Lipochaeta tenuifolia
(nehe)

5-Year Review
Summary and Evaluation

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawaii

5-YEAR REVIEW

Species reviewed: *Lipochaeta tenuifolia* / nehe

TABLE OF CONTENTS

5-YEAR REVIEW
Lipochaeta tenuifolia (nehe)

1.0 GENERAL INFORMATION

1.1 Reviewers

Lead Regional Office:
Region 1, Endangered Species Program, Division of Recovery, Jesse D`Elia, (503) 231-2071

Lead Field Office:
Pacific Islands Fish and Wildlife Office, Loyal Mehrhoff, Field Supervisor, (808) 792-9400

Cooperating Field Office(s):
N/A

Cooperating Regional Office(s):
N/A

1.2 Methodology used to complete the review

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), beginning on March 16, 2009. The review was based on final critical habitat designations for *Lipochaeta tenuifolia* and other species from the islands of Oahu (USFWS 2003) as well as a review of current, available information. The National Tropical Botanical Garden provided an initial draft of portions of the review and recommendations for conservation actions needed prior to the next five-year review. The evaluation of Tamara Sherrill, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Recovery Program Lead and the Assistant Field Supervisor for Endangered Species before submission to the Deputy Field Supervisor for approval.

1.3 Background:

1.3.1 Federal Register (FR) Notice citation announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

1.3.2 Listing history

Original Listing
FR notice: USFWS. 1991. Endangered and threatened wildlife and plants; determination of endangered status for 26 plants from the Waianae Mountains, island of Oahu, Hawaii; final rule. Federal Register 56(209):55770-55786.
Date listed: October 29, 1991
Entity listed: Species
Classification: Endangered

Revised Listing, if applicable
FR notice: N/A
Date listed: N/A
Entity listed: N/A
Classification: N/A

1.3.3 Associated rulemakings:

USFWS. 2003. Endangered and threatened wildlife and plants; final designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. Federal Register 68(116):35949-36406.

Critical habitat was designated for *Lipochaeta tenuifolia* in three units totaling 207 hectares (516 acres) on Oahu (USFWS 2003). These units all occur on State land.

1.3.4 Review History:

Species status review [FY 2010 Recovery Data Call (September 2010)]: Stable

Recovery achieved:
1 (0-25%) (FY 2007 Recovery Data Call – most recent year reported)

1.3.5 Species' Recovery Priority Number at start of this 5-year review:

8

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: U.S. Fish and Wildlife Service. 1998. Recovery plan for Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pages, plus appendices.
Date issued: August 10, 1998.

Dates of previous revisions, if applicable: N/A

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

____ ***Yes***
__X_ ***No***

2.1.2 Is the species under review listed as a DPS?

____ ***Yes***
__X_ ***No***

2.1.3 Was the DPS listed prior to 1996?

____ ***Yes***
____ ***No***

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

____ ***Yes***
____ ***No***

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

____ ***Yes***
____ ***No***

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

____ ***Yes***
__X_ ***No***

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?

__X_ ***Yes***
____ ***No***

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and

its habitat?

__X_ ***Yes***
____ ***No***

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

__X_ ***Yes***
____ ***No***

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:

A synthesis of the threats (Listing Factors A, C, D, and E) affecting this species is presented in section 2.3.2 and Table 2. Listing Factor B (overutilization for commercial, recreational, scientific, or educational purposes) is not known to be a threat to this species.

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for Oahu plants (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Lipochaeta tenuifolia* is a short-lived perennial, and to be considered stabilized, which is the first step in recovering the species, the taxon must be managed to control threats (*e.g*., fenced, weeding, etc.) and be represented in an *ex situ* (off-site) collection. In addition, a minimum of three populations should be documented on Oahu. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

This recovery objective has been met. Only three of the six known populations may contain more than 300 mature individuals and all threats are not being managed

For downlisting, a total of five to seven populations of *Lipochaeta tenuifolia* should be documented on Oahu. Each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

This recovery objective has not been met.

For delisting, a total of eight to ten populations of *Lipochaeta tenuifolia* should be documented on Oahu. Each of these populations must be

naturally reproducing, stable or increasing in number, and secure from threats, with 300 mature individuals per population for short-lived perennials. Each population should persist at this level for a minimum of five consecutive years before delisting is considered.

