

APPENDICIES

Palikea Fire Reconnaissance

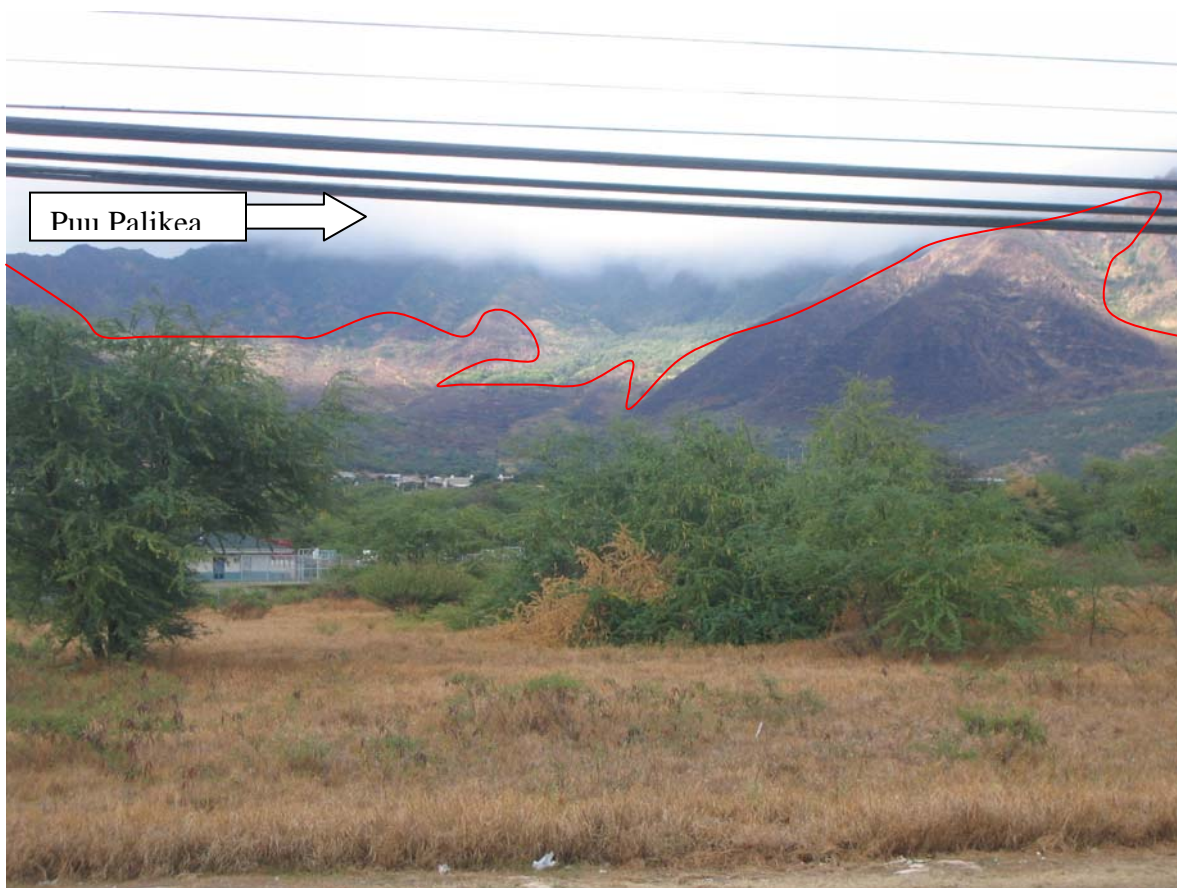
APVG-GWV (200-3)

20 June 2005

MEMORANDUM FOR RECORD

SUBJECT: Reconnaissance for Nanakuli fire that threatened Puu Palikea

1. On 16 June 2005, Michelle Mansker, Gayland Enriques, Kapua Kawelo and Dan Sailer (Nature Conservancy Staff) hiked out to Puu Palikea to discuss the Nanakuli fire that occurred in May 2005. The fire was climbing out of Nanakuli valley in the direction of Puu Palikea (Honouliuli Preserve) and threatening the rare resources atop the Puu. The Army funded a Huey helicopter to fly water drops in Nanakuli to fight the fire. The Army spent \$17K on helicopter time for the first Thursday of May. The fire was not completely extinguished until over a week later.
2. A photo showing the extent of the fire is attached. More than 3,000 acres burned. The fire started near the residential area in Nanakuli Valley. The cause of the fire was determined to be arson.
- 3.



View from Farrington Highway looking up into Nanakuli Valley toward Puu Palikea. Puu Palikea is in the clouds but proximity of the fire to Puu Palikea is visible. The fire burned everything below the red line.

4. The site visit conducted on 16 June 2005 was conducted as an after action review of fire response. The following topics were discussed:

Huey Helicopter

Dan Sailer stated that the most useful resource committed by the Army during the fire operations was the helicopter support. The incident command (IC) system was discussed as it related to directing helicopter resources. Mr. Enriquez stated that it really does not matter how the helicopter is intended to be used, the incident commander has control of all the helicopter assets. Mr. Enriquez said it was really important to be clear about the intent of use of the helicopter with the IC from the start and then to have someone at the IC center representing your interests.

Ms. Kawelo asked if the Huey could be hired to fight fires on Army training lands particularly in areas of natural resource value. Mr. Enriquez said that he fully supports their help.

Fire line clearing atop Puu Palikea

The Nature Conservancy cleared an area of bare earth along and on the leeward side of the ridge crest at Puu Palikea. The intent of this cleared zone was as a fuel break for use in the event the fire did reach Puu Palikea. Mr. Sailer intended to wet the area with a fire retardant and water if the fire climbed the ridges to near Puu Palikea. The swath that was cleared along the ridge crest averaged six feet in width. Mainly alien grasses were cleared.

Communication

Communication during the fire was essential. Gayland Enriquez stated that it was important for us to be in constant communication with the IC center below in the event that the fire began to climb quickly toward the Puu. Ms. Kawelo stated that communication was very cumbersome during the fire and that one person should do nothing but communicate.

Safety

Mr. Enriquez stated that it was very important to be in communication with the IC when involved in a fire. Mr. Sailer contends that the operation atop the ridge was an independent Nature Conservancy effort for which they did not need IC approval. Mr. Enriquez stated that we should have had a permanent look out to inform us of the fire's status and exact location. The smoke below in the valley limited visibility from above.

