

Poa sandvicensis
(Hawaiian bluegrass)

**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: *Poa sandvicensis* (Hawaiian bluegrass)

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5-YEAR REVIEW
***Poa sandvicensis*/ (Hawaiian bluegrass)**

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)
794-9400

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 April 29, 2008. The review was based on the final critical habitat designation for *Poa sandvicensis* and other species from the island of Kauai (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 Samuel Aruch, biological consultant, was reviewed by the Plant Recovery Coordinator. The document was then reviewed by the Assistant Field Supervisor for Endangered Species and Acting Deputy Field Supervisor before submission to the Field Supervisor for approval.

1.3 Background:

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

USFWS. 2008. Endangered and threatened wildlife and plants; initiation of 5-year status reviews of 70 species in Idaho, Montana, Oregon, Washington, and the Pacific Islands. Federal Register 73(83):23264-23266.

1.3.2 Listing history

Original Listing

FR notice: USFWS. 1992. Endangered and threatened wildlife and plants; determination of endangered status for six plants from Kokee Region, island of Kauai, Hawaii. Federal Register 57:20580-20589.

Date listed: May 13, 1992

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 rule makings :

USFWS. 2003. Endangered and threatened wildlife and plants; final designation or nondesignation of critical habitat for 95 plant species from the islands of Kauai and Niihau, Hawaii; final rule. Federal Register 68(39):9116-9479.

Critical habitat was designated for *Poa sandvicensis* in four units unit totaling 1,163 hectares (2,875 acres) on the island of Kauai. These designations includes habitat on State and private lands (USFWS 2003).

1.3.4 Review History:

Species status review [FY 2009 Recovery Data Call (September 2009)]:

Stable

Recovery achieved:

1 (0-25%) (FY 2007 Recovery Data Call – this is the last year this was reported)

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

2

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: USFWS. Recovery plan for the Kauai plant cluster. U.S. Fish and Wildlife Service, Portland, Oregon. 140 pages.

Date issued: September 20, 1995.

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
 No

2.1.2 Is the species under review listed as a DPS?

Yes
 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
 No

2.2 Recovery Criteria

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

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?

Yes
 No

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

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 (Factors A, C, D, and E) affecting this species is presented in section 2.4. 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 the Kauai plant cluster (USFWS 1995), based on whether the species is an annual, a short-lived perennial (fewer than 10 years), or a long-lived perennial. *Poa sandvicensis* 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* (at other than the plant's natural location, such as a nursery or arboretum) collection. In addition, a minimum of three populations should be documented on islands where they now occur or occurred historically. Each of these populations must be naturally reproducing and increasing in number, with a minimum of 50 mature individuals per population.

There are 4 populations with over 50 individuals. However, they are not being managed to control threats. Therefore this recovery objective has not been met.

For downlisting, a total of five to seven populations of *Poa sandvicensis* should be documented on Kauai where they now occur or occurred historically. 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 *Poa sandvicensis* should be documented on islands where they now occur or occurred historically. 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

In addition to the status summary table below, information on the species' status and threats was included in the final critical habitat rule referenced above in section 1.3.3 ("Associated Rulemakings") and in section 2.4 ("Synthesis") below, which also includes any new information about the status and threats of the species.

Table 1. Status of *Poa sandvicensis* from listing through 5-year review.

Date	No. wild individuals	No. outplanted	Downlisting Criteria identified in Recovery Plan	Downlisting Criteria Completed?
1992 (listing)	40	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	No
			5-7 populations with 300 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for five consecutive years	Unknown
1995 (recovery plan)	<1,000	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	Yes
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for five consecutive years	Unknown
2003 (critical habitat)	1,321	0	All threats managed in all 5-7 populations	No
			Complete genetic storage	Partially
			5-7 populations with 300 mature individuals each	No

			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for five consecutive years	Unknown
2008 (5-year review)	~6,000	0	All threats managed	No
			Complete genetic storage	Partially
			3 populations with 50 mature individuals each	No
			Naturally reproducing, stable, and increasing in number	Unknown
			Stable for five consecutive years	Unknown