This recovery objective has not been met.

2.3 Updated Information and Current Species Status

No new information.

2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

Lipochaeta tenuifolia occurs primarily on north-facing slopes, cliff faces and cliff ledges, and steep rocky ridge sides; or in forest openings vegetated with native shrubs, grasses, and sedges. *Lipochaeta tenuifolia* flowers for much of the year, mostly in late winter and spring until onset of the summer dry season. The flowers are probably insect-pollinated, as many yellow-flowered members of the sunflower family are pollinated by insects. Although seeds from cultivated plants which were initially propagated by cuttings from wild plants (clones) appear to be viable, they have failed to germinate. Research is needed to determine how to overcome seed dormancy for feasible reintroduction techniques (USFWS 2007). Temperature data loggers were placed at wild sites in Ohikilolo and Kamaileunu-Waianae Kai locations of *L. tenuifolia* to help determine what temperature fluctuations may stimulate germination *in situ* (U.S. Army Garrison 2008a). By 2010, only the Ohikilolo site was recording temperature (U.S. Army Garrison 2010).

The species is a short-lived perennial with a tendency to reproduce vegetatively, making it very difficult to identify individual plants genetically, since vegetative reproduction often results in identical adjacent plants. Genetic studies have suggested that plant material separated by more than two meters (six feet) may be classified as genetically distinct individuals. The main stems of *Lipochaeta tenuifolia* have been reported to grow several meters long, therefore allowing the stems to rest on the ground or on other plants, which often cause new roots to sprout along the undersides of the stems. The leaves of *L.*

tenuifolia are oppositely arranged in pairs but may appear whorled owing to the three-parted, palmately compound, finely dissected leaflets (USFWS 2007; U.S. Army Garrison 2010).

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

Lipochaeta tenuifolia was listed as endangered in 1991, when seven populations were known to contain 400 to 600 individuals, all within an area about 6 by 5 miles (10 by 8 kilometers) (USFWS 1991). At the time the recovery plan was written in 1998, there were 9 populations containing around 2,000 individuals within the same area (USFWS 1998). In 2003, 41 occurrences of 759 to 1,174 individuals were noted (USFWS 2003).

This species is endemic to the Waianae Mountains of Oahu. *Lipochaeta tenuifolia* grows within four population units of the Makua Military Reservation on Oahu: Kahanahaiki, Kaluakauila, Keawaula, and Ohikilolo, and in 2008, these areas contained 53 percent of all known remaining individuals of the species (USFWS 2007). In 2010, this number increased to 54 percent (U.S. Army Garrison 2010). The Army also monitors two populations of *L. tenuifolia* outside the military reserve at Kamaileunu-Waianae Kai and Mt. Kaala. Totals of mature individuals in 2010 were: Kahanahaiki (11), Kaluakauila (92), Keawaula (60), Ohikilolo (1,233), Kamaileunu-Waianae Kai (883), and Mt. Kaala (300), for a total of 2,579 mature individuals between these six locations. Four of these populations contained seedlings and juveniles, and two populations did not (Ohikilolo and Mt. Kaala). *Lipochaeta tenuifolia* also occurs in Manuwai (U.S. Army Garrison 2008b). Only three mature individuals were seen during the monitoring of the lower Ohikilolo population in May 2008, a decline from the previous estimate in 2004. New plants were discovered in the Keawaula and the Kaluakauila locations in 2010 (U.S. Army Garrison 2010). There have been two fires in this area since 2004 (U.S. Army Garrison 2008a), and a fire in July 2010 burned all of the newly discovered plants in Kaluakauila. A decline in the Kahanahaiki population was also observed in 2008, though it remained stable in 2010 (U.S. Army Garrison

2008a, 2010). A 25 to 31 percent decrease in overall numbers seems to have occurred from 2003 to 2007 (USFWS 2007). In conclusion, there are currently about 2,579 individuals in six populations, three of which contained more than 300 individuals (U.S. Army Garrison 2010).

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

No new information.

