

avenacea Gmel.

He'u-pueo

Exotic

Widespread weedy grass, occasional in goat infested areas particularly W. Kaupō Gap. Listed by Mitchell (1945) as A. rectofracta (Willd.) Link.

rectofracta (Willd.) Link
See Agrostis avenacea.

sandwicensis Hbd.

Hawaiian bent

Endemic

Occasional in cinder desert.

Aira

caryophyllea L.

Silver hairgrass

Exotic

Occasional in dry scrub areas throughout the Crater District.

Anthoxanthum

odoratum L.

Sweet vernal grass

Exotic

Common in introduced grasslands and along trails.

Bromus

rigidus Roth

Ripgutgrass

Exotic

Common along trails, dry grasslands, and dry scrub areas.

Cynodon

dactylon (L.) Pers.

Bermuda grass

Exotic

Common along lower elevation roads and trails.

Dactylis

glomerata L.

Cocksfoot, orchardgrass

Exotic

Common in mesic introduced grasslands at base of Halemau'u Trail.

Danthonia

pilosa R. Br.

Hairy oatgrass

Exotic

Occasional in grass in dry to mesic scrub in Hosmer Grove area.

semiannularis (Labill.) R. Br.

Wallabygrass

Exotic

Occasional in grass in dry to mesic scrub in Hosmer Grove area.

Deschampsia

australis Nees ex Steud.

Endemic

Common, locally dominant, throughout the Crater District in Deschampsia grasslands. The taxonomy of this species is quite confused. Two subspecific taxa, f. haleakalensis (Skottsb.) Skottsb. and ssp. nubigena var. tenuissima (Skottsb.) Skottsb., are endemic to E. Maui.

Digitaria

violascens Link

Kūkaipua'a-uka

Exotic

Occasional in E. and W. lower Kaupō Gap, weedy.

Eragrostis

brownei (Kunth) Nees in H. & A.

Brown's lovegrass

Exotic

Occasional along trails, dry scrub, particularly in eastern half of the Crater District.

grandis Hbd.

Large Hawaiian lovegrass
Endemic

Uncommon, Kaupō and Palikū cliffs.

Festuca

dertonensis (All.) Aschers. & Graebn.

Exotic

Common along trails, dry scrubland, principally East part of Crater.

elatior L.

Tall fescue
Exotic

Occasional, introduced grasslands, as between bottom of Halemau'u Trail and Hōlua Cabin.

megalura Nutt.

Foxtail fescue
Exotic

Common everywhere.

rubra L.

Red fescue
Exotic

Occasional in introduced damp grasslands.

Gastridium

ventricosum (Gouan) Schinz & Thell.

Nittgrass
Exotic

Occasional in W. Kaupō Gap.

Holcus

lanatus L.

Yorkshire fog, velvetgrass
Exotic

Common everywhere.

Lolium

multiflorum Lam.

Italian ryegrass
Exotic

Rare, near Kapalaoa, only a single specimen found.

Panicum

sp..

Endemic

This is a new variety or species from W. Kaupō Gap, uncommon.

Paspalum

dilatatum Poir.

Paspalum grass

Exotic

Occasional along road near HQ.

larranagai Arech.

See Paspalum urvillei Steud.

orbiculare Forst. f.

Mau'u laiki, ricegrass

Exotic

Occasional, lower E. Kaupō Gap.

urvillei Steud.

Vaseygrass

Exotic

Listed as P. larranagai by Mitchell (1945). Not seen in RBI.

Pennisetum

clandestinum Hochst. ex Chiov.

Kikuyugrass

Exotic

Common along trails throughout the Crater District. Also dominant in lower E. Kaupō Gap. This species has recently been declared a noxious weed by the U. S. Department of Agriculture in all states except Hawai'i. See Recommendations.

Phalaris

tuberosa L.

Large canarygrass

Exotic

Locally common at Palikū.

Poa

annua L.

Annual bluegrass

Exotic

Common in front of cabins; occasional along wet trails.

compressa L.

Canada bluegrass

Exotic

Listed by Mitchell (1945) but not seen during RBI.

pratensis L.

Kentucky bluegrass

Exotic

Locally, common throughout the Crater District in wet areas, i.e., under trees, mesic grasslands, pit craters, abundant in Kaluanui where this species is apparently crowding out the native Deschampsia. Though not on the State's noxious weed list the spread of this species in certain areas such as Kaluanui, should be monitored.

Rhynchelytrum

repens (Willd.) C. E. Hubb.

Natal redtop

Exotic

Common in W. Kaupō Gap.

Sacciolepis

indica (L.) Chase

Glenwoodgrass

Exotic

Occasional in damp areas, lower E. Kaupō Gap.

Sporobolus

africanus (Poir.) Robyns & Tournay

African dropseed

Exotic

Common along trails throughout Crater, especially lower Kaupō Gap.

indicus (L.) R. Br.

West Indian dropseed

Exotic

Common along trails.

Trisetum

flavescens (L.) Beauv.

Yellow oatgrass

Exotic

Currently at Waikau but not in the Crater District. Tentative identification awaiting confirmation.

glomeratum (Kunth) Trin. in Steud.

He'u-pueo, pili-uka, mountain pili

Endemic

Occasional in desert and dry scrub.

IRIDACEAE
(Iris Family)

Sisyrinchium

acre Mann

Mau'u-la'ili, Hawaiian sisyrinchium

Endemic

Uncommon, only found near Waikau. Listed as depleted in Fosberg and Herbst (1975). It is not included on the Federal Register List (Anon. 1976).