2.3.1 Biology and Habitat

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

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:

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

2.3.1.4 Taxonomic classification or changes in nomenclature:

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.):

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

2.3.1.7 Other:

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:

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

2.3.2.3 Disease or predation:

2.3.2.4 Inadequacy of existing regulatory mechanisms:

2.3.2.5 Other natural or manmade factors affecting its continued existence:

2.4 Synthesis

Historically, *Poa sandvicensis* was known from the following areas on the island of Kauai: the rim of Kalalau Valley; Halemanu Ridge, Kumuwela Ridge, and Kauaikinana drainage; Awaawapuhi Trail; Kohua Ridge/Mohihi drainage; and Kaholuamanu. In 2003, a total of 9 populations with 1,321 individuals were known, all on State-owned land on the island of Kauai. *Poa sandvicensis* was known from Alealau, Keanapuka, Awaawapuhi Trail, Kumuwela Ridge, Maile Flat Trail (Kohua Ridge Trail), Mohihi Stream, Mohihi-Waialae Trail, Kawaiiki Valley, and Waialae Valley (USFWS 2003).

Poa sandvicensis was seen in Awaawapuhi Valley at 1,164 meters (3,820 feet) elevation in May 1994 (Perlman 2009). In Kawaiiki on Kaluahaula Ridge, about 1,000 individuals, 70 percent mature, 30 percent immature, were seen at 1,052 meters (3,450 ft) elevation on the west side of the trail along a moderately steep slope in November 1998 (Wood 2009). In August 2000 and June 2001, *P. sandvicensis* was seen in Kawaiiki, off Kaluahaula Ridge, in the upper forest and drainage to the south of Koaie and north of Waialae at 1,030 to 1,128 meters (3,380 to 3,700 feet) elevation (National Tropical Botanical Garden 2008; Wood 2009). Five thousand or more plants were scattered around the area (Perlman 2009; Wood 2009).

In Kokee State Park in the Kumuwela area, 3.2 kilometers (2 miles) in on the Ditch Trail about 30 individuals were seen between 1,135 and 1,175 meters (3,724 and 3,855 feet) elevation in September 1992 (Wood 2009). On the upper north branch of Nualolo Stream, 25 individuals of *Poa sandvicensis* were observed in clumps 25 centimeters (10 inches) in diameter at elevations from 1,128 meters to 1,158 meters (3,700 to 3,800 feet) in November 1995 (Wood 2009). In Waimea Canyon, on north slopes above Waialae Falls, botanists from the National Tropical Botanical Garden noted clumps of *P. sandvicensis* to be common in May 2004 (Tangalin 2009).

In the Waialae Valley, south of Waialae Falls on a ridge between Waialae and Nawaimaka Valley, *Poa sandvicensis* was seen at 1,000 meters (3,281 feet) elevation in March 1991 (Wood 2009). In August 1994, a good-sized population of *P. sandvicensis* was seen growing in clumps 30 centimeters (12 inches) in diameter, in Mohihi, heading

toward the falls and Poomau above the stream at approximately 1,067 meters (3,500 feet) elevation (Wood 2009). In May 1993, the species was seen in occasional clumps on forested hill sides off the Mohihi-Waialae Trail on Mohihi Stream near the trailhead, at about 1,067 meters (3,500 feet) elevation (Wood 2009). In December 1994, *P. sandvicensis* was seen occasionally on north slopes in the Mohihi drainage 2.75 miles (4.5 kilometers) off the Mohihi-Waialae Trail at 1,250 to 1,280 meters (4,100 to 4,200 feet) elevation (Wood 2009). On Kohua Ridge, it was seen in 1995 on the north side of the Waialae-Waialeale Trail, in a drainage of Mohihi Stream, by Ken Wood of the National Tropical Botanical Garden, who estimated there were 100 to 1,000 individuals at 1,177 meters (3,862 feet) elevation (National Tropical Botanical Garden 2008). *Poa sandvicensis* was seen on steep basalt walls along Nawaimaka Stream in March 1993, at 1,000 meters (3,281 feet) elevation (Wood 2009). In July 1996, it was seen at 1,012 meters (3,320 feet) (Wood 2009). It was seen again in August 2001, at 975 to 1,012 meters (3,200 to 3,320 feet) elevation (Perlman 2009). Off the Mohihi-Waialae Trail from Kokee, in April 2005, about 30 clumps of *P. sandvicensis* were seen dominating a small hillside in a subgulch on the Waimea Canyon side of the trail before the plum grove, on the north side at 1,097 meters (3,600 feet) elevation (Tangalin 2009). A year later, in October 2006, 50 individuals were observed scattered on vertical walls of a narrow gulch at the end of Camp 10 Road, in a side gulch off of Mohihi Stream at 1,036 meters (3,400 feet) elevation (National Tropical Botanical Garden 2008; Tangalin 2009).