Kapua Kawelo discussed training for her staff. All support more involvement by natural resources staff in fires in order to assist in directing fire fighting resources. Two risk assessments will be prepared, one for Army Civilian staff and one for contract RCUH staff. David Duffy said that his RCUH staff can clear fire line but should have appropriate training. Mr. Enriquez said that his new fire crew would be starting in July and that he'd be coordinating a basic fire fighting training course soon after they begin.

5. POC is the undersigned, 656-7641/7741.

KAPUA KAWELO
Biologist, Environmental Division

APVG-GWV (200-3)

18 Aug 2005

MEMORANDUM FOR RECORD

SUBJECT: Reconnaissance for Makua Military Reservation Fire started 8/3/05

On 3 August 2005, a fire started at MMR within the South firebreak road. Suspected cause was a White Phosphorus (WP) round which heated up and spontaneously ignited. The winds were strong easterly winds. The fire began close to 1200 hours. The fire burned a total of approximately 280 acres.

1. Natural Resources Involvement: On this date, Ms. Kapua Kawelo was conducting a site visit at Kaluakauila fence unit with a few visiting conservation biologists from New Caledonia. The site visit was to compare issues with dry forest restoration in Hawaii to those in New Caledonia. The group emerged from the forest at approximately 2:45pm and immediately saw the smoke coming from the MMR fire. Ms. Kawelo called the Natural Resources Center and was updated on the fire. This raises issues related to poor communications in Kaluakauila. NRS will work to acquire a pager and cellular phone service that uses radio towers at Yokohama.

Ms. Kawelo hiked up to the ridge crest and was able to observe the fire. It was possible to see that the fire had jumped outside the firebreak near the lower *Chamaesyce celastroides* patch at Lower Ohikilolo but from above it looked as if it was stopped along the perimeter of the patch. Ms. Kawelo asked base to notify Howard Esterbrook the owner of Pacific Helicopters that his services may be needed for fighting fire on Thursday. He stated that Gayland Enriques, Fire Chief had already spoken with him and he was on standby.

Natural Resources Staff headed back to the vehicle on Kuaokala Road and drove out via the Kaena Point Air Force Tracking Station. Ms. Kawelo wanted to get on site at the fire to assist Mr. Enriques with directing fire attack resources.

When Ms. Kawelo reached Makua Range Control, Mr. Enriques had been on site for sometime and was directing fire fighting ground crews and helicopters. The Honolulu City and County helicopter was on scene as was one Army Blackhawk. By the time Ms. Kawelo reached the site, the fire along the perimeter of the *Chamaesyce* had been extinguished. Fire was still burning inside the firebreak road just below the *Hibiscus brackenridgei* population where grass was tall and thick. Fuels modification is not conducted in this area as it is too steep for weed whacking contractors. Ms. Kawelo drove out along the road with Mr. Tom Piskel to obtain a closer view and give guidance to Mr. Enriques. The fire crews were at the point just below the *Hibiscus* and were actively fighting the fire with fire trucks. In addition, the air one helicopter was dropping water drops at this location. Ms. Kawelo felt comfortable that fire crews on site were being skillfully deployed with natural resource protection as a priority. She departed after providing Mr. Enriques an assessment and left him her contact information.

2. Extent of Fire. Please see attached map for extent. In addition photos are also included to illustrate the fires extent where natural resources are a concern.

MMR - Burn Area
Fire occurred 3 August 2005 covered ~185 acres

- ★ Range Control
- Rare Plant Patches
- ▨ Burn Area
- FireBreak Road
- ⋈ Fence

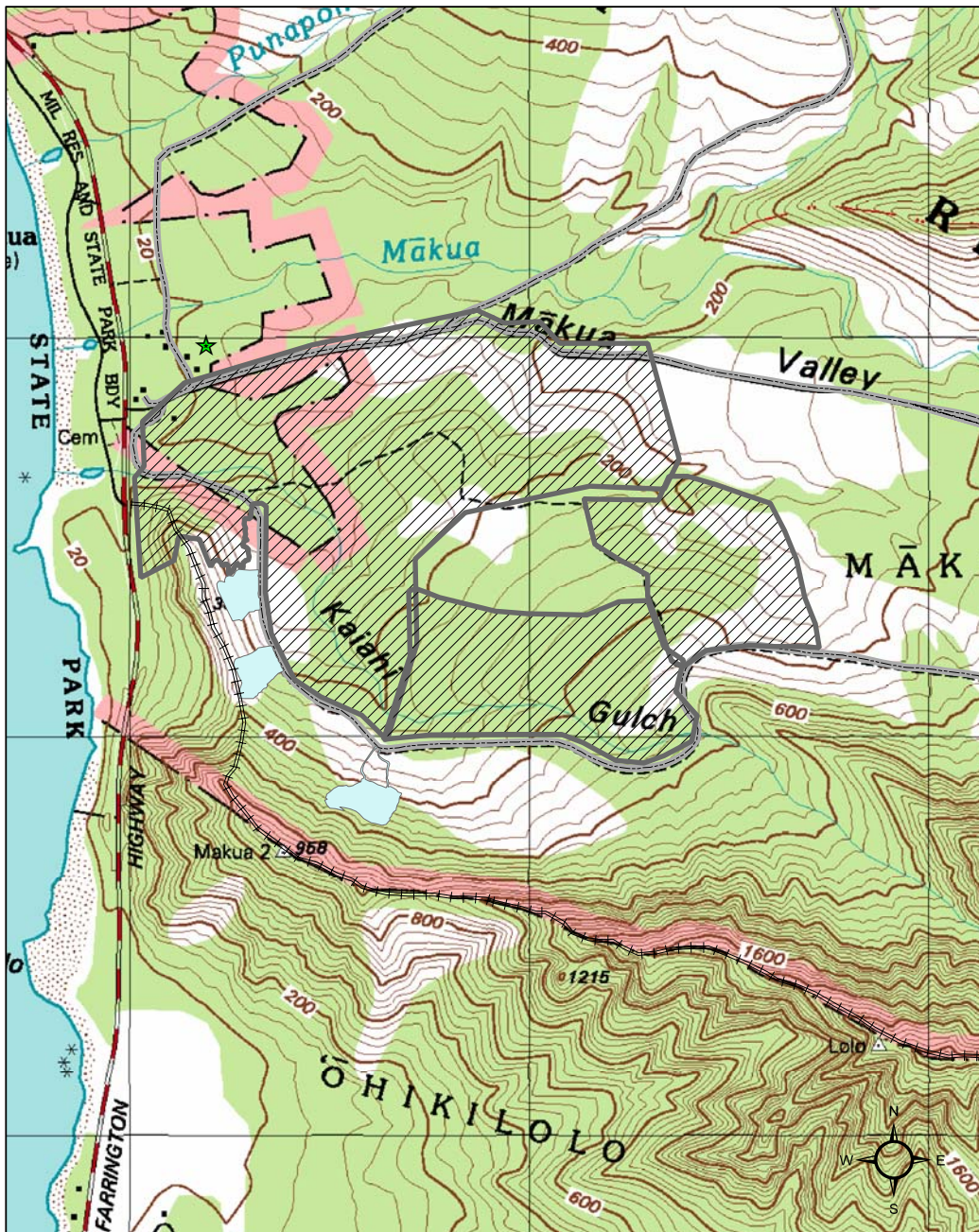




Photo taken from south firebreak below Ko`iahi gulch on 4 Aug 2005.

