

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Nysius wekiuicola*

COMMON NAME: Wekiu bug

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: April 2010

STATUS/ACTION

Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status

New candidate

Continuing candidate

Non-petitioned

Petitioned - Date petitions received: May 22, 2003 and May 11, 2004

90-day positive - FR date:

12-month warranted but precluded - FR date: May 11, 2005

Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? Yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current CNOR (<http://endangered.fws.gov/>) provides information on listing actions taken during the last 12 months.

Listing priority change

Former LP:

New LP:

Date when the species first became a Candidate (as currently defined): October 25, 1999

Candidate removal: Former LPN:

A – Taxon is more abundant or widespread than previously believed or not subject to

the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

- ___ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- ___ F – Range is no longer a U.S. territory.
- ___ I – Insufficient information exists on biological vulnerability and threats to support listing.
- ___ M – Taxon mistakenly included in past notice of review.
- ___ N – Taxon does not meet the Act’s definition of “species.”
- ___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Insects; Family Lygaeidae (seed bug)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Hawaii

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Hawaii

LAND OWNERSHIP: This species occurs on land owned by the State of Hawaii and administered by the University of Hawaii through the Office of Mauna Kea Management (OMKM).

LEAD REGION CONTACT: Linda Belluomini, (503) 231-6283, linda_belluomini@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish & Wildlife Office, Christa Russell (808) 792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION

Species Description

The adult wekiu bug is approximately 0.13 to 0.19 inches (in) (3.4 to 4.9 millimeters (mm)) long and 0.04 to 0.07 in (1.0 to 1.8 mm) wide. The head is black, with pale reddish-brown median bars from the base of head to just short of the anterior eye margins. The pronotum is black and grayish-brown, the abdomen is black with pale lateral margins, and the legs are black. The bug has extremely small wings (micropterous), has by far the longest, thinnest appendages in relation to body length of any Lygaeid in the world, and the most elongate head as well (Ashlock and Gagne 1983). The mean head width in millimeters of each immature stage is as follows: 1st instar .0353; 2nd instar 0.432; 3rd instar 0.553; 4th instar 0.639; and the 5th instar 0.748. Eggs of the wekiu bug are elongated, narrow, and oval-cylindrical (~1mm long and 0.3mm wide) with a yellow-cream color, becoming red-orange as the embryo matures. The chorion is wrinkled and iridescent yellow-gold in color (Jesse Eiben, University of Hawaii, pers. comm. 2010).

Taxonomy

Nysius wekiuicola was described as a distinct taxon by Ashlock and Gagne in 1983, the most recent and recognized taxonomic work for this species.

Habitat/Life History

The island of Hawaii today consists of five volcanic mountains. All are very young and three have been active in recent history (MacDonald *et al.* 1983). Mauna Kea is the highest of these volcanoes, rising 13,796 feet (ft) (4,206 meters (m)) above sea level. The surface lavas of this volcano are all younger than middle Pleistocene, and it has probably not been active during the last 2,000 years. During the Pleistocene epoch an ice cap existed on the summit of Mauna Kea, with at least four distinct glacial episodes during the last 300,000 years (Porter 1979). The most recent glacial event (the Makenapa ice cap) disappeared from Mauna Kea about 9,000 years ago, but permanent ice still exists in the cinder of the summit cones just a few feet below the surface (Woodcock 1976).

Currently on Mauna Kea, an alpine lava community is present above 9,843 ft (3,000 m). This community is sparsely vegetated with growths of foliose lichens and the moss, *Racomitrium lanuginosum* (Gagne and Cuddihy 1999). Prior to the 1980s, due to an apparent lack of vegetation, it was popularly believed the Mauna Kea summit was a lifeless alpine desert (Waldrop 1981). However, in 1979 with the discovery of the wekiu bug, and subsequently into the early 1980s, an entire aeolian community of arthropods was discovered at the summit (Mull and Mull 1980; Papp 1981; Gagne and Howarth 1982). Aeolian ecosystems are characterized by a near lack of natural producers; a windborne supply of nutrient material; a few plants such as algae, mosses, and lichens; and a community of mostly arthropod predators and scavengers evolved to feed on the windborne food supply. On Mauna Kea's summit, the major faunal components include a flightless moth whose caterpillars feed on the lichens, a *Lycosa* wolf spider that preys on other insects, a centipede that preys on moribund insects blown to the summit, and the unique, flightless wekiu bug, also a predator/scavenger (Howarth and Stone 1982).