Four of these populations of *Poa sandvicensis* have been reported since 2000. They may have been as many as 6,000 individuals in a given year. *Poa sandvicensis* appears to fluctuate in numbers, perhaps based on rainfall. Of the nine populations noted in the 2003 critical habitat designation (USFWS 2003), only four have had repeated observations recorded since 2000. The number of individuals however has apparently increased significantly since 2000, although most of this (5,000 individuals) is attributable to one location.

Poa sandvicensis is a perennial grass, one of three species of this cosmopolitan genus endemic to the island of Kauai. Little is known about its life history, flowering cycles, pollination vectors, seed dispersal agents, longevity, or specific environmental requirements (USFWS 2003).

Poa sandvicensis grows on wet, shaded, gentle to steep slopes, ridges, and rock ledges of stream banks in semi-open to closed, wet, diverse *Acacia koa* (koa) – *Metrosideros polymorpha* (ohia) montane forest, or in montane mesic forest at elevations between 473 and 1,290 meters (1,553 and 4,232 feet) (USFWS 2003).

Awaawapuhi has mesic habitat with *Acacia koa* – *Metrosideros polymorpha* forest with associated species including *Carex meyenii* (no common name [NCN]), *Chamaesyce atrococca* (akoko), *Dianella sandwicensis* (uki uki), *Dodonaea viscosa* (aalii), *Lysimachia kalalauensis* (NCN), and *Wikstroemia* sp. (akia) (Perlman 2009).

In Kawaiiiki, *Poa sandvicensis* grows in *Metrosideros polymorpha* mixed mesic forest with *Acacia koa*, *Alphitonia ponderosa* (kauila), *Alyxia stellata* (maile), *Asplenium*

macraei (iwa iwa lau lii), *Bidens cosmoides* (poola nui), *Carex meyenii* (NCN), *Charpentiera elliptica* (papala), *C. obovata* (papala), *Cheirodendron trigynum* (olapa), *Claoxylon sandwicensis* (laukea), *Cyanea fissa* (haha), *Dianella sandwicensis* (ukiuki), *Diellia erecta f. alexandri* (palapalai lau lii), *Diospyros* sp. (lama), *Diplazium sandwichianum* (hoio), *Dodonaea viscosa*, *Doodia kunthiana* (okupukupu), *Dubautia laevigata* (naenae), *Dryopteris fusco-atra* (ii), *Embelia pacifica* (kilioe), *Hibiscus waimeae* subsp. *waimeae* (kokio keokeo), *Kadua affinis* (manono), *Lysimachia kalalauensis*, *Myrsine lanaiensis* (kolea), *Panicum nephelophilum* (konakona), *Peperomia macraeana* (ala ala wai nui), *Pleomele aurea* (hala pepe), *Perrottetia sandwicensis* (olomea), *Pritchardia minor* (loulu), *Psychotria greenwelliae* (kopiko), *Pteridium decompositum* (kilau), *Pteris irregularis* (mana), *Santalum* sp. (iliahi), *Schiedea stellarioides* (laulihilihi), *Syzygium sandwicensis* (ohia ha), *Tetraplasandra kawaiense* (ohe ohe), *Wikstroemia* sp., and *Vaccinium dentatum* (ohelo) (National Tropical Botanical Garden 2008; Wood 2009).