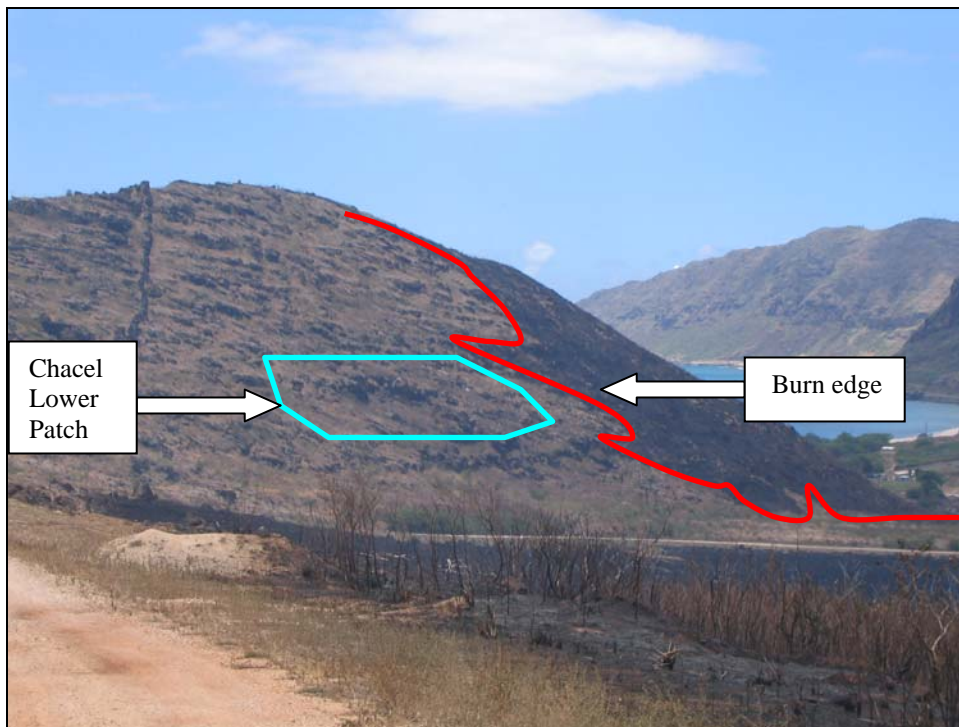


Photo shows edge of fire closest to *Chamaesyce celastroides* population.

3. Natural Resource Impact. There were no rare native resources impacted in this fire. Common native species and alien species burned are listed in the table below. A thorough survey of the *Chamaesyce celastroides* population was conducted on 30 August 2005. Although the fire did

not burn any *C. celastroides* plants, the burn perimeter at its closest was 10 meters away from an outlier plant.

Native Plant Species	Alien Plant Species
<i>Heterpogon contortus</i> (Pili)	<i>Leucaena leucocephala</i> (Koa Haole)
<i>Waltheria indica</i> (Uhaloa)	<i>Panicum maximum</i> (Guinea grass)
<i>Sida fallax</i> (Ilima)	<i>Prosopis pallida</i> (Kiawe)
<i>Dodonaea viscosa</i> (A`ali`i)	<i>Andropogon virginicus</i>
<i>Argemone glauca</i> (Puakala)	<i>Acacia mearnsii</i> (Klu)
	<i>Rhyncheletrum repens</i>
	<i>Chloris barbata</i>
	<i>Leonotis nepetifolia</i>

4. POC is the undersigned, 656-7741/7641.

Encl

KAPUA KAWELO
Biologist, Environmental Division

Ekahanui Fire Chain of Events

APVG-GWV (200-3)
26 September 2005

MEMORANDUM FOR RECORD

SUBJECT: Chain of Events of fire that threatened Ekahanui Special Management Area (SMA)

1. On 22 September 2005, Michael Walker (Army NRM/ The Nature Conservancy), Chad Koide, Kahale Pali, Stefanie Loo Jefts, Pauline Sato, Lynette Williams, and Dan Sailer (The Nature Conservancy) assembled at TNC's Kunia baseyard to discuss the wildfire that occurred on September 2005 and threatened the Ekahanui SMA. The fire burned for 2 days, smoldered for an additional 11 days, with minor flare ups on 4 of those days. The fire consumed 170 acres, five of which were in the preserve. A map showing the extent of the fire is attached. The Army spent \$2450 on Helicopter time to combat the fire on 4 September 2005, while DOFAW spent ____ on helicopter time. TNC/Campbell Estate spent \$~6,000 on helicopter time. TNC also spent another \$10.5k on travel expenses for neighbor island staff and personnel time. The Ekahanui SMA contains 78 threatened and endangered species and a 40 acre fence, which would cost \$200,000 to replace today.
2. The following is a record of the chain of events reconstructed by the afore mentioned personnel.
 - 3 September 2005
 - 1300 hours, Del Monte staff report a fire in a gulch in their pineapple fields. Chief Lochran from Honolulu Fire Department takes command as the Incident Commander (IC), and Pat Costales (DOFAW) Dan Sailer, Stefanie Loo Jefts, Chad Koide, and Pauline Sato (TNC), arrive soon after.
 - Air One is the only helicopter working the fire as no contract helicopters were available.
 - Mid-afternoon Chief Lochran informed Dan Sailer that he requested federal assistance through the Civil Defense fire center and was denied. He also asked his supervisor, the deputy chief of the department (Tomita?), to request assistance and he was also denied.
 - Pauline Sato contacts Gayland Enriques concerning the denied request for federal assistance. Gayland was informed that no one had made an official request to the fire center. Chief Lochran was adamant that he had made the request through the proper channels.
 - Dan Sailer notifies Chief Lochran ~7pm of his plans for the next morning.
 - 4 September 2005
 - TNC field staff arrive at Kunia baseyard at 0500 hours to prepare equipment. TNC staff (crew of four) meet Paradise Helicopter pilot Richard Potts at 0700 for reconnaissance flight of burned area. Several small fires are burning. TNC staff then hike into the burned area and initiate coordinated water drops with the contract helicopter, paid for by DOFAW.
 - ~0800 hours HFD arrives at the Kunia Golf Course to began operations, Air One begins water drops soon after. Chief Manny Neves assumes IC position.
 - Kapua Kawelo contracts Pacific Helicopters to assist with coordinated water drops.
 - Two more TNC from Molokai arrive and join the TNC crew. Matt Keir of the Army assists with logistical support.
 - Federal Fire Department arrives in the late morning with Chief Casserly and a ground crew of ~ six personnel. Pat Costales of DOFAW is present as well.

