Checklist of plants occuring in Nu'alolo Kai
September 2006

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Species	Status	Observations		
Angiosperms-Dicots				
Amaranthaceae				
Amaranthus viridis L. **slender amaranth**	Nat.		2002	2006
Nototrichium sandwicense (A. Gray) Hillebr. **kulu'i**	End.	1965	2002	2006
Asclepiadaceae				
Asclepias curassavica L. **butterfly weed**	Nat.	1965		
Asteraceae				
Ageratum conyzoides L. **maile honohono**	Nat.	1965	2002	2006
Artemisia australis Less. **'ahinahina**	End.	1965	2002	2006
Bidens pilosa L. **ki, ki nehe**	Nat	1965	2002	
Bidens sp. **ko'oko'olau**	End.	1965	2002	
Cirsium vulgare (Savi) Ten. **bull thistle**	Nat	1965		
Conyza bonariensis (L.) Cronq. **hairy horseweed**	Nat.	1965	2002	
Emilia sonchifolia (L.) DC **Flora's paintbrush**	Nat.	1965		
Erigeron karvinskianus DC **daisy fleabane**	Nat.		2002	
Galinsoga parviflora Cav.	Nat.	1965		
Hypochoeris radicata L. **hairy cat's ear**	Nat.	1965		
Lipochaeta connata (Gaud.) DC var. *acris* (Sherff) Gardner **nehe**	End.		2002	
Lipochaeta sp. **Nehe**	End.	1965		
Pluchea carolinensis (Jacq.) G. Don **sourbush**	Nat.	1965	2002	
Pluchea symphytifolia (new name for P. carolinensis) New name for *P. carolinensis*	Nat.			2006
Sonchus oleraceus L. **pualele, sow thistle**	Nat.	1965	2002	
Vernonia cinerea (l.) Less. **little ironweed**	Nat.	1965		
Xanthium strumarium L. var. *canadense* (Mill.) Torr. & A. Gray **cocklebur**	Nat.	1965	2002	2006
Bignoniaceae				
Spathodea campanulata P. Beauv. **African tulip tree**	Nat.		2002	
Buddlejaceae				
Buddleia sp. possibly the silvery plant near the tabacco **butterfly bush**	Nat.		2002	
Cactaceae				
Opuntia ficus-indica (L.) Mill. **prickly pear, panini**	Nat.		2002	2006
Capparaceae				
Capparis sandwichiana DC **maiapilo**	End. V	1965	2002	2006
Caricaceae				
Carica papaya L. **papaya**	Nat.	1965	2002	2006
Caryophyllaceae				
Cerastium fontanum Baumg. subsp. *triviale* (Link) Jalas **common mouse-ear chickweed**	Nat.		2002	
Schiedea apokremnos St. John **ma`oli`oli**	End. E		2002	
Schiedea sp. Probably the same species as *Schiedea apokremnos* above.		1965		
Casuarinaceae				

Casuarina equisetifolia L. **common ironwood**	Nat.		2002	2006
Chenopodiaceae				
Chenopodium oahuense (Meyen) Aellen **‘aheahea, ‘aweoweo**	End.	1965	2002	2006
Chenopodium album L. probable mis-identification, check Manual of Fl. Plants	Nat.	1965		
Chenopodium murale L. **‘aheahea**		1965		
Combretaceae				
Terminalia catappa L. **false kamani, tropical or Indian almond**	Nat.		2002	2006
Convolvulaceae				
Ipomoea indica (Burm.) Merr. **koali ‘awa**	Ind.	1965	2002	
Ipomoea obscura)	Nat.			2006
Ipomoea pes-caprae (L.) R. Br. subsp. *brasiliensis* (L.) Ooststr. **pohuehue**	Ind.	1965	2002	
Jacquemontia ovalifolia (Choisy) H. Hallier **pa’uohi’iaka**	Ind.	1965		
Cucurbitaceae				
Momordica charantia L. **bitter melon**	Nat.	1965	2002	2006
Sicyos pachycarpus Hook. & Arnott **kupala, ‘anunu**	End.	1965	2002	
Cuscutaceae				
Cuscuta sandwichiana Choisy **kauna’oa**	End.	1965		2006
Euphorbiaceae				
Chamaesyce celastroides (Boiss.) Croizat & Degener var. *celastroides* **‘akoko**	End.		2002	2006
Chamaesyce hirta (L.) Millsp. **hairy or garden spurge**	Nat.		2002	
Ricinus communis L. **castor bean**	Nat.	1965	2002	2006
Fabaceae				
Canavalia napaliensis St. John **‘awikiwiki, puakauhi**	End. V		2002	
Canavalia kauaiensis **`awikiwiki, puakauhi**	End.			2006
Canavalia sp. All three *Canavali* are probably the same species, just misidentified.	End.	1965		
Desmodium sandwicense E. Mey. **Spanish or chili clover, pua pilipili**	Nat.	1965		
Desmodium sp.	Nat.			2006
Indigofera suffruticosa Mill. **indigo**	Nat.		2002	2006
Leucaena leucocephala (Lam.) de Wit **koa haole**	Nat.	1965	2002	2006
Samanea saman (Jacq.) Merr. **monkeypod**	Nat.		2002	
Goodeniaceae				
Scaevola taccada (Gaertn.) Roxb. **naupaka kahakai**	Ind.	1965	2002	2006
Lamiaceae				
Plectranthus parviflorus Willd. **‘ala’ala wai nui pua ki**	Ind.		2002	
Salvia occidentalis Sw. **west Indian sage**	Nat.	1965	2002	2006
Stachys arvensis L. **staggerweed**	Nat.		2002	
Lauraceae				
Persea americana Mill. **avocado, alligator pear**	Nat.		2002	
Malvaceae				
Abutilon grandifolium (Willd.) Sweet **hairy abutilon**	Nat.	1965	2002	2006