2.3.1.4 Taxonomic classification or changes in nomenclature:

This species, formerly classified and listed as *Lipochaeta tenuifolia*, has been renamed *Melanthera tenuifolia*. The 2001 treatment by Wagner and Robinson transferred 14 Hawaiian species from the genus *Lipochaeta* to *Melanthera* (Wagner and Robinson 2001). This taxonomic change to *Melanthera tenuifolia* was cited in the "Supplement to the Manual of the Flowering Plants of Hawaii" (Wagner and Herbst 2003). This change results in no change in the range or distribution of the species (USFWS 2007). Therefore, throughout the remainder of this review, *Lipochaeta tenuifolia* will now be referred to as *Melanthera tenuifolia.*

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g., corrections to the historical range, change in distribution of the species within its historic range, etc.):

No new information.

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

Melanthera tenuifolia is found in habitats that range from very dry (Ohikilolo Makai subpopulation) to mesic (Mt. Kaala Natural Area Reserve population unit). It grows on ridge tops, cliffs or bluffs in open areas or protected pockets or in shrublands or forests, dominated by *Diospyros sandwicensis* (lama), between 110 and 978 meters (361 and 3,208 feet)

elevation. All locations contained one or more of the following associated native plant species: *Alectryon macrococcus* (mahoe), *Antidesma pulvinatum* (hame), *Artemisia australis* (ahinahina), *Bidens torta* (kookoolau), *Bobea sandwicensis* (ahakea), *Carex meyenii* (no common name [NCN]), *C. wahuensis* (NCN), *Chamaesyce celastroides* var. *amplectens* (akoko), *Charpentiera tomentosa* (papala), *Claoxylon sandwicensis* (poola), *Coprosma longifolia* (pilo), *Dodonaea viscosa* (aalii), *Doodia kunthiana* (okupukupu), *Doryopteris decipiens* (kumuniu), *Dubautia herbstobatae* (naenae), *D. sherffiana* (naenae), *Elaeocarpus bifidus* (kalia), *Eragrostis grandis* (lovegrass), *E. variabilis* (kawelu), *Eugenia reinwardtiana* (nioi), *Euphorbia haeleeleana* (NCN), *Gouania meyenii* (NCN), *Hibiscus arnottianus* (kokio keokeo), *Leptecophylla tameiameiae* (pukiawe), *Kadua parvula* (NCN), *Labordia kaalae* (kamakahala), *Lepidium arbuscula* (anaunau), *Lobelia niihauensis* (NCN), *Lysimachia hillebrandii* (kolokolo lehua), *L. remyi* (NCN), *Machaerina angustifolia* (uki), *Metrosideros* spp. (ohia), *Myoporum sandwicense* (naio), *Myrsine lessertiana* (kolea lau nui), *Neraudia melastomifolia* (maaloa), *Nototrichium humile* (kului), *Osteomeles anthyllidifolia* (ulei), *Panicum beecheyi* (NCN), *Peucedanum sandwicense* (makou), *Pleomele* sp. (hala pepe), *Polypodium pellucidum* (ae lau nui), *Psychotria hathewayi* (kopiko), *Psydrax odorata* (alahee), *Pteridium aquilinum* var. *decompositum* (kilau), *Rauvolfia sandwicensis* (hao), *Reynoldsia sandwicensis* (ohe), *Rumex* sp., *Sanicula mariversa* (NCN), *Sapindus oahuensis* (lonomea), *Santalum freycinetianum* (iliahi), *Schiedea hookeri* (NCN), *S. mannii* (NCN), *Sida fallax* (ilima), *Silene lanceolata* (NCN), *Sophora chrysophylla* (mamane), *Stenogyne kaalae* (NCN), *Tetramolopium filiforme* (NCN), *Viola chamissoniana* (pamakani), and *Zanthoxylum kauaense* (ae) (Perlman 2010; USFWS 2007; Wood 2010). On Ohikilolo, native plants predominate because of intensive efforts to control invasive introduced grasses around populations of the endangered native species *Chamaesyce celastroides* var. *kaenana* (akoko), *Hibiscus brackenridgei* subsp. *mokuleianus* (mao hau hele), and *Spermolepis hawaiiensis* (NCN) by the U.S. Army Garrison (USFWS 2007).