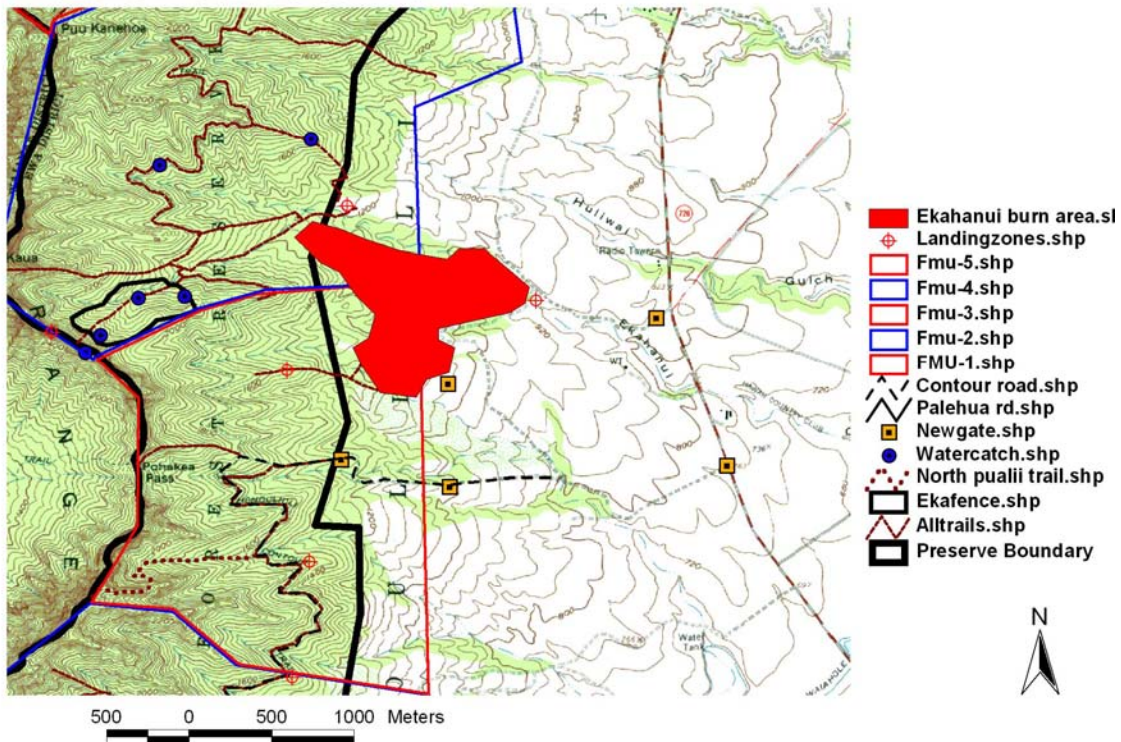
- Dan Sailer requests additional help, Pauline Sato calls Gayland Enriques and urges him to contact Chief Casserly and discuss options for more air support and activating the Army's wildfire control crew.
 - Gayland informs Pauline Sato in the afternoon that the U.S. Army Garrison does not have funding to send a Blackhawk helicopter to assist fire fighting measures.
 - During TNC staff's lunch break the Air One pilot lands and asks TNC staff if they requested a specific water drop. Since they were not working on the fire at that point, they replied no. Somehow this statement was interpreted by the pilot that no further assistance was needed by TNC, and he reported to Chief Neves that TNC requests no further assistance. Chief Neves reports this to Chief Casserly, who when speaks to Gayland Enriques reports that no further assistance is required.
 - After the afore mentioned communication breakdown, Gayland informs Pauline that the wildfire control crew is not properly trained and can not come out. He then says that he will talk to the crew members and ask them if they can come out on a volunteer basis the next day. TNC staff discuss the situation afterward, and were perplexed since the hot shot crew were on scene at the Nanakuli/Palehua fire a month earlier. TNC staff surmise that the garrison can not afford to pay the crew weekend and holiday overtime pay to work the fire.
 - TNC Hawaii Island crew of three arrives and joins the TNC team. HFD fire personnel are assigned to assist. They bring a water pump to facilitate pumping water from TNC's water tank transported via contract helicopter to the upper edge of the burn site.
 - Further discussions Pauline has separately with Chief Casserly and Gayland Enriques reveals that they have opposing view points on the federal fire response chain of command. Casserly says he has no say over the deployment of the hot shot crew, while Enriques maintains that the hot shot crew is to report to the federal fire department when called for duty.
 - By the end of the evening the fire is contained by HFD and TNC staff.
- 5 September 2005
 - Mop up work begins in the AM with TNC staff and HFD. Air One performs a few water drops, but for the majority of the day is not needed.
 - Army wildfire crew does not come as volunteers.
 - 6 September 2005
 - Small spot fire flares up, but is contained by HFD.
 - 8 September 2005 -
 - Small spot fire flares up, but is contained by TNC staff.
 - 14 September 2005
 - Last flare up occurs and is put out by TNC staff and HFD.
3. Communication and Safety Items of Concern
- While TNC staff are convinced that on the ground coordination of water drops was crucial in extinguishing the fire early, HPD was concerned that too much radio traffic was potentially hazardous as contract helicopter radios were tied up with ground crews repeatedly when Air One was attempting to contact the contract helicopters. (This could be resolved in the future by having HFD personnel work side-by-side with TNC's crew.)
 - The chain of command issues between HFD, Federal Fire Department and the Army must be resolved.
 - Who HFD Chief Lochran spoke to (Civil Defense) that denied Federal assistance should be determined to understand why the request was denied and if proper protocol was followed.