Malvastrum coromandelianum (L.) Garcke subsp. *coromandelianum* **false mallow**	Nat.		2002	2006
Sida cordifolia L.		1965		
Sida fallax Walp. **'ilima**	Ind.		2002	
Meliaceae				
Melia azedarach L. **Pride-of-India, Chinaberry**	Nat.		2002	2006
Menispermaceae				
Cocculus trilobus (Thunb.) DC **huehue**	Ind.	1965		
Cocculus orbiculatus **huehue** Plant identified as *Cocculus trilobus* above is probably the same plant.	Ind.			2006
Moraceae				
Ficus microcarpa L. fil. **Chinese or Malayan banyan**			2002	2006
Myoporaceae				
Myoporum sandwicense A. Gray **naio**	Nat.	1956	2002	2006
Myrtaceae				
Psidium guajava L. **common guava, kuawa**	Nat.	1965	2002	2006
Syzygium cumini (L.) Alston **Java plum**	Nat.		2002	2006
Nyctaginaceae				
Boerhavia glabrata Blume **alena**	Ind.	1965		
Boerhavia coccinea	Nat.			2006
Oxalidaceae				
Oxalis corniculata L. **yellow wood sorrel, ihi 'ai**	Ind.	1965	2002	2006
Papaveraceae				
Argemone glauca (Nutt. ex Prain) Pope var. *glauca* **pua kala**	End.	1965	2002	2006
Passifloraceae				
Passiflora edulis Sims **passion fruit, liliko'i**	Nat.		2002	2006
Phytolaccaceae				
Phytolacca octandra L. **southern pokeberry**	Nat.		2002	
Rivina humilis L. **coral berry**	Nat.		2002	2006
Piperaceae				
Peperomia leptostachya Hook. & Arnott **'ala'ala wai nui**	Ind.	1965		
Plantaginaceae				
Plantago lanceolata L. **narrow-leaved or English plantain**	Nat.	1965	2002	2006
Plantago major L. **laukahi, broad-leaved or common plantain**	Nat.		2002	
Plumbaginaceae				
Plumbago zeylanica L. **'ilie'e**	Ind.	1965	2002	2006
Portulacaceae				
Portulaca oleracea L. **pigweed, 'akulikuli kula**	Nat.	1965	2002	2006