2.3.1.7 Other:

No new information.

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

Threats that modify habitat of *Melanthera tenuifolia* include feral goats and pigs (*Sus scrofa*) that degrade the habitat creating erosion, which can cause rock slides (Wood 2010). Invasive introduced plant species which compete with *M. tenuifolia* include *Acacia confusa* (Formosa koa), *Ageratina riparia* (spreading mist flower), *Bryophyllum pinnatum* (airplant), *Conyza* sp. (horseweed), *Erigeron karvinskianus* (daisy fleabane), *Grevillea robusta* (silk oak), *Lantana camara* (lantana), *Melinis minutiflora* (molasses grass), *Psidium cattleianum* (strawberry guava), *Schinus terebinthifolius* (Christmas berry), and *Stachytarpheta* sp. (Perlman 2010; Wood 2010).

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

Not a threat.

2.3.2.3 Disease or predation:

Goats are reported to consume plant parts of *Melanthera tenuifolia* (Wood 2010). Rats (*Rattus* spp.) and slugs (unidentified species) are also reported to eat or damage this species (Perlman 2010).

2.3.2.4 Inadequacy of existing regulatory mechanisms:

No new information.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

The invasive introduced plant species previously described in Section 2.3.2.1, in addition to degrading habitat, directly compete with *Melanthera tenuifolia* for light, nutrients, and water.

Fire is a serious threat in many of the areas where *Melanthera*

tenuifolia occurs. Plants in the Kahanahaiki, Kaluakauila, Keawaula, and the three Ohikilolo population units are located in zones at risk from training-related wildfires (USFWS 2007). There have been two fires in Ohikilolo from 2004 to 2008 (U.S. Army Garrison 2008a) and another in July 2010 in Kaluakauila that destroyed individuals of *M. tenuifolia* (U.S. Army Garrison 2010).

Climate change may also pose a threat to this species. However, current climate change analyses in the Pacific Islands lack sufficient spatial resolution to make predictions on impacts to this species. The Pacific Islands Climate Change Cooperative (PICCC) has currently funded climate modeling that will help resolve these spatial limitations. We anticipate high spatial resolution climate outputs by 2013.

Control of feral ungulates is vital to the protection of *Melanthera tenuifolia*. The Lower Ohikilolo and Ohikilolo management units bordered by the Ohikilolo perimeter ridgeline fence are goat-free, and feral goats (*Capra hircus*) have been nearly eradicated from Makua. The Lower Ohikilolo management unit contains a small strategic fence to protect *Melanthera tenuifolia.* The habitat located outside of the military installation boundary near the Ohikilolo management unit is steep and does not require fencing. The Mt. Kaala Natural Area Reserve population unit is not fenced and not ungulate-free (U.S. Army Garrison 2010), but is regularly controlled for goats. Makaha and Manuwai are not fenced (USFWS 2007), and Kamaileunu and Waianae Kai are not ungulate-free (U.S. Army Garrison 2010). The Kaluakauila population also is protected by a fence and grass control is ongoing within forest patches to minimize the spread of fire. Incidental observations indicate that following fencing, *Melanthera tenuifolia* returned in habitats where it had been extirpated by goats (USFWS 2007).

In the Ohikilolo management unit, conservation efforts include control of invasive introduced plants; rat control around certain rare plant species; propagule collection and outplanting of rare native plants; Oahu tree snail management within a small fenced exclosure; and snail habitat restoration through outplanting of common, native host trees. This management unit also contains small fences around occurrences of *Neraudia angulata* (NCN) and *Pritchardia kaalae* (loulu). Lower portions of the Ohikilolo

management unit are inaccessible to U.S. Army Natural Resources staff due to the presence of unexploded ordinance (USFWS 2007).