At least six major habitat types can be recognized within this alpine ecosystem, and not all are suitable for each of the aeolian species (Howarth and Stone 1982): (1) snow patches provide moisture and help retain food for the summit arthropods, but are not directly utilized by any of the species; (2) tephra (fragmental material produced by a volcanic eruption) ridges and slopes on cinder cones are important habitat for the spider, the wekiu bug, and smaller arthropods such as springtails; (3) loose, steep tephra slopes with smaller cinders are not suitable habitat for the wekiu bug; (4) lava flows with large outcrops of andesitic (iron-poor gray lava) rock are the primary habitat for the moth, the spider, and the centipede, but the wekiu bug is rare in this habitat due to the lack of suitable microclimate; (5) talus slopes and fractured rock outcrops are typically smaller areas that occur within areas of andesitic lava flows and are suitable habitat for the wekiu bug; (6) compacted ash, silt, and mud along roadsides and in depressions; and (7) large expanses of pulverized cinder and ash between cinder cones that had previously been covered by a glacier that is not suitable for the wekiu bug, but lycosa spiders are occasionally found there. Because the interstitial voids among the cinders are filled, the aeolian arthropods cannot utilize this habitat (Howarth and Stone 1982, Porter and Englund 2006).

The wekiu bug is a unique component of the high elevation aeolian ecosystem on Mauna Kea (13,796 ft above sea level) (4,206 m). Along with its close relative on Mauna Loa (13,679 ft (4,169 m)), the wekiu bug differs from all other *Nysius* species in its predatory habits and unusual physical characteristics and high elevation habitat (Polhemus 1998). Wekiu bugs are most often found under rocks and cinders. They are diurnally active and feed on moribund and dead insects that blow up from lower elevations. The presence of high altitude arthropods on Mauna Kea has been known since the 1920s (Bryan 1923, 1926; Swezey and Williams 1932; Wentworth *et al.* 1935; Usinger 1936; Gagne 1971), but it wasn't until 1980 that the wekiu bug and other arthropods were identified as being resident predator-scavengers. In field conditions, the wekiu bug has been observed feeding upon adult lady beetles, upon recently dead adult syrphid and other flies, and even dead birds. The wekiu bug has not been observed feeding upon other resident aeolian arthropods (Ashlock and Gagne 1983; Howarth 1997a). Larval and adult wekiu bugs can remain active during winter months, and exhibit activity at ambient air temperatures of 19 degrees Fahrenheit (minus 7 degrees Celsius) (Howarth and Stone 1982). The cold of the annual snow fall on Mauna Kea may assist the wekiu bug by immobilizing and preserving prey that are carried by winds up to the upper elevations and summit of Mauna Kea. Although difficult to establish, it is widely believed the wekiu bug has some obligatory association with snow and/or permafrost, the former for food, and the latter especially for year-around moisture. This would at least partly explain its restriction to higher elevations on Mauna Kea (Englund *et al.* 2002). Wekiu bugs are fairly susceptible to dehydration, which may be related to extreme swelling of the abdomen (physogastricity) after feeding (Ashlock and Gagne 1983). Wekiu bugs will emerge from beneath the 3 to 10 in (7.6 to 25 centimeter) diameter tephra (volcanic pyroclastic rock) to feed and mate when the sun has warmed the rock surfaces, particularly at the margins of snow fields. They may prefer the narrow melting, outer perimeter of snowfields where they can take advantage of any frozen insects which drop from the receding snowfield perimeter (Howarth 1997a). The onset of a shadow or the sunset will result in a quick retreat of the bugs into the tephra. Numerous surveys show that the distribution and biology of these bugs is strongly linked with the tephra cinder cones present on Mauna Kea, especially in the summit area; tephra habitats have yielded the highest capture rates of wekiu bugs (Ashlock and Gagne 1983; Englund *et al.* 2002). The tephra may facilitate vertical movement through the interstitial spaces according to day and night or seasonal temperatures. The bugs may also follow shifting snowfield edges by means of the spaces between the tephra (Howarth 1997b).