Portulaca pilosa L.	Nat.		2002	2006
Rubiaceae				
Hedyotis st.-johnii Stone & Lane	End. E.	1965	2002	
Morinda citrifolia L. **noni**	Pol.	1965	2002	2006
Psydrax odorata (G. Forster) A. C. Smith & S. P. Darwin **alahe'e**	Ind.		2002	2006
Solanaceae				
Nicotiana tabacum L. **tobacco**	Nat.		2002	
Solanum americanum Mill. **popolo, glossy nightshade**	Ind?	1965		
Solanum lycopersicum L. var. *cerasiforme* (Dunal) Spooner, G. Anderson & Jansen **currant tomato**	Nat.		2002	2006
Verbenaceae				
Lantana camara L. **lantana**	Nat.	1965	2002	2006
Stachytarpheta dichotoma (Ruiz & Pav.) Vahl **owi**	Nat.	1965		
Stachytarpheta jamaicensis (L.) Vahl **Jamaica vervain** This is probably the same planta as *Stachytarpheta dichotoma* above.	Nat.		2002	2006
Vitex rotundifolia L. fil. **pohinhina, beach vitex**	Ind.	1965	2002	2006
Angiosperms—Monocots				
Agavaceae				
Cordyline fruticosa (L.) A. Chev. **ki, ti**	Pol.	1965	2002	2006
Araceae				
Colocasia esculenta (L.) Schott **taro, kalo**	Pol.	1965	2002	2006
var. antiquorum (according to St. John)				
Arecaceae				
Cocos nucifera L. **niu, coconut**	Pol.	1965	2002	2006
Commelinaceae				
Commelina diffusa Burm. f. **dayflower, honohono grass**	Nat.		2002	2006
Cyperaceae				
Mariscus javanicus (Houtt.) Merr. & Metcalfe **'ahu'awa**	Ind.	1965	2002	2006
Pandanaceae				
Pandanus tectorius S. Parkinson ex Z. **hala, pu hala**	Ind.	1965, 2 var.		
Poaceae				
Andropogon glomeratus (Walter) E. Britton, Sterns & Poggenb. **broomsedge**	Nat.		2002	
Bromus mollis L. **soft chess**	Nat.		2002	
Chloris barbata (L.) Sw. **swollen fingergrass**	Nat.		2002	2006
Cynodon dactylon (L.) Pers. **Bermuda grass**	Nat.	1965		2006
Digitaria setigera Roth **kukaipua'a, itchy crabgrass**	Ind?	1965		
Eleusine indica **goosegrass, manienie ali`i**	Nat.			2006
Eragrostis variabilis (Gaud.) Steud. **kawelu, 'emoloa**	End.	1965	2002	2006
Eragrostis tenella **lovegrass**	Nat.			2006
Heteropogon contortus (L.) P. Beauv. Ex Roem. & Schult. **pili grass**	Ind?	1965		
Melinis minutiflora P. Beauv. **molasses grass**	Nat.		2002	

Paspalum vaginatum Sw. **seashore paspalum**	Nat.		2002	
Rhynchelytrum repens (Willd.) Hubb. **natal redtop**	Nat.	1965		
Schizachyrium condensatum (Kunth) Nees **little bluestem, beardgrass**	Nat		2002	
Setaria gracilis Kunth **yellow foxtail**	Nat.		2002	
Pteridophytes				
Dryopteridacea				
Nephrolepis cordifolia **narrow swordfern, kupukupu, `okupukupu**	Ind.			2006
Psilotaceae				
Psilotum nudum (L.) P. Beauv. **moa**	Ind.		2002	
Pteridaceae				
Adiantum hispidulum **five-finger maidenhair**	Nat.			2006
Adiantum raddianum C. Presl **common maidenhair**	Nat.		2002	
Thelypteridaceae				
Cyclosorus interruptus (Willd.) H. Itô (end) **neke**	End.		2002	2006
Fungi				
Polyporaceae				
Pycnoporus sanguineus				2006

Comments:

Asteraceae:
Emilia sonchifolia should be *E. fosbergii*.

Pluchea carolinensis should be *P. symphytifolia*

Convolvulaceae:
Found *Ipomoea obscura* (nat.). Not found before.

Fabaceae:
`Awikiwiki was identified as *Canavalia sp*. In 1965, and *Canavaslia napaliensis* in 2002. The `awikiwiki we found did not have the texture of the leaves of the *C. knapaliensis*; it had smooth leaves like the *C. kauaiensis*. I believe it is *C. kauaiensis*.

We found clover in Nu`alolo Kai, but could not identify the species. I listed it as *Desmodium sp*.

Indigofera suffruticosa is listed as creeping indigo. *I. suffruticosa* has the common name of indigo. Creeping indigo is *Indigofera spicata*

Menispermaceae:
Cocculus trilobus and *Cocculus orbiculatus* afre probably the same plant.

Moraceae:
Left the Chinese banyan as *Ficus microcarpal.*

Nyctaginaceae:
Boerhavia glabrata now known as *Boerhavia repens.*

Verbenaceae:
Stachytarpheta dichotoma (found in 1965) and *Stachytarpheta jamaicensis* (found in 2002 and 2006) may be the same plants, since both are very similar.

Pocaceae:
Added two grasses:

1) *Eleusine indica* (nat.) **goosegrass, manienie ali`I**
2) *Eragrostis tenella* (nat.) **lovegrass**

Difficult to identify the other grasses with out the flowers. Did anyone id the tall grass with the fluffy spikes found along the trails?