In the next year the Oahu U.S. Army Natural Resource Program plans the following conservation activities for *Melanthera tenuifolia*:

- Complete the Manuwai management unit fence, which will protect plants in the Mt. Kaala Natural Area Reserve population.
- Revisit small populations that are highly threatened by fire from training at Makua Military Reservation and collect clones from new founders to expand the greenhouse genetic storage collections.
- Determine how greenhouse plants will be used to produce seed for storage.
- Continue studies to investigate dormancy-breaking mechanisms to determine the storage potential of seeds collected for genetic storage.
- Deploy additional data loggers at higher elevation sites in Ohikilolo, to continue researching the role of temperature fluctuations in germinating *Melanthera tenuifolia*.
- Determine a strategy to protect the Kamaileunu and Waianae Kai Population Unit from ungulate threats.

Currently 535 seeds from 18 wild individuals collected by the U.S. Army are in seed storage at the Harold L. Lyon Arboretum (Center for Conservation Research and Training 2010; U.S. Army Garrison 2010), and the Army nursery has 52 wild individuals represented in their nursery. There are no reintroduced individuals in the wild (U.S. Army Garrison 2010). Twelve plants are in cultivation at the Waimea Valley Arboretum on Oahu (Waimea Valley Arboretum 2009).

2.4 Synthesis

Stabilizing, downlisting, and delisting objectives are provided in the recovery plan for Oahu plants (USFWS 1998), based on whether the species is an annual, a short-lived perennial (fewer than ten years), or a long-lived perennial. *Melanthera tenuifolia* is a short-lived perennial, and to be considered for downlisting to threatened status, a minimum of five to seven populations

should be documented on Oahu. For the species to be downlisted, each of these populations must be naturally reproducing, stable or increasing in number, and secure from threats, with a minimum of 300 mature individuals per population. Each population should persist at this level for a minimum of five consecutive years before downlisting is considered.

The downlisting goals for this species have not been met. Only three of the six known populations contain more than 300 mature individuals (Table 1 and Section 2.3.1.2), and all threats are not being managed (Table 2). Therefore, *Melanthera tenuifolia* meets the definition of endangered as it remains in danger of extinction throughout its range.

Table 1. Status of *Melanthera tenuifolia* from listing through 5-year review.

Date	No. wild indivs	No. outplanted	Downlisting Criteria identified in Recovery Plan	Dowlisting Criteria Completed?
1991 (listing)	400-600	0	All threats managed in all 5-7 populations	No
			Naturally reproducing, stable or increasing in number	Unknown
			5-7 populations with 300 mature individuals each	Unknown
1998 (recovery plan)	2,000	0	All threats managed in all 5-7 populations	No
			Naturally reproducing, stable or increasing in number	Unknown
			5-7 populations with 300 mature individuals each	Unknown
2003 (critical habitat)	759-1,174	Unknown	All threats managed in all 5-7 populations	Partially
			Naturally reproducing, stable or increasing in number	Unknown
			5-7 populations with 300 mature individuals each	Unknown
2010 (5-year review)	2,579	0	All threats managed in all 5-7 populations	Partially (Table 2)
			Naturally reproducing, stable or increasing in number	Partially
			5-7 populations with 300 mature individuals each	Partially: Ohikilolo 1,233 individuals, Kamaileunu-Waianae Kai 883 individuals, and

				Mt. Kaala 300 individuals

Table 2. Threats to *Lipochaeta tenuifolia*.

Threat	Listing factor	Current Status	Conservation/ Management Efforts
Ungulates – habitat modification and herbivory	A, C, D	Ongoing	Partially: Ohikilolo and Kaluakauila only fenced populations
Rats – herbivory	C	Ongoing	Partially: at populations in Ohikilolo
Slugs – herbivory	C	Ongoing	No
Fire	E	Ongoing	Partially: fuel break maintained at Ohikilolo
Invasive introduced plants	A, E	Ongoing	Partially: weed control at Ohikilolo
Climate change	A, E	Increasing	No

3.0 RESULTS

3.1 Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
__X_ No change is needed

3.2 New Recovery Priority Number:

Brief Rationale:

3.3 Listing and Reclassification Priority Number:

Reclassification (from Threatened to Endangered) Priority Number: ____
Reclassification (from Endangered to Threatened) Priority Number: ____
Delisting (regardless of current classification) Priority Number: ____

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

- Continue to collect material for genetic storage and propagation for reintroduction.
- Implement conservation activities for 2011 outlined by Oahu Army Natural Resource Program in Section 2.3.2.5.
- Control rats in the vicinity of these populations.
- Develop and implement methods to control slugs.
- Develop and implement fire management plans for each population.
- Work with Hawaii Division of Forestry and Wildlife, U.S. Army Garrison, and other land owners to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.
- Update the listed entity on 50 CFR 17 to match the currently recognized taxonomy.
- Assess the modeled effects of climate change on this species, and use to determine future landscape needed for the recovery of the species.