- Overtime/holiday pay for Army wildfire control crew should not be an issue during a fire that threatens endangered species.

4. POC is the undersigned, 656-7641/7741.

Michael Walker
Senior Natural Resource Management Specialist
Environmental Division

Ekahanui/Puumaialau Fire



‘Ēkahanui flora and fauna list

** = Reintroduction to PMA

E = Federally listed Endangered

SOC = Federally listed as a Species of Concern

C = Candidate for listing as endangered

NCN = No common name

* = Endemic to Honouliuli Preserve

Life form	Scientific Name	Common Name	Federal Status	Known only Historically From Preserve
Plant Community	<i>Acacia koa</i> / <i>Metrosideros polymorpha</i> Lowland Mesic Forest		None (rare on Oahu)	
Plant Community	Oahu Diverse Lowland Mesic Forest		None (rare on Oahu)	
Plant Community	<i>Metrosideros polymorpha</i> Lowland Mesic Forest		None (rare on Oahu)	
Plant	<i>Abutilon sandwicense</i>	NCN	E	
Plant	<i>Alectryon macrococcus</i> var. <i>macrococcus</i>	Māhoe	E	
Plant	<i>Bobea sandwicensis</i>	Ahakea	SOC	
Plant	<i>Chamaesyce herbstii</i>	‘Akoko	E	X
Plant	<i>Cenchrus agrimonioides</i> var. <i>agrimonioides</i> *	Kamanomano	E	
Plant	<i>Clermontia persicifolia</i>	‘Ōhā wai	SOC	
Plant	<i>Cyanea calycina</i>	Hāhā	C	
Plant	<i>Cyanea grimesiana</i> subsp. <i>obatae</i>	Hāhā	E	
Plant	<i>Cyanea membranacea</i>	Hāhā	SOC	
Plant	<i>Cyanea pinnatifida</i> *	Hāhā	E	
Plant	<i>Delissea subcordata</i>	Hāhā	E	
Plant	<i>Diellia falcata</i>	NCN	E	
Plant	<i>Diellia x lauii</i>	NCN	None (rare on Oahu)	
Plant	<i>Diellia unisora</i>	NCN	E	
Plant	<i>Dissochondrus biflorus</i>	NCN	SOC	
Plant	<i>Exocarpos gaudichaudii</i>	Heau	SOC	
Plant	<i>Fluggea neowawraea</i>	Mēhamehame	E	X
Plant	<i>Hedyotis parvula</i>	NCN	E	X
Plant	<i>Labordia kaalae</i>	Kāmakahala	SOC	
Plant	<i>Lobelia yuccoides</i>	Pānaunau	SOC	

Plant	<i>Melicope christophersenii</i>	Alani	C	X
Plant	<i>Melicope saint johnii</i>	Alani	E	
Plant	<i>Morinda trimera</i>	Noni Kuahiwi	SOC	
Plant	<i>Neraudia angulata var. angulata</i>	Ma'aloa	E	X
Plant	<i>Neraudia angulata var. dentata</i>	Ma'aloa	E	X
Plant	<i>Neraudia melastomifolia</i>	Ma'aloa	SOC	
Plant	<i>Nothoestrum longifolium</i>	'Aiea	SOC	
Plant	<i>Phyllostegia parviflora var. lydgatei</i>	NCN	E	
Plant	<i>Phyllostegia kaalaensis</i>	NCN	E	X
Plant	<i>Phyllostegia mollis</i>	NCN	E	
Plant	<i>Plantago princeps var. princeps</i>	Ale	E	
Plant	<i>Platydesma cornuta var. decurrens</i>	Pilokea	C	
Plant	<i>Pleomele forbesii</i>	Halapepe	C	
Plant	<i>Pteralyxia macrocarpa</i>	Kaulu	SOC	
Plant	<i>Schiedea hookeri</i>	NCN	E	
Plant	<i>Schiedea kaalae</i>	NCN	E	
Plant	<i>Schiedea pentandra</i>	NCN	SOC	
Plant	<i>Solanum sandwicense*</i>	Pōpolo 'aiakeakua	E	
Plant	<i>Sophora chrysophylla</i>	Māmane	None (rare on Oahu)	
Plant	<i>Stronglyodon rubber</i>	Nuku 'iwi	SOC	
Plant	<i>Tetramolopium lepidotum subsp. lepidotum</i>	Lali'i	E	
Plant	<i>Urera kaalae</i>	Ōpuhe	E	
Plant	<i>Zanthoxylum dipetalum var. dipetalum</i>	A'e	SOC	
Vertebrate	<i>Chasiempis sandwichensis subsp. Ibis</i>	O'ahu `elepaio	E	
Vertebrate	<i>Asio flammeus sandwichensis</i>	Pueo	None (rare on Oahu)	
Vertebrate	<i>Vestiaria coccinea</i>	'iwi	None (rare on Oahu)	X
Invertebrate (snail)	<i>Achatinella concavospira</i>	Pūpū Kuahiwi	E	
Invertebrate (snail)	<i>Achatinella mustelina</i>	Pūpū Kuahiwi	E	
Invertebrate (snail)	<i>Amastra crassilabrum</i>	NCN	None (rare on Oahu)	X
Invertebrate (snail)	<i>Amastra cylindrical</i>	NCN	SOC	
Invertebrate (snail)	<i>Amastra elephantine</i>	NCN	None (rare on Oahu)	X
Invertebrate (snail)	<i>Amastra micans</i>	NCN	SOC	