Native species not found:
Fourteen plants previously found at Nu`alolo Kai were not found in 2006. Of these six were identified in 1965, but not since. We found eighteen native species on this survey, one (*Nephrolepis cordifolia*) which was not found on previous surveys.

It is believed that *Lipochaeta sp*. (1965) and *Lipochaeta cannata* (2002) are the same plant. *Schiedea sp*. (1965) and *Schiedea apokremnos* (2002) are probably the same plant also. These plants are not included in the number of fourteen.

The 2006 survey was taken in early September (1-3), while the 2002 survey was taken in August. There should not have been much climatic changes between the two surveys. It is not know in which month the 1965 survey was taken. It was dry in 2006, but not drought conditions. It seem to be a normal summer. The results could have been different if the survey were taken in early summer.

Very noticeable was the lack of plants you normally find on the beaches. The only plants found were *Scaevola taccada* (naupaka kahakai) and *Vitex rotundifolia* (pohinahina). There were only two places that S. taccada were found, at the boat landing and high on the east cliff. Missing were the normal beach plants *Ipomoea pes-caprae* (pohuehue) and *Jacquemonita ovalifolia* (pa`uohi`iaka). Boerhavia glabrata (alena) also was not found. Only *Vitex rotundifolia* (pohinahina) was doing well.

Bidens sp. **Ko'oko'olau**	End.	1965	2002
Lipochaeta connata* (Gaud.) DC var. *acris* (Sherff) Gardner **nehe	End.		2002
Lipochaeta sp.* **Nehe Probably same plant as above (2002).	End.	1965	
Schiedea apokremnos* St. John **ma`oli`oli	End. E		2002
**Schiedea sp.* Probably the same plant as above (2002).		1965	
Ipomoea indica (Burm.) Merr. **koali 'awa**	Ind.	1965	2002
Ipomoea pes-caprae (L.) R. Br. subsp. *brasiliensis* (L.) Ooststr. **pohuehue**	Ind.	1965	2002
Jacquemontia ovalifolia (Choisy) H. Hallier **pa'uohi'iaka**	Ind.	1965	
Sicyos pachycarpus Hook. & Arnott **kupala, 'anunu**	End.	1965	2002
Plectranthus parviflorus Willd. **'ala'ala wai nui pua ki**	Ind.		2002
Sida fallax Walp. **'ilima**	Ind.		2002
Boerhavia glabrata Blume **alena**	Ind.	1965	
Peperomia leptostachya Hook. & Arnott **'ala'ala wai nui**	Ind.	1965	
Hedyotis st.-johnii Stone & Lane	End. E.	1965	2002
Solanum americanum Mill. **popolo, glossy nightshade**	Ind?	1965	
Digitaria setigera Roth **kukaipua'a, itchy crabgrass**	Ind?	1965	
Heteropogon contortus (L.) P. Beauv. Ex Roem. & Schult. **pili grass**	Ind?	1965	
Psilotum nudum (L.) P. Beauv. **moa**	Ind.		2002

* Probably the same species as the other plant in the same genus.

Recommendations:

1. ***Carica papaya*** **(papaya**): Five large plants were found in the walled area near the beach. Only one of these was a heterosexual plant producing fruits. The other four were male plants producing male flowers only and will not produce fruits. Recommend that the heterosexual tree be removed. To eradicate the plant completely, seedlings must be removed by volunteer workers.

2. ***Opuntia ficus-indica*** **(prickly pear, panini):** Ony two plants were found, a small one high on the cliffs left of the waterfall and the other on the slope above the beach at GPS location: N 122° 9.493', W 159° 42.111'. The one on the slope was large and was cut down. Monitor this plant and remove any that starts to grow in the area.

3. ***Ficus microcarpa*** **(Chinese banyan):** There were five of these trees in the boat landing area. The ones by the picnic tables provide valuable shade for the tour groups. They should remain, but those farther inland should be removed. Other Native or Polynesian introduced trees such as the *Cordia subcordata* (kou) or *Callophyllum inophylum* (kamani) trees should be planted in the area of the picnic tables so that all the banyans could eventually be removed. Arrangements could be made with the tour boats to water the newly planted trees to keep them from drying out.

4. ***Psidium guajava*** **(guava):** Only four trees were found; one near the cap area and three along the stream, above where it branches to east and west outlets. All were cut down. Monitor these area as they will probably grow back. Recomment all seedlings be removed to prevent them from growing back.