JUNCACEAE
(Rush Family)

Juncus

bufonius L.

Common toad rush

Exotic

Occasional along moist trails in eastern half of the Crater.

Luzula

campestris
var. hawaiiensis (Buch.) Deg. & Fosb.
See Luzula hawaiiensis Buch. var. hawaiiensis.

hawaiiensis Buch.
var. hawaiiensis

Endemic

Occasional in most vegetated areas. Listed as L. campestris var. hawaiiensis by Mitchell (1945).

LILIACEAE
(Lily Family)

Astelia

forbesii Skottsb.

Endemic

Occasional.
Rain forest species confined to Palikū cliffs.
Three subspecies are listed in Fosberg and Herbst (1975) as of uncertain status or with a localized distribution.
None of the subspecies are listed on the Federal Register List (Anon. 1976).

Dianella

sandwicensis H. & A.

Uki, 'uki-'uki,
Hawaiian dianella
Endemic

Occasional between Pu'umaile and Palikū.

Pleomele

aurea (H. Mann) N. E. Br.

Halapepe
Endemic

Uncommon, Kaupō Trail. Frequently referred to as *Dracaena aurea* H. Mann.

Smilax

sandwicensis Kunth
var. *sandwicensis*

Hoi-kuahiwi, aka'awa
Endemic

Occasional, Kaupō Trail.

FLOWERING PLANTS
DICOTYLEDONAE

ANACARDIACEAE
(Mango Family)

Schinus

terebinthifolius Raddi

Christmas berry

Exotic

Single specimen seen, W. Kaupō Gap ca. 4400 feet. It should be removed. See Recommendations.

APOCYNACEAE
(Periwinkle Family)

Alyxia

olivaeformis Gaud.

Maile

Endemic

Uncommon, Kaupō Trail.

AQUIFOLIACEAE
(Holly Family)

Ilex

anomala H. & A.

Kāwa'u, ka'awa'u

Endemic

Occasional, Palikū, Palikū cliffs, and in gullies of E. Kaupō Gap.

ARALIACEAE
(Ginseng Family)

Cheirodendron

trigynum (Gaud.) Heller

Ōlapa

Endemic

Occasional at Palikū and Palikū cliffs.
The variety *oblongum* Sherff was included in Mitchell (1945) but recent unpublished work suggests that this variety may not be distinct. *Cheirodendron gaudichaudii* (DC.) Seem. listed by Mitchell is considered a synonym of *C. trigynum*.

ASCLEPIADACEAE
(Milkweed Family)

Gomphocarpus

physocarpus E. Mey.

Balloon plant

Exotic

Occasional near the Crater District boundary, W. Kaupō Gap.

BEGONIACEAE
(Begonia Family)

Hillebrandia

sandwicensis Oliver

Pua-maka-nui

Endemic

Mitchell (1945) listed this species along Kaupō Trail at 3900 feet in a cave. Not seen during RBI. See Recommendations.

CACTACEAE
(Cactus Family)

Opuntia

megacantha Salm-Dyck

Pa-nini, prickly pear

Exotic

Occasional, presumably controlled; Lā'ie Cave, lower mid-Kaupō Gap.

CAMPANULACEAE
(Bellflower Family)

Clermontia

haleakalensis Rock

Haleakala clermontia

Endemic

Endemic to E. Maui.
Last recorded at Pu'unianiau. See Rock (1974: 489).
Listed by Mitchell (1945) but not seen during RBI. See Recommendations.

Lobelia

grayana E. Wimm.

Endemic

Occasional, vertical walls of Crater including E. and W. Kaupō Gap, Palikū cliffs, and E. and W. Ko'olau Gap.
Listed as L. neriifolia Gray in Mitchell (1945).

neriifolia Gray
See Lobelia grayana.

CARYOPHYLLACEAE
(Pink Family)

Arenaria

serpyllifolia L.
Thyme-leaved sandwort
Exotic

Occasional along trails and in goat habitat throughout the Crater District.

Cerastium

vulgatum L.
Hehine-hauli,
larger mouseear chickweed
Exotic

Occasional along trails and in goat habitat throughout the Crater District.

Polycarpon

tetraphyllum (L.) L.
Allseed
Exotic

Occasional along trails and in goat habitat throughout the Crater District.

Schiedea

haleakalensis Deg. & Sherff in Sherff
Haleakala schiedea
Endemic

Uncommon on vertical walls, found between Sliding Sands and Hōlua, and on wall of W. Kaupō Gap. This species is listed as of uncertain status in Fosberg and Herbst (1975). It is not included on the Federal Register List (Anon. 1976).

Silene

gallica L.
Small-flowered catchfly
Exotic

Occasional along trails and in goat habitat throughout the Crater District.

hawaiiensis Sherff
var. kaupoana (Deg. & Sherff in Sherff)
Deg. & Sherff in Sherff

Endemic

Endemic to East Maui.
Listed as S. struthioides Gray by Mitchell (1945). Occasional on loose cinder substrates in central region of the Crater District between Nā mana o ke akua and Pele's Paint Pot. Also on vertical walls E. and W. Kaupo Gap. Listed as possibly endangered in Fosberg and Herbst (1975). It is not included on the Federal Register List (Anon. 1976).

struthioides Gray
See Silene hawaiiensis var. kaupoana.

CHENOPODIACEAE
(Goosefoot Family)

Chenopodium

ambrosioides L.