Invertebrate (snail)	<i>Amastra spirizona</i>	NCN	SOC	
Invertebrate (snail)	<i>Armsia petasus</i>	NCN	None (rare on Oahu)	X
Invertebrate (snail)	<i>Auricullela ambusta</i>	NCN	SOC	
Invertebrate (snail)	<i>Auricullela perpusilla</i>	NCN	None (rare on Oahu)	
Invertebrate (snail)	<i>Auricullela tenella</i>	NCN	None (rare on Oahu)	
Invertebrate (snail)	<i>Catanella rotundata</i>	NCN	SOC	
Invertebrate (snail)	<i>Cookeconcha sp. 1*</i>	NCN	None (rare on Oahu)	
Invertebrate (snail)	<i>Endodonta sp. 1</i>	NCN	None (rare on Oahu)	
Invertebrate (snail)	<i>Laminella sanguinea</i>	NCN	SOC	
Invertebrate (snail)	<i>Leptachatina sp. 2</i>	NCN	SOC	
Invertebrate (snail)	<i>Leptachatina sp. 8</i>	NCN	SOC	
Invertebrate (snail)	<i>Philonesia sp.</i>	NCN	SOC	
Invertebrate (snail)	<i>Pleuropoma sandwichensis</i>	NCN	SOC	
Invertebrate (snail)	<i>Pterodiscus heliciformis</i>	NCN	None (rare on Oahu)	
Invertebrate (fly)	<i>Drosophiles aglaia</i>	pomace fly	C	
Invertebrate (fly)	<i>Drosophila ambochila*</i>	pomace fly	C	
Invertebrate (fly)	<i>Drosophila montgomeryi*</i>	pomace fly	C	
Invertebrate (fly)	<i>Drosophila tarphytrichia</i>	pomace fly	C	
Invertebrate (fly)	<i>Drosophila flexipes</i>	pomace fly	None (rare on Oahu)	
Invertebrate (lacewing)	<i>Anomalochrysa sylvicola</i>	Sylvan green lacewing	None (rare on Oahu)	
Invertebrate (bee)	<i>Nesoprosopis unica</i>	Unique yellow-faced bee	None (rare on Oahu)	
Invertebrate (psyllid)	<i>Gen. nov. sp. 1</i>	Nothocestrum psyllid	None (rare on Oahu)	
Invertebrate (planthopper)	<i>Dictyophorodelphax mirabilis</i>	'akoko planthopper	None (rare on Oahu)	
Invertebrate (moth)	<i>Hedylepta monogramma</i>	Hedylepta moth	None (rare on Oahu)	X
Invertebrate (beetle)	<i>Nesopeplus serratus</i>	Souring beetle	None (rare on Oahu)	X
Invertebrate (weevil)	<i>Pentarthum obscurum</i>	Pentarthum weevil	None (rare on Oahu)	X

Taxa Abbreviations

Taxa Abbreviations	Taxa
Abugra	<i>Abutilon grandifolium</i>
Acacon	<i>Acacia confusa</i>
Acafar	<i>Acacia farnesiana</i>
Acaman	<i>Acacia mangium</i>
Acamea	<i>Acacia mearnsii</i>
Achasp	<i>Achyranthes aspera</i> var. <i>aspera</i>
Adihis	<i>Adiatum hispidulum</i>
Adirad	<i>Adiantum radianum</i>
Agasis	<i>Agave sisalana</i>
Ageade	<i>Ageratina adenophora</i>
Agerip	<i>Ageratina riparia</i>
Agecon	<i>Ageratum conyzoides</i>
Alemol	<i>Aleurites moluccana</i>
Alomac	<i>Alocasia macrorrhiza</i>
Altses	<i>Alternanthera sessilis</i>
Alyvag	<i>Alysicarpus vaginalis</i>
Amaspi	<i>Amaranthus spinosus</i>
Amavir	<i>Amaranthus viridis</i>
Ambart	<i>Ambrosia artemisiifolia</i>
Anaarv	<i>Anagallis arvensis</i>
Andvir	<i>Andropogon virginicus</i>
Angeve	<i>Angiopteris evecta</i>
Antodo	<i>Anthoxanthum odoratum</i>
Aracol	<i>Araucaria columnaris</i>
Arcale	<i>Archontophoenix alexandrae</i>
Ardcre	<i>Ardesia cretica</i>
Ardell	<i>Ardesia elliptica</i>
Artcil	<i>Arthrostemma ciliatum</i>
Arugra	<i>Arundia graminifolia</i>
Ascphy	<i>Asclepias physocarpa</i>
Asygan	<i>Asystasia gangetica</i>
Atrsem	<i>Atriplex semibaccata</i>
Avefat	<i>Avena fatua</i>
Axocom	<i>Axonopus compressus</i>
Axofis	<i>Axonopus fissifolius</i>
Bidalb	<i>Bidens alba</i>
Bidpil	<i>Bidens pilosa</i>
Bleapp	<i>Blechnum appendiculatum</i>
Boecoc	<i>Boerhavia coccinea</i>
Botper	<i>Bothriochloa pertusa</i>
	<i>Bougainvillea</i> sp.
Bramut	<i>Brachiaria mutica</i>
Brasub	<i>Brachiaria subquadripara</i>
Brexmad	<i>Brexia madagascariensis</i>
Brugym	<i>Bruguiera gymnorrhiza</i>
Budasi	<i>Buddleia asiatica</i>

Taxa Abbreviations	Taxa
Budmad	<i>Buddleia madagascariensis</i>
Caedec	<i>Caesalpinia decapetala</i>
	<i>Callitris</i> sp.
Calvia	<i>Calyptocarpus vialis</i>
Cancat	<i>Canavalia cathartica</i>
Carpap	<i>Carica papaya</i>
Casarv	<i>Castilleja arvensis</i>
Casela	<i>Castilloa elastica</i>
Casequ	<i>Casuarina equisetifolia</i>
Casgla	<i>Casuarina glauca</i>
Cecobt	<i>Cecropia obtusifolia</i>
	<i>Cedar</i> sp.
Cencil	<i>Cenchrus ciliaris</i>
Cenech	<i>Cenchrus echinatus</i>
Cenery	<i>Centaurium erythraea</i>
Cenasi	<i>Centella asiatica</i>
Cerfon	<i>Cerastium fontanum</i> subsp. <i>triviale</i>
Cesnoc	<i>Cestrum nocturnum</i>
Chanic	<i>Chamaecrista nictitans</i> var. <i>glabrata</i>
Chahir	<i>Chamaesyce hirta</i>
Chahyp	<i>Chamaesyce hypericifolia</i>
Chapro	<i>Chamaesyce prostrata</i>
Chemur	<i>Chenopodium murale</i>
Chivir	<i>Chielanthes viridis</i> (green cliff break)
Chlbar	<i>Chloris barbata</i>
Chlrad	<i>Chloris radiata</i>
	<i>Chloris</i> sp.
Chlvir	<i>Chloris virgata</i>
Chrden	<i>Christella dentata</i>
Chrpar	<i>Christella parasitica</i>
Chroli	<i>Chrysophyllum oliviforme</i>
Chraci	<i>Chrysopogon aciculatus</i>
Ciclep	<i>Ciclospermum leptophyllum</i>
Cinbur	<i>Cinnamomum burmannii</i>
Cirvul	<i>Cirsium vulgare</i>
Citcau	<i>Citharexylum caudatum</i>
Citspi	<i>Citharexylum spinosum</i>
	<i>Citrus</i> sp.
Clihir	<i>Clidemia hirta</i>
Cluros	<i>Clusea rosea</i>
Cocgra	<i>Coccinia grandis</i>
Codvar	<i>Codiaeum variegatum</i>
Cofara	<i>Coffee arabica</i>
Coilac	<i>Coix lachryma-jobi</i>
Comdif	<i>Commelina diffusa</i>
Conbon	<i>Conyza bonariensis</i>