Recent studies of the wekiu bug in captivity by University of Hawaii Ph.D. candidate Jesse Eiben, have been used to create a life table for the species. He has found that at 28°C eggs averaged 17.4 days to hatch, the 1st instar stage lasted 7.45 days, 2nd instar 5.44 days, 3rd instar 5.2 days, 4th instar 5.79 days, 5th instar 8.2 days. Therefore, time for maturity of the wekiu bug at 28°C was 31.9 days after hatching. Nymphs had a survival rate of 75%, and the average egg mortality was 48.5%. The average number of eggs laid per female was 75.7, with a rate of 3.3 eggs laid per day. The net reproductive rate was 15.4, the gross reproductive rate was 38.15, the average generation time was 39.7 days, and the intrinsic rate of increase (r) was 0.069. These values were obtained at a constant temperature that never occurs on Mauna Kea in the wekiu bug habitat range, but ongoing studies are quantifying the thermal tolerances, and growth and reproduction rates of wekiu bugs to provide estimates of generation times and reproduction rates under field conditions. In the field, the generation time will be much longer than 40 days, with

the initial estimate from this ongoing research of over 100 days for successive generations (OMKM 2008, Eiben pers. comm. 2010).

Historical Range/Distribution

The wekiu bug was first discovered in 1979 by F.G. Howarth, S.L. Montgomery, and W.P. Mull on Puu Wekiu, the summit cinder cone of Mauna Kea on the island of Hawaii (Ashlock and Gagne 1983).

Current Range/Distribution

Currently, the wekiu bug is known to be limited to Mauna Kea on various cinder cones above approximately 11,400 ft (3,474 m). The cinder cones with known wekiu bug populations are as follows: All summit Pu'u, including: Pu'u Poliahu, Pu'u Wekiu, Pu'u Hau Oki, Pu'u Hau Kea, Pu'u Kea, Pu'u Pohaku to the west of the summit, the following cones northeast of the summit: Pu'u Mahoe, Pu'u Ala, Pu'u Poe Poe, Pu'u Makanaka, and the following cones south and southeast of the summit: Pu'u Lilinoe, Pu'u Kookoolau, and the unnamed cinder cones flanking the north and south of the VLBA, and the two cinder cones to the east of VLBA. There are a few unnamed cinder cones that are likely to support wekiu bugs at the far NW and NE of their range (to about 11,400ft), but none have ever been recorded from them (Porter and Englund 2006, and Eiben pers. comm. 2010). Wekiu bugs are seldom, if ever, found on the habitat between cinder cones predominated by ash and rocks characterized as 'glacial wash'.

Population Estimates/Status

No quantitative estimates of the population are currently available but surveys show regular occurrence at specific sites which likely indicate a stable population (Englund *et al.* 2002).

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Due to atmospheric and weather conditions, the University of Hawaii has developed the summit area as the Mauna Kea Science Reserve for astronomical study which is within wekiu bug habitat (Research Corporation of the University of Hawaii 1983). There are 11,200 acres (ac) 4,532 hectares (ha) in the Mauna Kea Science Reserve. The Reserve's lower boundary is 11,700 ft (3,566 m) to 12,100 ft (3,688 m) elevation. Above 12,000 ft (3,658 m), there are approximately 3,800 ac (1,538 ha) contained within the protected, State-owned Natural Area Reserves (NAR) (RCUH 1983). The lowest elevation the wekiu bug has been found was near the Very Long Baseline Array observatory at 11,715 ft (3,572m) (National Aeronautical and Space Administration (NASA) 2005).

Prior to development of the Mauna Kea Science Reserve, a development plan for the summit area was written that addressed the sensitivity of the wekiu bug and its habitat. Despite the fact that important wekiu bug habitat was identified as sensitive in the 1983 plan and was to be avoided in the development of the facilities, a lack of communication and monitoring of construction activities at the summit during construction of the Subaru telescope facility resulted in the loss of most wekiu bug habitat in Puu Hau Oki (State Auditor 1998).