5. ***Passiflora edulus*** **(passion fruit, lilikoi):** Only two plants were found, one young one near the boat landing and a mature one near the camp. Bothe were uprooted, but there are probably more. Recommend that any new plants be removed.

6. ***Syzygium cumini*** **(Java plum**): These trees are present but not abundant. The goats do not appear to like the bark of these trees so they will not be destroyed by them. Recommend that action be taken to remove these trees before they become too abundant.

5. ***Melia azedarach*** **(pride-of-India, chinaberry**): These trees seem to be spreading and should be removed before they become a serious problem. They are still small in numbers and could be eradicated.

6. ***Psydrax odorata*** **(alahe`e):** Nine plants were found, mostly up near the cliffs and one near the Kamaile site. The ones higher up show signs of being nibbled on by goats. Recommend that these trees be made goat-proof.

7. ***Xanthium strumarium*** (cocklebur): This plant was found mostly at the top of the rocky beach between the campsite and the boat landing. A few plants were also found at guide marker 1. All plants found were removed. A This species could be eradicated if it is removed anytime it is

found. There were a lot of the fruits in the rocks so the seeds will continue to produce new plants for a while.

8. Two new alien species (***Boerhavia coccinea*** **and** ***Desmodium sp***.) were found on this survey. Both were found on the established trails for tourists and nowhere else. Both are common weeds outside of Nu`alolo Kai with sticky seeds or seed pods. The seeds were probably brought in on the clothing of people visiting the park. Efforts should be made to insure that people coming into Nu`alolo Kai brush their shoes and clothing off to remove any seeds. These are standard procedures at Nature Conservancy preserves.

9. **Water** will be the limiting factor if future plantings of native and Polynesian trees and shrubs are planned. Any new plants introduced into Nu`alolo Kai will need to be watered regularly to survive. Native plants often require a lot of watering for at least the first year. A water source is needed as it will be difficult to carry all the water needed to Nu`alolo Kai. Recommend that the spring be tested for flow rate and that water tank and collection system be established to irrigate newly plants trees and shrubs. A horse watering trough or tanks can be concealed uphill of the plantings and black poly tubing with drip emitters, hidden under a layer of leaves, be used to water the seedlings using gravity flow. A nine volt or solar powered solenoid valve can be used to turn the irrigation system on and off.

   Perhaps the local tour boat captains and crews or the Napali Coast 'Ohana who visit regularly can be encouraged to help water the new seedling plantings as they will beautify their areas. It could be as simple and easy as pouring the leftover ice chest water into water troughs, tanks or on to the planting holes. Tourists may even be encouraged to help by tote in gallon jugs for watering.

10. Suggest that any new plantings of native trees and shrubs grown from the seeds found in neighboring Napali Coast valleys begin around the picnic table and restroom areas above the boat landing, along the pathway borders. Plantings could also be established near the fresh water spring, but care must be taken not to damage the walls, heiau, and cemetery. Seeds should be gathered soon so that the seedlings needed will be large enough for transplanting next summer. Planting holes can be dug using hand tools and trowels as to not damage any archeological artifacts... the sandy soil can be sifted to remove anything of value. Holes should be at least a foot to two feet deep and ten inches in diameter. Moist soil is much easier to dig up, but because fresh water is scarce, maybe spring water can be used for this purpose. A combination of topsoil from the mauka areas and compost from the coconut trash piles can be used to enhance the existing sandy soil to help in water retention and root growth, or commercial compost can be brought in by boat. A handful of 10-30-10 fertilizer should be added to the bottom of the planting hole, more soil/compost mixture added, and then the seeding can be transplanted into the hole. Once the seedlings begin to grow, they will reach down in to this nutrient rich layer and flush with new growth... a practice used by fruit tree growers. Too much fertilizer may burn the plants, so care must be given when adding it to the holes... it cannot touch or be too near the seedling roots. Planting holes should be ringed with large pohaku from the shoreline to help retain moisture and conserve water, a Hawaiian sustainable method practiced on the mauka drylands of Kona. A thick layer of coconut husks and noni leaves can be used as mulch to conserve and retain moisture... both are in good supply. The noni trees are very healthy

and the new leaves dark green in color, indicating that the fresh water table is rather close to the surface... ninety percent of most tree roots are within a few feet of the soil surface. Something must be done to protect the seedlings from the goats, possibly wire fencing if it is acceptable.

Once the plants near the landing area are established and can survive on their own, new plantings can be expanded and started along the walkways, and little by little, Nualolokai will blossom into the oasis it once was.

Botanical Survey Team Members

Clayton Godbolt

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