Taxa Abbreviations

Taxa Abbreviations	Taxa
Corgla	<i>Cordia glabra</i>
Corfru	<i>Cordyline fruticosa</i>
Cordid	<i>Coronopus didymus</i>
Corlae	<i>Corynocarpus laevigatus</i>
Cracre	<i>Crassocephalum crepidioides</i>
Criaug	<i>Crinum augustum</i>
Criasi	<i>Crinum asiaticum</i>
CroXcro	<i>Crocasmia X crocosmiifolia</i>
Cropal	<i>Crotalaria pallida</i>
Croret	<i>Crotalaria retusa</i>
Cupcar	<i>Cuphea carthenagensis</i>
Cyacin	<i>Cyanthillium cinereum</i>
Cyclep	<i>Cyclospermum leptophyllum</i>
Cyodac	<i>Cynodon dactylon</i>
Cypgra	<i>Cyperus gracilis</i>
Cyprot	<i>Cyperus rotundus</i>
	<i>Cypress sp.</i>
Datstr	<i>Datura stramonium</i>
Daupus	<i>Daucus pusillus</i>
Deppet	<i>Deparia petersenii</i>
Desvir	<i>Desmanthus virgatus</i>
Desinc	<i>Desmodium incanum</i>
Desint	<i>Desmodium intortum</i>
Dessan	<i>Desmodium sandwicense</i>
Destor	<i>Desmodium tortuosum</i>
Destri	<i>Desmodium triflorum</i>
Digcil	<i>Digitaria ciliaris</i>
Digins	<i>Digitaria insularis</i>
	<i>Digitaria sp.</i>
Digvio	<i>Digitaria violascens</i>
	<i>Dracaena</i>
	<i>Echinochloa sp.</i>
Ehrsti	<i>Ehrharta stipoides</i>
Elegen	<i>Eleocharis geniculata</i>
Eleobt	<i>Eleocharis obtusa</i>
Elerad	<i>Eleocharis radicans</i>
Eleind	<i>Eleusine indica</i>
Emifos	<i>Emilia fosbergii</i>
Emison	<i>Emilia sonchifolia</i>
EpiXobr	<i>Epidendrum X obrienianum</i>
Epipinaur	<i>Epipremnum pinnatum var. aureum</i>
Eraelo	<i>Eragrostis elongata</i>
Eraten	<i>Eragrostis tenella</i>
Erival	<i>Erichtites valerianifolia</i>
Erikar	<i>Erigeron karvinskianus</i>
Erijap	<i>Eriobotrya japonica</i>

Taxa Abbreviations	Taxa
Eucglo	<i>Eucalyptus globulus</i>
Eucrob	<i>Eucalyptus robusta</i>
	<i>Eucalyptus sp.</i>
Euphet	<i>Euphorbia heterophylla</i>
Euppep	<i>Euphorbia peplus</i>
	<i>Euphorbia sp.</i>
Falmol	<i>Falcataria moluccana</i>
Ficmic	<i>Ficus microcarpa</i>
	<i>Ficus sp.</i>
Frauhd	<i>Fraxinus uhdei</i>
Gampur	<i>Gamochoeta purpurea</i>
Neowig	<i>Neonotonia wightii</i>
Gomglo	<i>Gomphrena globosa</i>
Goshir	<i>Gossypium hirsutum</i>
Greban	<i>Grevillea banksii</i>
Grerob	<i>Grevillea robusta</i>
Haecam	<i>Haematoxylum campechianum</i>
Hedcor	<i>Hedychium coronarium</i>
Hedfla	<i>Hedychium flavescens</i>
Hedgar	<i>Hedychium gardnerianum</i>
Helpop	<i>Heliocarpus popayanensis</i>
Helprodep	<i>Heliotropium procumbens var. depressum</i>
	<i>Hibiscus sp.</i>
Hibtil	<i>Hibiscus tiliaceus</i>
Hollan	<i>Holcus lanatus</i>
Hypruf	<i>Hyparrhenia ruffa</i>
Hypgla	<i>Hypochoeris glabra</i>
Hyorad	<i>Hypochoeris radicata</i>
	<i>Hypochoeris species</i>
Hyppec	<i>Hyptis pectinata</i>
	<i>Hyptis sp.</i>
Indspi	<i>Indigofera spicata</i>
Indsuf	<i>Indigofera suffruticosa</i>
Ipoalb	<i>Ipomoea alba</i>
Ipoat	<i>Ipomoea batatas</i>
Ipocai	<i>Ipomoea cairica</i>
Ipoobs	<i>Ipomoea obscura</i>
Ipooch	<i>Ipomoea ochracea</i>
	<i>Ipomoea sp.</i>
Ipotri	<i>Ipomoea triloba</i>
Ipovil	<i>Ipomoea viloacea</i>
	<i>Iris sp.</i>
Jasflu	<i>Jasminum fluminense</i>
Junpla	<i>Juncus planifolius</i>
	<i>Juniperus sp.</i>

Taxa Abbreviations

Taxa Abbreviations	Taxa
Jusbet	Justicia betonica
Kalcre	Kalanchoe crenata
Kalpin	Kalanchoe pinnata
Kylbre	Kyllinga brevifolia
Kylnem	Kyllinga nemoralis
Labpur	Lablab purpureus
Lancam	Lantana camara
Leonep	Leonotis nepetifolia
Lepfla	Leptospermum flavescens
Lepsco	Leptospermum scoparium
Leuleu	Leucaena leucocephala
Lintri	Linum trigynum
Livchi	Livistona chinensis
Lopcon	Lophostemon confertus
Ludoct	Ludwigia octovalis
	Lychee sp.
Lycesc	Lycopersicon esculentum
Lypim	Lycopersicon pimpinellifolium
Macint	Macadamia integrifolia
Macmap	Macaranga mappa
Macung	Macfadyena unguis-cati
Macatr	Macroptilium atropurpureum
Maclat	Macroptilium lathyroides
Macaxigla	Macrotyloma axillare var. glabrum
Malpar	Malva parviflora
Malcor	Malvastrum coromandelianum
Malpen	Malvaviscus penduliflorus
Manind	Mangifera indica
Medlup	Medicago lupulina
Medpol	Medicago polymorpha
Melqui	Melaleuca quinquenervia
Melcan	Melastoma candidum
Melaze	Melia azedarach
Melmin	Melinis minutiflora
Melumb	Melochia umbellata
Meraeg	Merremia aegyptia
Mertub	Merremia tuberosa
Mimpuduni	Mimosa pudica var. unijuga
Momcha	Momordica charantia
Mondel	Monstera deliciosa
Monhib	Montanoa hibiscifolia
Morcit	Morinda citrifolia
	Musa sp.
Myrfay	Myrica faya
Nepmul	Nephrolepis multiflora
Nerole	Nerium oleander