Mexican tea

Exotic

Occasional W. Kaupō Gap. Also near Lā'ie Cave.

hybridum L.

Maple-leaved goosefoot

Exotic

Listed by Mitchell (1945) but not seen during RBI.

oahuense (Meyen) Aellen
var. discosperma Fosb.

'Āweoweo

Endemic

Uncommon at Nā mana o ke akua (the type locality of the variety) and in Lā'ie kipuka. The variety is listed as local, rare, and protected in Fosberg and Herbst (1975). It is not included on the Federal Register List (Anon. 1976). St. John gives an incorrect location for this taxon.

COMPOSITAE
(Sunflower Family)

Argyroxiphium

sandwicense DC.
var. macrocephalum (Gray) Hbd.
Hinahina, 'āhinahina, silversword
Endemic

Occasional on loose cinder cones throughout west-central part of Crater. Also on vertical cliffs above Kapalaoa, and on Kalapawili Ridge. Listed as a local and depleted but protected species in Fosberg and Herbst (1975). However, the Federal Register List (Anon. 1976) lists Argyroxiphium macrocephalum Gray, which is the name used for Maui silversword if it is to be considered distinct from the Mauna Kea silversword. The listing indicates that the Maui silversword should be considered rare and endangered. No longer being considered for endangered species status (Anon. 1980).

virescens Hbd.
var. virescens
Greensword
Endemic

Endemic to E. Maui.
Reported by Mitchell (1945) as present at 'Palikū-Kuiki.' Not seen by RBI team. Thought to be extinct by most field botanists. See Recommendations.
USFWS presently has sufficient information on hand for the taxon to support the biological appropriateness of being listed as Endangered or Threatened species.

Artemisia

australis Less.
Hinahina-kuahiwi
Endemic

Occasional in shaded gulches, E. Kaupō Gap.

mauiensis (Gray) Skottsb.
Maui wormwood
Endemic

Endemic to E. Maui.
Occasional steep cliffs throughout the Crater; above Palikū, Waikau, Halemau'u Trail, etc.
Both varieties are listed as rare in Fosberg and Herbst (1975). Neither variety is included on the Federal Register List (Anon. 1976).

Bidens

pentamera (Sherff) Deg. & Sherff in Sherff
Ko'oko'olau
Endemic

Endemic to E. Maui.
Mitchell (1945) reported it above Hōlua cabin. Not seen by RBI team.

pilosa L.
Kī-nehe, Spanish needle
Exotic

Localized population above Hōlua Cabin; occasional along trails and increasing in abundance toward lower elevations of Kaupō Gap.

sp.
Endemic

Not fertile.
Occasional on west wall of Kaupō Gap. Degener also collected a sterile specimen in this locality.

Centaurea

melitensis L.
Napa thistle,
yellow star thistle
Exotic

Listed by Mitchell (1945) but not seen during RBI.

Cirsium

vulgare (Savi) Tenore
Pua-kala, bull thistle,
spear thistle
Exotic

Uncommon E. and W. Kaupō Gap, also heavily goat infested areas. A troublesome weed which has invaded the Crater District. See Recommendations.

Dubautia

fallax Sherff
See Railliautia x fallax (Sherff) Sherff.

plantaginea Gaud.
Endemic

Occasional, vertical cliffs E. Kaupō Gap.
Listed as of uncertain status in Fosberg and Herbst (1975) but not listed on the Federal Register List (Anon. 1976).

Erigeron

bonariensis L.

Ilioha, hairy horseweed
Exotic

Occasional in dry scrub and weedy areas, especially W. Kaupō Gap. Synonym Conyza bonariensis (L.) Cronq.

canadensis L.

Canada fleabane
Exotic

Listed by Mitchell (1945) but not seen during RBI.

Eupatorium

adenophorum Spreng.

Maui pā'makani
Exotic

Common to abundant at medium to low elevations throughout the Crater District, occasional up to 8500 feet. This species has been declared a noxious weed by the State of Hawaii. See Recommendations.

riparium Regel

Hāmākua pamakani
Exotic

Occasional near Hosmer Grove. See Recommendations.

Galinsoga

ciliata (Raf.) Blake

Galinsoga
Exotic

Gnaphalium

japonicum Thunb.

Exotic

Stables area, and in goat infested areas.

purpureum L.

Purple cudweed
Exotic

Occasional in areas heavily disturbed by goats and horses.

sandwicensium Gaud.

'Ena'ena, Hawaiian cudweed
Endemic

Occasional on Sliding Sands trail, rock deserts.
The variety of the Haleakalā specimen has not been identified yet. The variety lineatum Sherff, which is present on E. Maui, is listed as of uncertain status in Fosberg and Herbst (1975). It is not included on the Federal Register List (Anon. 1976).

Heterotheca

grandiflora Nutt.

Telegraph plant
Exotic

Common to abundant along trails and in disturbed habitats throughout the Crater.

Hypochaeris

radicata L.

Hairy Cats-ear, gosmore
Exotic

Common throughout the Crater District.

Lapsana

communis L.

Nipplewort
Exotic

Occasional in shaded disturbed habits.

Madia

sativa Molina

Tarweed
Exotic

Rare. Trailside between Nā mana o ke akua and 'Ō'ilipu'u.