To date, 13 telescopes (including one removed in 1994) and several buildings and associated structures have been constructed in the Mauna Kea summit area. In addition, there is a radio telescope facility located off the summit to the southeast. The 1983 Mauna Kea Science Reserve Complex Development Plan envisioned 13 telescopes on the Mauna Kea summit by the year 2000. Resultant impacts, in addition to loss of wekiu bug habitat in developed areas, have included road construction, parking areas, temporary storage areas, substrate removal, oil spills, and daily traffic to the summit with the concomitant human dispersal of trash and debris (NASA 2005). The preferred habitat of the wekiu bug, tephra cinders, are easily crushed to dust-sized particles, and vehicular traffic can quickly result in permanent changes from rocky tephra habitat to compacted silt and mud. Furthermore, the silt and mud has the potential to degrade nearby tephra habitat by filling the interstitial spaces between cinders that are used by this bug and other arthropods (Ashlock and Gagne 1983).

In 2000, the University of Hawaii adopted a master plan for the Mauna Kea Science Reserve (Master Plan). The Plan described existing facilities and possible future development. The latter comprised: redevelopment of up to five existing observatories, with a possible increase in size in some cases; additions to two facilities; and three new facilities at new sites. The Master Plan specified siting areas, design guidelines, and an extensive review process for all future development. The plan and its associated EIS (UH 1999) assessed the potential impact of future development on the flora and fauna (esp. the wekiu bug) of the summit area, based on the studies done for the plan. The siting areas and design guidelines were developed with the aim of minimizing any such impact. Development of interferometers on Mauna Kea may continue under the current management plan since they do not count as “telescopes”. Interferometers are specialized antennae for observing astronomical occurrences, and the resulting structures can impact significant surface areas (State Auditor 1998).

The Institute for Astronomy receives and entertains new inquiries/proposals for telescope construction on an on-going basis (State Auditor 1998). The summit area of Mauna Kea is one of the most desirable locations worldwide for astronomical observation. In addition to the possibility of new facility construction, many of the existing facilities and structures are nearly 25 years old and will probably soon require rebuilding and updating (State Auditor 1998).

In December 2006, the UH Institute for Astronomy submitted a report to the Hawaii State Legislature entitled "Report on long-term development of observatory sites on the summit of Mauna Kea", in response to HCR 314 (2006). It projected a substantially smaller scope of future development than was discussed in the Master Plan. This was corroborated in the January 2010 Decommissioning Plan prepared by the University for the Board of Land and Natural Resources. The Decommissioning Plan states that by the end of the lease in 2033, there may be 10 telescopes compared to the current 13. Only one of the existing facilities is a candidate for expansion and the extent of that expansion is much less than suggested in the Master Plan. Of the three new facilities at new sites, only one remains. One has been eliminated entirely and the other, the UH Hilo Instructional Telescope, will replace the existing UH 24" telescope.

An environmental assessment was published for the UH Hilo Instructional Telescope, and work on the structure of the project was completed in 2009. (Stephanie Nagata, OMKM, pers.comm.2009. The telescope is currently being installed.(Stephanie Nagata, OMKM, pers.

Comm., 2010) Work has begun on an Environmental Impact Statement (EIS) for the Pan-STARRS project, which is proposed to replace the UH 2.2-m telescope, however completion of the EIS has been put on hold and it is not certain when it will resume nor when work on this project might commence. (S. Nagata, OMKM, pers. comm. 2010).

An environmental impact statement is currently being finalized relating to the construction of a 30 meter telescope. A draft was released in Spring 2009 (S. Nagata, pers.comm. 2010).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

None known.

C. Disease or predation.

None known.

D. The inadequacy of existing regulatory mechanisms.

The wekiu bug currently receives no protection under Hawaii's endangered species law (HRS, Sect. 195-D) or the Federal Endangered Species Act (16 U.S.C. §1531-1544).

E. Other natural or manmade factors affecting its continued existence.

None known.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

Several members of the local community and the scientific community are interested in and have taken active steps to help protect the arthropod fauna of the Mauna Kea summit. In 1982, two biological surveys above the 13,000 ft (3,963 m) level were completed as part of the environmental impact studies for planned construction of astronomy facilities. A second, more inclusive environmental impact study was conducted in 1985, which developed into the first Mauna Kea Master Plan. In 1997 and 1998, the Bishop Museum was contracted by the Institute for Astronomy to conduct research necessary for development of an arthropod conservation plan for the Mauna Kea summit. The Bishop Museum's goal was to identify the high priority habitat areas needing protection and also to delineate the extent of the weiku bug's range (Brenner *et al.* 1997a, b).