On Kohua Ridge, the habitat is *Metrosideros polymorpha* - *Cheirodendron* sp. (olapa) montane wet forest with associated species including *Coprosma* sp. (pilo), *Cyanea leptostegia* (haha lua), *Cyrtandra longifolia* (haiwale), *Diellia* sp. (NCN), *Dodonaea viscosa*, *Dubautia laevigata*, *Kadua affinis*, *Melicope anisata* (mokihana), *Melicope clusiifolia* (kukaemoa), *Psychotria* sp. (kopiko), *Scaevola procera* (naupaka kuahiwi), and *Tetraplasandra* sp. (ohe) (National Tropical Botanical Garden 2008). Kumuwela's habitat is *Metrosideros polymorpha* – *Acacia koa* montane mesic forest with *Bidens cosmoides*, *Chamaesyce* sp., *Coprosma* sp., *Panicum nephelophilum*, *Leptecophylla tameiameiae* (pukiawe), and *Dianella sandwicensis* (Wood 2009).

Nawaimaka Stream has *Metrosideros polymorpha* – *Acacia koa* montane mesic forest with a *Carex alligata* (NCN) riparian community. Associated species include *Bidens cosmoides*, *Carex meyenii*, *Cheirodendron* sp., *Claoxylon* sp., *Coprosma kauaiensis* (koi), *Dicranopteris linearis* (uluhe), *Diplazium sandwichianum*, *Dodonaea viscosa*, *Eragrostis variabilis* (kawelu), *Kadua affinis*, *Lobelia hypoleuca* (kuhiaikamoo wahie), *Neraudia* sp. (NCN), *Panicum nephelophilum*, *Perrottetia sandwicensis* (olomea), *Pittosporum* sp. (hoawa), *Pouteria sandwicensis* (alaa), *Psychotria greenwelliae*, *Scaevola procera*, *Schiedea stellarioides* (NCN), *Syzygium sandwicense*, *Urera* sp. (opuhe), and *Xylosma crenatum* (NCN) (Wood 2009).

Nualolo Stream has *Acacia koa* – *Metrosideros polymorpha* montane mesic forest with *Alyxia stellata*, *Bobea brevipes* (ahakea lau lii), *Dubautia latifolia* (koholapehu), *Lobelia yuccoides* (panaunau), *Melicope macropus* (alani), *Myrsine knudsenii* (kolea), *Nothoestrum peltatum* (aiea), *Poa siphonoglossa* (NCN), *Psychotria grandiflora* (kopiko), and *Xylosma crenatum* (NCN) (Wood 2009).

On the Mohihi-Waialae Trail to Waialae Valley, the species' habitat is *Metrosideros polymorpha* – *Dicranopteris linearis* montane wet forest with associated species *Bobea elatior* (ahakea lau nui), *Broussaisia arguta* (kanawao), *Cheirodendron trigynum* (olapa), *Cibotium* sp. (hapuu), *Coniogramme pilosa* (loulu), *Coprosma kauensis*, *Cryptocarya mannii* (holio), *Cyanea leptostegia*, *Cyanea hirtella* (haha), *Diplopterygium pinnatum*

(uluhe lau nui), *Dubautia* sp., *Elaeocarpus bifidus* (kalia), *Freycinetia arborea* (ie ie), *Gahnia beecheyi* (NCN), *Ilex anomala* (kawau), *Kadua affinis*, *Korthalsella* sp. (hulumoa), *Labordia hirtella* (kamakahala), *Melicope anisata*, *M. clusiifolia*, *M. ovata* (alani), *Myrsine alyxifolia* (kolea), *Nestegis sandwichensis* (olopua), *Perrottetia sandwichensis*, *Pouteria sandwichensis*, *Psychotria mariniana* (kopiko), *Sadleria* sp. (amau), *Sticherus owhyhensis* (uluhe), *Vaccinium* sp., *Viola wailenalenae* (NCN), and *Wikstroemia oahuensis* (akia) (National Tropical Botanical Garden 2008; Perlman 2009; Tangalin 2009; USFWS 1994).