Railliardia

(Most botanists include this genus in Dubautia but this list follows St. John's treatment with which we do not agree on this point).

coriacea Sherff

Kūpaoa
Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Probably a hybrid.

demissifolia Sherff
var. demissifolia
Cliff railliardia
Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Probably belongs in R. menziesii Gray.

demissifolia
var. verticillata Sherff
Kūpaoa
Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Listed as of uncertain status in Fosberg and Herbst (1975).
Not on Federal Register List (Anon. 1976). Probably a hybrid.

x dolosa Deg. & Sherff in Sherff
Kūpaoa
Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.

lonchophylla Sherff
var. lonchophylla
Kūpaoa
Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Listed by Fosberg and Herbst (1975) and on Federal Register List (Anon. 1976). Probably a hybrid.
No longer being considered for endangered species status (Anon. 1980).

lonchophylla
var. stipitata (Sherff) Sherff
Kūpaoa
Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Probably a hybrid.

menziesii Gray

Na'ena'e

Endemic

Common.
Occasional throughout Crater District above 7000 feet.
The variety of the Haleakalā specimen has not been identified yet. The variety angustifolia Sherff, which is present on E. Maui, is listed as of uncertain status in Fosberg and Herbst (1975). It is not included on the Federal Register List (Anon. 1976).

montana
var. longifolia Sherff

Kūpaoa

Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Listed by Fosberg and Herbst (1975) and on Federal Register List (Anon. 1976). Type locality is in Kaupō Gap.
Probably a hybrid.
No longer being considered for endangered species status (Anon. 1980).

montana
var. robustior Sherff

Kūpaoa

Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Listed by Fosberg and Herbst (1975) and on Federal Register List (Anon. 1976). Type locality is on Pu'unianiau.
Probably a hybrid.
No longer being considered for endangered species status (Anon. 1980).

platyphylla Gray
var. platyphylla

Flat-leaved railliardia

Endemic

The variety platyphylla endemic to E. Maui is listed in Fosberg and Herbst (1975). It is not listed on the Federal Register List (Anon. 1976).

platyphylla
var. trillioidea Deg. & Sherff in Sherff

Flat-leaved railliardia

Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Probably not a distinct taxon.

reticulata Sherff

Kūpaoa

Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
USFWS presently has sufficient information on hand for the taxon to support the biological appropriateness of being listed as Endangered or Threatened species.

rockii Sherff

Kūpaoa

Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Listed in Fosberg and Herbst (1975) and on Federal Register List (Anon. 1976). Probably a variant of R. menziesii.
No longer being considered for endangered species status (Anon. 1980).

scabra DC.

Endemic

Occasional Palikū gulches.

thyrsiflora Sherff

Kūpaoa

Endemic

Endemic to E. Maui.
Listed in Mitchell (1945) but not seen during RBI.
Listed in Fosberg and Herbst (1975) and on Federal Register List (Anon. 1976). Probably a hybrid.
No longer being considered for endangered species status (Anon. 1980).

Railliautia

x *fallax* (Sherff) Sherff

Endemic

Listed by Mitchell (1945) as *Dubautia fallax* but not seen during RBI.

Senecio

sylvaticus L.

Wood groundsel

Exotic

Listed by Mitchell (1945) but not seen during RBI.

Sonchus

asper (L.) Hill

Spiny sow thistle
Exotic

Occasional along Kaupō Trail.

oleraceus L.

Pua-lele, sow thistle
Exotic

Occasional in shaded disturbed areas.

Taraxacum

officinale (L.) Weber in Wiggers

Lau-lele, dandelion
Exotic

Occasional, damp exposed substrate.

Tetramolopium

arbusculum (Gray) Sherff

Endemic

Listed by Mitchell (1945) but not seen during RBI. Listed by Fosberg and Herbst (1975) and on Federal Register List (Anon. 1976, 1980). See Recommendations.

humile (Gray) Hbd.
var. humile

Alpine tetramolopium
Endemic

Endemic to E. Maui.
Common above diurnal frostline at approximately 8000 feet.

Youngia

japonica (L.) DC.

Oriental hawksbeard
Exotic

Occasional shaded disturbed areas.

CONVOLVULACEAE
(Morning-glory Family)

Ipomoea

sp.
Sterile material from Kaupō Gap.

CRUCIFERAE
(Mustard Family)

Capsella

bursa-pastoris (L.) Medik

Shepherd's purse

Exotic

Occasional especially where horses have travelled.

Coronopus

didymus (L.) Sm.

Swine cress

Exotic

Listed by Mitchell (1945) but not seen during RBI.

Descurainia

sp.

Exotic

New State record.
Uncommon near stables. Plants have been uprooted and destroyed.

Lepidium

auriculatum Regel & Koern

Listed by Mitchell (1945) but name not recognized by St. John (1973).

virginicum L.
var. *virginicum*

Wild peppergrass

Exotic

Occasional in areas heavily browsed by goats.

Sisymbrium

altissimum L.

Jim Hill mustard

Exotic

Listed by Mitchell (1945) but not seen during RBI.

officinale (L.) Scop.

Hedge mustard

Exotic

Occasional, goat browsed exposed areas, central crater.

CUCURBITACEAE
(Squash Family)

Sicyos

sp.

Endemic

Occasional in Kaupō Gap. Sterile material, probably one of the two listed by Mitchell (1945).

EPACRIDACEAE
(Epacris Family)

Styphelia

douglasii (Gray) F. Muell. ex Skottsb.

Kāwa'u

Endemic

tameiameiae (Cham.) F. Muell.

Pūkiawe

Indigenous

Common throughout Crater District. There are no clear cut distinctions between this and the former species.

tameiameiae
var. brownii (Gray) St. John

Endemic

Listed by Mitchell (1945) but not seen during RBI. It is doubtful that this is a valid taxon.