5.0 REFERENCES

Center for Conservation Research and Training Seed Storage Laboratory. 2010. Seed storage lab database report for *Lipochaeta* (*Melanthera*) *tenuifolia*. University of Hawaii at Manoa, Honolulu, Hawaii. One page. Unpublished.

Perlman, S. 2010. *Melanthera tenuifolia*. National Tropical Botanical Garden, Kalaheo, Hawaii. 4 pages. Unpublished.

U.S. Army Garrison. 2008a. Status Report for the Makua Implementation Plan. Unpublished report, submitted to Directorate of Public Works, Environmental Division, Schofield Barracks, Hawaii. 210 pages.

U.S. Army Garrison. 2008b. Final implementation plan for Oahu training areas: Schofield Barracks Military Reservation, Schofield Barracks East Range; Kawailoa Training Area, Kahuku Training Area, and Dillingham Military Reservation. Directorate of Public Works, Environmental Division, Schofield Barracks, Hawaii. 624 pages.

U.S. Army Garrison. 2010. 2010 status report for the Makua and Oahu implementation plans. Submitted to Directorate of Public Works, Environmental Division, Schofield Barracks, Hawaii. 560 pages + appendices. Unpublished.

[USFWS] U.S. Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants; determination of endangered status for 26 plants from the Waianae Mountains, island of Oahu, Hawaii; final rule. Federal Register 56(209):55770-55786.

[USFWS] U.S. Fish and Wildlife Service. 1998. Recovery plan for Oahu plants. U.S. Fish and Wildlife Service, Portland, Oregon. 207 pp., plus appendices. Available online at <http://www.fws.gov/pacificislands/recoveryplans.html>.

[USFWS] U.S. Fish and Wildlife Service. 2003. Endangered and threatened wildlife and plants; final designations or nondesignations of critical habitat for 101 plant species from the island of Oahu, Hawaii; final rule. Federal Register 68(116):35949-36406.

[USFWS] U.S. Fish and Wildlife Service. 2007. Reinitiation of the 1999 biological opinion of the U.S. Fish and Wildlife Service for U.S. Army Military Training at Makua Military Reservation, island of Oahu, Honolulu, Hawaii. 639 pages + appendices. Unpublished.

Wagner, W.L. and H. Robinson. 2001. *Lipochaeta* and *Melanthera* (Asteraceae: Heliantheae subtribe Ecliptinae): establishing their natural limits and a synopsis. Britonnia 53(4):123.

Wagner, W. L. and D. R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai‘i, version 3.1. Available online at <http://botany.si.edu/pacificislandbiodiversity/hawaiianflora/supplement.htm>.

Waimea Valley Arboretum. 2009. Report to U.S. Fish and Wildlife Service on controlled propagation of listed and candidate species, as designated under the U.S. Endangered Species Act. Honolulu, Hawaii. 16 pages. Unpublished.

Wood, K.R. 2010. Notes on *Melanthera tenuifolia*. National Tropical Botanical Garden, Kalaheo, Hawaii. 3 pages. Unpublished.

Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Lipochaeta tenuifolia* (nehe)

Pre-1996 DPS listing still considered a listable entity? N/A

Recommendation resulting from the 5-year review:

_____ Delisting
_____ Reclassify from Endangered to Threatened status
_____ Reclassify from Threatened to Endangered status
__X__ No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable:_____

Review Conducted By:
Chelsie Javar, Fish and Wildlife Biologist
Marie Bruegmann, Plant Recovery Coordinator
Jess Newton, Recovery Program Lead
Assistant Field Supervisor for Endangered Species

Field Supervisor, Pacific Islands Fish and Wildlife Office

_____ Date _____