Mohihi-Waialae also has *Acacia koa* – *Metrosideros polymorpha* montane mesic forest habitat with associated plants including *Asplenium acuminatum* (lola), *A. contiguum* (NCN), *A. hobdyi* (NCN), *A. schizophyllum* (NCN), *Athyrium microphyllum* (akolea), *Bidens cosmoides*, *Carex meyenii*, *Chamaesyce atrococca*, *Dianella sandwicensis*, *Dodonaea viscosa*, *Dryopteris crinalis* (palapalai aumakua), *Kadua affinis*, *Lobelia yuccoides*, *Lysimachia kalalauensis*, *Melicope anisata*, *Schiedea lychnoides* (kuawawaenuhu), *S. stellarioides*, *S. viscosa*, *Wikstroemia* sp., and *Zanthoxylum dipetalum* (kawau) (Perlman 2009; Wood 2009). In Waimea Canyon, the habitat is *Metrosideros polymorpha* – *Acacia koa* mixed mesic forest with *Bidens cosmoides*, *Melicope barbiger* (uahiapele), *Panicum nephelophilum*, *Schiedea stellarioides*, and *S. viscosa* (Tangalin 2009).

The greatest immediate threat to the survival of *Poa sandwicensis* is competition from invasive introduced plant species such as *Bryophyllum pinnatum* (airplant), *Buddleia asiatica* (dogtail), *Sphaeropteris cooperi* (Australian tree fern), *Erigeron karvinskianus* (daisy fleabane), *Grevillea robusta* (silk oak), *Hedychium gardnerianum* (Kahili ginger), *Lantana camara* (lantana), *Cyperus meyenianus* (NCN), *Morella faya* (firetree), *Passiflora tarminiana* (banana poka), *Psidium cattleianum* (strawberry guava), *Rubus argutus* (blackberry), *R. rosifolius* (thimbleberry), *Setaria parviflora* (yellow foxtail), and *Vulpia bromoides* (brome fescue) (Factor E) (National Tropical Botanical Garden 2008; Perlman 2009; Tangalin 2009; USFWS 2003; Wood 2009). Climate change may also pose a threat to *P. sandwicensis* (Factors A and E). However, current climate change models do not allow us to predict specifically what those effects, and their extent, would be for this species.

Seven hundred-fifty seeds from 6 accessions are stored in the seed bank at the National Tropical Botanical Garden. No propagation or outplanting is being conducted by the National Tropical Botanical Garden at this time (National Tropical Botanical Garden 2009). The Kokee Rare Plant Facility has propagated 21 individuals of *Poa sandwicensis* (Hawaii Department of Land and Natural Resources 2008).

The downlisting goals for this species have not been met (see Table 1), because only 4 populations have been observed with 300 mature individuals, and not all populations are secure from threats. Therefore, *Poa sandwicensis* meets the definition of threatened as it remains in danger of extinction throughout its range.

3.0 RESULTS

3.3 Recommended Classification:

Downlist to Threatened

Uplist to Endangered

Delist

Extinction

Recovery

Original data for classification in error

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 seeds for adequate genetic storage.
- Survey suitable habitat within historical range to determine current status of species.
- Conduct research on the life history and reproductive biology of this annual grass to determine the most useful conservation measures.
- Work with Hawaii Division of Forestry and Wildlife and Hawaii State Parks to initiate planning and contribute to implementation of ecosystem-level restoration and management to benefit this species.

5.0 REFERENCES

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Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Poa sandvicensis*/ (Hawaiian bluegrass)

Current Classification: _____ E _____

Recommendation resulting from the 5-Year Review:

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: _____

Review Conducted By:

Marie Bruegmann, Plant Recovery Coordinator
Marilet A. Zablan, Assistant Field Supervisor for Endangered Species
Jeff Newman, Acting Deputy Field Supervisor

Approved  Date **AUG 27 2010**
par **Field Supervisor, Pacific Islands Fish and Wildlife Office**