ERICACEAE
(Heath Family)

Vaccinium

berberifolium (Gray) Skottsb.

Barbery-leaved 'ōhelo

Endemic

Common on outer north face, particularly in disturbed rocky areas. Occasional in Kaupō Gap.

calycinum Sm.

'Ōhelo-kau-lā'au

Endemic

Rain forest specimen. Occasional at Palikū and adjacent areas.

dentatum Sm.

Endemic

Occasional in shaded areas at Hosmer Grove.

reticulatum Sm.

'Ōhelo

Endemic

Common throughout the Crater District.

EUPHORBIACEAE
(Spurge Family)

Euphorbia

celastroides Boiss. in A. DC.
var. amplectens Sherff

Endemic

Common in W. Kaupō Gap with scattered specimens elsewhere in the Gap.

Ricinus

communis L.

Castor bean

Exotic

Locally common, potentially troublesome weed currently confined to lower E. Kaupō Gap. See Recommendations.

GENTIANACEAE
(Gentian Family)

Centaurium

erythraea Rafn.

European centaury

Exotic

Occasional along trails at lower elevations, W. Kaupō.

GERANIACEAE
(Geranium Family)

Erodium

cicutarium (L.) L'Hér. ex Ait.

Heron's bill, filaree

Exotic

Along trails, common at HQ and stables area and between Nā mana o ke akua and 'Ō'ilipu'u, occasional in W. Kaupō Gap.

Geranium

arboreum Gray

Red-flowered native geranium
Endemic

Endemic to E. Maui.
Uncommon, gullies near Hosmer Grove.
This species is listed as rare and endangered both in Fosberg and Herbst (1975) and on the Federal Register List (Anon. 1976, 1980).

carolinianum L.
var. australe (Benth.) Fosb.

Carolina crane's bill
Exotic

Occasional in shaded disturbed habitats.

cuneatum Hook.
var. tridens (Hbd.) Fosb.

Hinahina, nohu-anu
Endemic

Variety endemic to E. Maui.
Common on outer NW face below 8000 feet.

multiflorum Gray

Endemic

Occasional near Palikū and along Waikau Trail to Halemau'u Trail. Four varieties--canum Hbd., forbesii (Deg. & Deg.) St. John, ovatifolium (Gray) Fosb., and superbum (Deg. Deg. & Greenw. in Deg. & Deg.) St. John--are endemic to E. Maui. The variety superbum does not exist in the Crater. There are several plants which are very close to variety canum, whereas the remainder have a mixture of the characteristics of canum, forbesii, and ovatifolium. The varieties forbesii, ovatifolium, and superbum are listed in Fosberg and Herbst (1975). The varieties ovatifolium and superbum are included on the Federal Register List (Anon. 1976). The variety canum is listed in Mitchell (1945).
Probably appropriate for being listed but sufficient information not available.

Pelargonium

?hortorum Bailey

Fish geranium, laniuma
Exotic

In residence area.

GOODENIACEAE
(Naupaka Family)

Scaevola

chamissoniana Gaud.
var. *bracteosa* Hbd.

Naupaka-kuahiwi

Endemic

Uncommon along Kaupō Trail.

LABIATEAE
(Mint Family)

Lepechinia

hastata (Gray) Epling

Pakaha

Indigenous

Indigenous to Maui and Baja California islands. Rare in the Crater District--small population noted in lower W. Kaupō Gap within the Crater District. Included in Fosberg and Herbst (1975). Not included on Federal Register List (Anon. 1976).

Mentha

rotundifolia (L.) Huds.

Apple-mint

Exotic

Occasional at Palikū.

Plectranthus

parviflorus Willd.

Spurflower

Exotic

Occasional in Kaupō Gap in exposed rocky habitats.

Prunella

vulgaris L.

Self-heal

Exotic

Occasional herb in damp shaded areas.

Stenogyne

crenata Gray

Crenate-leaved stenogyne
Endemic

Vine occasionally associated with māmane groves and occasionally also with Santalum. Two varieties have been described from Haleakalā, var. crenata and var. muricata Deg. & Sherff in Deg. Both varieties are included in Fosberg and Herbst (1975) and on the Federal Register List (Anon. 1976, 1980).

haliakalae Wawra

Haleakala stenogyne
Endemic

Listed by Mitchell (1945) but not seen during RBI. Listed by Fosberg and Herbst (1975) and on Federal Register List (Anon. 1976, 1980). See Recommendations.

rotundifolia Gray
var. rotundifolia

Pua'a-i-naka,
round-leaved stenogyne
Endemic

Endemic to E. Maui.
Uncommon in gullies near Palikū.

rotundifolia
var. oblonga Sherff

Pua'a-i-naka
Endemic

Listed by Mitchell (1945) but not seen during RBI. Listed by Fosberg and Herbst (1975) and on Federal Register List (Anon. 1976, 1980).

sessilis
var. hexanthoides Deg. & Sherff in Sherff

Endemic

Endemic to E. Maui.
Listed by Mitchell (1945) but not seen during RBI. Listed by Fosberg and Herbst (1975) but not on Federal Register List (Anon. 1976).

LEGUMINOSAE
(Pea Family)
SUBFAMILY Caesalpinoideae

Cassia

laevigata Willd.
See *Cassia occidentalis* L.

occidentalis L.