Taxa Abbreviations	Taxa
Nicphy	Nicandra physalodes
Ocigra	Ocimum gratissimum
Odocus	Odontonema cuspidatum
Oplhir	Oplismenus hirtellus
Opufic	Opuntia ficus-indica
Opucoc	Opuntia cochenillifera
Oxacorn	Oxalis corniculata
Oxacory	Oxalis corymbosa
Oxypan	Oxyspora paniculata
Panmax	Panicum maximum
Parfal	Paraserianthes falcataria
Pascon	Paspalum conjugatum
Pasdil	Paspalum dilatatum
Pasfim	Paspalum fimbriatum
	Paspalum sp.
Pasurv	Paspalum urvillei
Pasedu	Passiflora edulis
Pasfoe	Passiflora foetida
Paslau	Passiflora laurifolia
Paslig	Passiflora ligularis
Pasmol	Passiflora mollissima
Passub	Passiflora suberosa
Pencla	Pennisetum clandestinum
Penpol	Pennisetum polystachion
Penpur	Pennisetum purpureum
Penset	Pennisetum setaceum
Perame	Persea americana
Phatan	Phaius tankervilleae
	Philodendron
Phlaur	Phlebodium aureum
Phyded	Phyllanthus debilis
Phyten	Phyllanthus tenellus
Phynig	Phyllostachys nigra
Phygro	Phymatosorus grossus
Phyper	Physallis peruviana
Pilmic	Pilea microphylla
Pimdio	Pimenta dioica
	Pinus sp.
Pitdul	Pithecellobium dulce
Pitaut	Pityrogramma austroamericana
Pitcal	Pityrogramma calomelanos
Plalan	Plantago lanceolata
Plamaj	Plantago major
Plucar	Pluchea carolinensis
Pluind	Pluchea indica
	Plumeria sp.

Taxa Abbreviations

Taxa Abbreviations	Taxa
Polpan	<i>Polygala paniculata</i>
Porole	<i>Portulaca oleracea</i>
Porpil	<i>Portulaca pilosa</i>
Propal	<i>Prosopis pallida</i>
Psicat	<i>Psidium cattleianum</i>
Psigua	<i>Psidium guajava</i>
Pteglo	<i>Pterolepis glomerata</i>
Rhiman	<i>Rhizophora mangle</i>
Rhotom	<i>Rhodomirtus tomentosa</i>
Rhyrep	<i>Rhynchelytrum repens</i>
	<i>Rhynchospora sp. (Beak-rush)</i>
Riccom	<i>Ricinus communis</i>
Rivhum	<i>Rivina humilis</i>
	<i>Roystonea sp.</i>
Rubarg	<i>Rubus argutus</i>
Rubros	<i>Rubus rosifolius</i>
Ruebre	<i>Ruellia brevifolia</i>
Ryncad	<i>Rynchospora caduca</i>
Sacspo	<i>Saccharum spontaneum</i>
Sacind	<i>Sacciolepis indica</i>
Salcoc	<i>Salvia coccinea</i>
Salocc	<i>Salvia occidentalis</i>
Samsam	<i>Samanea saman</i>
Sanalab	<i>Santalum album</i>
Schact	<i>Schefflera actinophylla</i>
Schter	<i>Schinus terebinthifolius</i>
Schglä	<i>Schizostachyum glaucifolium</i>
Senmad	<i>Senecio madagascarensis</i>
Sensur	<i>Senna surattensis</i>
Setgra	<i>Setaria gracilis</i>
Setpal	<i>Setaria palmifolia</i>
Sidrho	<i>Sida rhombifolia</i>
Sidspi	<i>Sida spinosa</i>
Sidmic	<i>Sidastrum micranthum</i>
Solame	<i>Solanum americanum</i>
	<i>Solanum sp.</i>
Sonole	<i>Sonchus oleraceus</i>
Spacam	<i>Spathodea campanulata</i>
Spapli	<i>Spathoglottis plicata</i>
Speass	<i>Spermacoce assurgens</i>
Sphcoo	<i>Sphaeropteris cooperi</i>
Sphtri	<i>Sphagneticola triloba</i>
Spound	<i>Sporobolus indicus</i>
Staarv	<i>Stachys arvensis</i>
Stadic	<i>Stachytarpheta dichotoma</i>
Stajam	<i>Stachytarpheta jamaicensis</i>

Taxa Abbreviations	Taxa
	<i>Stachytarpheta sp.</i>
Staurt	<i>Stachytarpheta urticifolia</i>
Stagig	<i>Stapelia gigantea</i>
Styfru	<i>Stylosanthes fruticosa</i>
Swimah	<i>Swietenia mahagoni</i>
Synnod	<i>Synedrella nodiflora</i>
Syzcum	<i>Syzygium cumini</i>
Syzjam	<i>Syzygium jambos</i>
Syzmal	<i>Syzygium malaccense</i>
Taroff	<i>Taraxacum officinale</i>
Tercat	<i>Terminalia catappa</i>
Termyr	<i>Terminalia myriocarpa</i>
Thepop	<i>Thespesia populnea</i>
Thugra	<i>Thunbergia grandiflora</i>
Tiburv	<i>Tibouchina urvilleana</i>
Toocil	<i>Toona ciliata</i>
Treori	<i>Trema orientalis</i>
Triprio	<i>Tridax procumbens</i>
Triarvarv	<i>Trifolium arvense var. arvense</i>
Tridub	<i>Trifolium dubium</i>
Trisem	<i>Triumfetta semitriloba</i>
Verlit	<i>Verbena litoralis</i>
Verenc	<i>Verbesina encelioides</i>
Vulbro	<i>Vulpia bromoides</i>
Wedtri	<i>Wedelia trilobata</i>
Xanstrcan	<i>Xanthium strumarium var. canadense</i>
Youjap	<i>Youngia japonica</i>
Zinzer	<i>Zinziber zerumbet</i>

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