'Auko'i, coffee senna
Exotic

Potentially problematic shrub.
Occasional in lower E. Kaupō Gap. Listed as *C. laevigata* by Mitchell (1945) from same locality.

SUBFAMILY Mimosoideae

Acacia

koa Gray

Koa
Endemic

Confined to E. Kaupō Gap within the Crater District.
Common but probably depleted from former range.

SUBFAMILY Papilionoideae

Desmodium

uncinatum (Jacq.) DC.

Hawaiian tick-trefoil, Spanish clover
Exotic

Shrubby herb occasional in lower E. Kaupō Gap.

Medicago

lupulina L.

Black medic, trefoil
Exotic

Occasional herb near stables and disturbed dry areas.

Sophora

chrysophylla (Salisb.) Seem.

Māmane, mamamo
Endemic

Locally common throughout most of the Crater but depleted from former range.

Trifolium

arvense L.

Rabbit-foot clover
Exotic

Occasional herb near barracks area.

dubium Sibth.

European yellow clover
Exotic

Occasional to common herb along almost all trails and roads.

procumbens L.

Hopclover
Exotic

Listed by Mitchell (1945) but not seen during RBI.

repens L.

White clover
Exotic

Occasional to common herb along almost all trails and roads.

Ulex

europaeus L.

Gorse, furze
Exotic

This species has been declared a noxious weed by the State of Hawaii. Currently controlled in only known locality just below HQ. See Recommendations.

LOGANIACEAE
(Strychnine Family)

Labordia

sp.

Endemic

Listed by Mitchell (1945) but not seen during RBI.

LORANTHACEAE
(Mistletoe Family)

Korthalsella

complanata (v. Tiegh.) Engler

Hulumoa, mistletoe
Endemic

Uncommon parasite in Kaupō Gap up to Paliku.

LYTHRACEAE
(Loosestrife Family)

Lythrum

maritimum HBK.

Pūkāmole

Exotic

Occasional herb in areas where goat browsing is common in Kaupō Gap.

MALVACEAE
(Mallow Family)

Malva

parviflora L.

Little mallow

Exotic

Locally common herb in stable area and uncommon along trails in Crater.

MENISPERMACEAE
(Moonseed Family)

Cocculus

ferrandianus Gaud.

Huehue

Endemic

Occasional vine in lower Kaupō Gap.

MYOPORACEAE
(Naio Family)

Myoporum

sandwicense Gray

Naio

Endemic

Uncommon tree in lower Kaupō Gap. Naio was probably more common in the Kaupō Gap in the past.

MYRSINACEAE
(Myrsine Family)

Myrsine

lanaiensis Hbd.
var. lanaiensis

Kolea

Endemic

Locally common tree in dry forest area of Kaupō Gap.

lessertiana A. DC.

Kōlea-lau-nui

Endemic

Occasional tree at Palikū and on cliffs by trail from Pu'umāmane to Waikau.

MYRTACEAE
(Myrtle Family)

Eucalyptus

globulus Labill.

Blue gum

Exotic

Tree plantation at 8500 feet and Hosmer Grove.

robusta Sm.

Swamp mahogany

Exotic

Hosmer Grove.

spp.

Exotic

Hosmer Grove Plantation, several species are present, some of which are weedy. See Recommendations.

Metrosideros

collina (J. R. & G. Forst.) Gray ssp. polymorpha (Gaud.) Rock var. typica Rock

'Ōhi'a-lehua, lehua

Endemic

Rain forest tree confined to Palikū, Hosmer Grove, and occasional in Kaupō Gap, including cliffs.

collina var. glaberrima (Lévl.) Rock

'Ōhi'a-lehua, lehua

Endemic

Rain forest tree confined to Palikū, Hosmer Grove, and occasional in Kaupō Gap.

collina var. haleakalensis Rock

'Ōhi'a-lehua, lehua

Endemic

Endemic to Haleakalā. Common in Kaupō Gap.

sp.

'Ōhi'a-lehua, lehua

Endemic

Occasional on W. Kaupō cliffs. Not accessible to RBI.

NYCTAGINACEAE
(Four o'clock Family)

Pisonia

brunoniana Endl.

Pāpala-kēpau

Endemic

Uncommon, lower Kaupō Gap.

ONAGRACEAE
(Evening Primrose Family)

Epilobium

cinereum A. Rich.

Pūkāmole, willow herb

Exotic

Occasional herb in disturbed areas throughout Crater District. Listed as E. oligodontum in Mitchell (1945).

oligodontum

See Epilobium cinereum.

Oenothera

laciniata Hill

Evening primrose

Exotic

Included by Mitchell (1945) from Kapalaoa, probably O. stricta Ledeb. in Link.

stricta Ledeb. in Link

Evening primrose

Exotic

Common herb along trail and disturbed areas throughout the Crater District, misspelled as striata by Mitchell (1945).

OXALIDACEAE
(Wood Sorrel Family)

Oxalis

corniculata L.

'Ihi, lady's sorrel

Exotic

Occasional herb of damp shaded disturbed areas such as La'ie Cave and in W. Kaupō Gap.

PASSIFLORACEAE
(Passion Flower Family)

Passiflora

?subpeltata Ortega

White passionflower

Exotic

Potentially problematic?; presently an uncommon vine, E. Kaupō Gap.

PHYTOLACCACEAE
(Pokeweed Family)

Phytolacca

sandwicensis Endl.
var. puberulenta (Deg.) St. John

Pōpolo-ku-mai

Endemic

Listed by Mitchell (1945) but not seen during RBI. See Recommendations.

PIPERACEAE
(Pepper Family)

Peperomia

cookiana
var. ovatilimba (C. DC.) Yuncker

'Ala'ala-wai-nui

Endemic

Listed by Mitchell (1945) but not seen during RBI.

erythroclada C. DC.

'Ala'ala-wai-nui

Endemic

Occasional, Palikū gulches.

globulanthera C. DC.

'Ala'ala-wai-nui

Endemic

Listed by Mitchell (1945) but not seen during RBI.

leptostachya H. & A.

'Ala'ala-wai-nui

Indigenous

Occasional, gulches E. Kaupō Gap.

tetraphylla (Forst. f.) H. & A.

Indigenous

Listed by Mitchell (1945) but not seen during RBI.

tetraphylla
var. parvifolia (C. DC.) Deg. & Deg.

Indigenous

Listed by Mitchell (1945) but not seen during RBI.

sp.

Endemic

Gulches E. Kaupō Gap.

PITTOSPORACEAE
(Pittosporum Family)

Pittosporum

confertiflorum Gray

Hō'awa

Endemic

Uncommon tree in dry central to West part of Crater; Pu'umaile and near Hōlua. This species should be much more common throughout the Crater and Kaupō Gap. It has probably suffered from the impact of feral herbivores.

PLANTAGINACEAE
(Plantain Family)

Plantago

lanceolata L.

Narrow-leaved plantain

Exotic

Common herb along trails and in disturbed habitats. Abundant below Kalahaku Lookout.

major L.

Broad-leaved plantain

Exotic

Occasional; Palikū Horse Pasture.

pachyphylla Gray

Manene

Endemic

Uncommon herb in lava fields near Waikau, and in the forest on Kuiki. The variety of the Haleakalā specimen has not been identified yet. The variety maviensis, which is present on E. Maui, is listed in Fosberg and Herbst (1975) but not on the Federal Register List (Anon. 1976).

princeps C. & S.
var. laxifolia Gray

Ale

Endemic

Rare woody herb on cliffs of W. Kaupō Gap.
This variety is included both in Fosberg and Herbst (1975) and on the Federal Register List (Anon. 1976, 1980).

virginica L.

Dwarf plantain

Exotic

Occasional? Along trail E. Kaupō Gap.

POLYGONACEAE
(Buckwheat Family)

Rumex

acetosella L.

Sheep sorrel

Exotic

Common throughout the Crater District.

albescens Hbd.

Hu'ahu'a-kō

Endemic

Rare NW outer slopes. Mitchell (1945) called this species R. giganteus Ait.

crispus L.

Yellow dock

Exotic

Occasional near stable.

giganteus Ait.

See Rumex albescens.

PRIMULACEAE
(Primrose Family)

Anagallis

arvensis L.

Scarlet pimpernel

Exotic

Occasional throughout the Crater District.

Lysimachia

hillebrandi Hook. f. ex Gray

Pua-hekili

Endemic

Listed by Mitchell (1945) but not seen during RBI. According to St. John (1973) this species is not found on Maui.

sp.
c.f. remyi Hbd.
Endemic
Occasional, vertical cliffs of Palikū, E. and W. Kaupō, and Ko'olau. A revision of the Hawaiian species of Lysimachia is presently near completion by Dr. H. St. John which should facilitate the identification of the Crater District's taxa.

RANUNCULACEAE
(Buttercup Family)

Ranunculus

hawaiensis Gray
Makou, large-flowered native buttercup
Endemic
Previously common at Pu'unianiau but not located within the Park during RBI.

ROSACEAE
(Rose Family)

Eriobotrya

japonica (Thunb.) Lindl.
Loquat
Exotic
Uncommon E. Kaupō Gap along trail.

Fragaria

chiloensis (L.) Duch.
var. sandwicensis Deg. & Deg.
'Ōhelo-papa, Hawaiian strawberry
Endemic
Occasional at Hosmer Grove, Waikau; rare in gulches near Kapalaoa.

Osteomeles

anthyllidifolia Lindl.
Uulei, 'ūlei, Hawaiian hawthorn
Endemic
Occasional in dry scrub vegetation.

Prunus

cerasifera Ehrh. x salicina Lindl.
Methey plum
Exotic
Occasional Palikū.

Rubus

hawaiiensis Gray
var. hawaiiensis

'Ākala, 'ākalakala

Endemic

Locally abundant. Palikū, Waikau, E. Kaupō Gap, 'Āinahou.

penetrans Bailey

Prickly Florida blackberry

Exotic

Occasional, Palikū Horse Pasture, lower E. Kaupō Gap. This species has been declared a noxious weed by the State of Hawaii. See Recommendations.

rosaefolius Sm.

Thimbleberry

Exotic

Occasional lower E. Kaupō Gap with Myrsine. See Recommendations.

RUBIACEAE
(Coffee Family)

Coprosma

ernodeoides Gray
var. mauiensis St. John

Kūkae-nēnē

Endemic

Occasional cinder desert and dry scrub throughout.

montana Hbd.
var. montana

Pilo

Endemic

montana
var. crassa Oliver

Pilo

Endemic

Listed by Fosberg and Herbst (1975) but not on Federal Register List (Anon. 1976).

ochracea Oliver
var. ochracea

Pilo

Endemic

Kuiki, and above Palikū, occasional.

pubens Gray

Pilo

Endemic

Listed by Mitchell (1945) but not seen during RBI.

stephanocarpa Hbd.

Pilo

Endemic

Occasional E. Kaupō Gap.

sp.

Endemic

Unidentified species with bilobed fruit.
Lower E. Kaupō Gap.

Gouldia

hillebrandii Fosb.

Manono

Endemic

Uncommon above Palikū.

terminalis
var. parvifolia (Wawra) Fosb.

Manono

Endemic

Endemic to E. Maui.
Listed by Mitchell (1945) but not seen during RBI.
Listed in Fosberg and Herbst (1975) but not on Federal Register List (Anon. 1976).

Hedyotis

centranthoides (H. & A.) Steud.

Endemic

Uncommon, trail to Kuiki.

centranthoides
f. laevis Fosb.

Endemic

Listed in Mitchell (1945) as H. laevis f. accrescens Fosb., a name not known to us. The f. vestita Fosb. is also unknown to us.

Psychotria

sp.

Endemic

On cliff in E. Kaupō Gap in remnant dry forest.

Sherardia

arvensis L.

Spurwort

Exotic

Listed by Mitchell (1945) but not seen during RBI. Recent collection from lower Kaupō Gap confirms presence in Crater District.

RUTACEAE
(Rue Family)

Pelea

clusiaefolia Gray

Alani

Endemic

Uncommon gullies near Palikū.

orbicularis Hbd.

Endemic

According to St. John (1973) this species is endemic to W. Maui. The variety of the Haleakalā specimen has not been identified yet. Both varieties are included in Fosberg and Herbst (1975) and on the Federal Register List (Anon. 1976).

SANTALACEAE
(Sandalwood Family)

Santalum

ellipticum Gaud.

'Ili-ahi-a-lo'e

Endemic

Locally occasional, in a few areas of lower central Kaupō Gap.

haleakalae Hbd.

'Ili-ahi, Haleakala sandalwood

Endemic

Endemic to E. Maui.
Locally occasional, scrub above 6000 feet.
This species is listed as depleted in Fosberg and Herbst (1975). It is not included on the Federal Register List (Anon. 1976).

SAPINDACEAE
(Soapberry Family)

Dodonaea

eriocarpa Sm.

'A'ali'i

Endemic

Common throughout the Crater District.
The variety of the Haleakalā specimens has not been determined yet. The varieties amplectens and eriocarpa, which occur on E. Maui, are listed as depleted or of uncertain status in Fosberg and Herbst (1975). Neither variety is included on the Federal Register List (Anon. 1976). Mitchell (1945) lists varieties degeneri Sherff and hillebrandii Sherff.

sandwicensis Sherff

A'ali'i

Endemic

SAPOTACEAE
(Sapodilla Family)

Planchonella

sp.

Endemic

E. Kaupō Gap in remnant dry forest.

SAXIFRAGACEAE
(Saxifrage Family)

Broussaisia

arguta Gaud.

Kanawao

Endemic

Occasional, confined to Palikū gulches.

SOLANACEAE
(Nightshade Family)

Physalis

peruviana L.

Poha, husk tomato

Exotic

Occasional along Kaupō Trail.

Solanum

nigrum L.

Exotic

Occasional lower Kaupō Gap along trails.
Listed by Mitchell (1945) as S. nodiflorum.

nodiflorum
See Solanum nigrum.

sodomeum L.
Apple of Sodom
Exotic

Occasional lower Kaupō Gap.

UMBELLIFERAE
(Carrot Family)

Foeniculum

vulgare Mill.
Sweet fennel
Exotic

Occasional in stables areas.

Petroselenum

crispum (Mill.) Nym.
Parsley
Exotic

Behind Hōlua Cabin.

Sanicula

sandwicensis Gray
Tall Hawaiian sanicle
Endemic

Rare, 'Ō'ilipu'u and Lā'ie kīpuka.
Formerly reported as 'not uncommon' (Degener 1933-present).
Listed in Fosberg and Herbst (1975) and on the Federal Register List (Anon. 1976, 1980).

URTICACEAE
(Nettle Family)

Pilea

peploides (Gaud.) H. & A.
var. peploides
Indigenous

Uncommon, localized in gullies at Palikū, Hōlua Spring, W. Kaupō cliff; damp areas.

Pipturus

sp.
Endemic

Uncommon lower E. Kaupō Gap in gullies.

VERBENACEAE
(Verbena Family)

Lantana

camara L.

Lantana, lākana, mikinolia-hihiu

Exotic

Presently uncommon at southern boundary of the Crater District in Kaupō Gap. This species has been declared a noxious weed by the State of Hawaii. See Recommendations.

Stachytarpheta

jamaicensis (L.) Vahl

Jamaica vervain, ōwī, oi

Exotic

Occasional, lower Kaupō Gap.

Verbena

litoralis HBK.

Ha'uōwī, Weed verbena

Exotic

Occasional in heavily goat infested areas.

VIOLACEAE
(Violet Family)

Viola

tracheliifolia Gingins

Pamakani

Endemic

Uncommon, W. Kaupō Cliffs.

APPENDIX II

DISTRIBUTION MAPS OF THE SPECIES

In order to cut the cost of publishing this report the distribution maps of the individual species have been produced as an addendum. Copies have been deposited in the following localities for reference.

Cooperative National Park Resources Studies Unit, University of Hawaii, Honolulu.

Hamilton Library, University of Hawaii, Honolulu.

National Park Service Hawaii State Director's Office, Honolulu.

National Park Service Western Region Office, San Francisco.

Haleakala National Park, Maui.