The adoption of the Mauna Kea Science Reserve Master Plan (Plan) (University of Hawaii 1999) by the Board of Regents of the University of Hawaii (UH) in June 2000 effectively changed the management of all activities on Mauna Kea. The Plan established management guidelines for the next 20 years. The process reflects the community's concerns over the use of Mauna Kea, including respect for Hawaiian cultural beliefs, protection of environmentally sensitive habitat, recreational use of the mountain, as well as astronomy research. The Master Plan created the OMKM as part of UH Hilo. Within UH, OMKM has the responsibility for stewardship of the natural and cultural resources of Mauna Kea, and for other Master Plan elements, including review of all proposals for new development and consultation with the community. The Plan places responsibility for future development and management of natural and cultural resources with the UH Hilo in the OMKM and Mauna Kea Management Board.

In June 2001, the State contracted a Smithsonian Institution researcher to do a survey of Puu Hau Kea within the NAR within the summit area. The survey revealed surprisingly high numbers of the bug within this habitat area (Polhemus 2001). During April, May and September of 2002, additional surveys for the wekiu bug were conducted by the Bishop Museum as contracted by the Office of Mauna Kea Management for the purpose of further delineating the species' habitat range (Englund *et al.* 2002).

Beginning in February 2002, the Keck Observatory contracted an independent researcher (Pacific Analytics, L.L.C.) to conduct quarterly surveys of the wekiu bug in and around the Puu Hau Oki and Puu Wekiu craters to establish baseline information prior to construction of the four outrigger telescopes project. The information would also be used to evaluate options for habitat mitigation and restoration in areas disturbed by future development activities near the Keck Observatory (Brenner 2002-2003). Surveys of the two Puu ceased when funding of the outrigger telescopes project was terminated. We have been receiving these quarterly reports from the researcher. The last report was submitted the first quarter 2006.

On June 17, 2004, we received an independent review of the status of the wekiu bug on Mauna Kea (Wekiu Bug Scientific Data Review Committee 2004). The review was done at the request of the OMKM, and the review committee was comprised of scientists who are experts in insect ecology and biology; life in extreme environments such as the summit of Mauna Kea; and data collection and analysis. These scientists are affiliated with Hawaii Community College, the University of Hawaii, the State Division of Forestry and Wildlife, and the U.S. Geological Survey's Biological Resources Discipline. Others who attended but did not have any formal role in the decision-making process were from the OMKM, KAHEA, and the U.S. Fish and Wildlife Service (Service). The committee reviewed the scientific merits of the available information on the wekiu bug and the extent to which this information supports the current candidacy of the species, including the five threats categories, and the committee agreed the information supports our conclusion that the wekiu bug is a candidate for listing.

On April 1, 2010, The University of Hawaii published an environmental assessment for the Mauna Kea Comprehensive Management Plan (CMP) which incorporated Bishop Museum field surveys, life history, and genetics information compiled by a University of Hawaii graduate student, and funded by OMKM. On April 9, 2009, the State's Board of Land and Natural Resources (BLNR) approved the draft CMP with conditions. Some of those conditions include providing the BLNR with 4 sub-plans: a natural resources plan, a cultural resources plan, a decommissioning plan, and a public access plan. Also to be included is a framework for reviewing new projects (S. Nagata, pers. comm. 2009). The BLNR approved all four sub-plans and the framework for reviewing projects on March 25, 2010. The four sub-plans plus the CMP comprise the University's management plan for its managed lands on Mauna Kea.

In addition, a Final Environmental Impact Statement was published in April 2010, on a potential 30 meter telescope to be built on Mauna Kea on the northern plateau (S. Nagata, pers.comm. 2010). The Service will continue to develop a candidate conservation agreement with OMKM.

SUMMARY OF THREATS

Based on our evaluation of degradation and loss of habitat due to development of astronomy

facilities, we conclude there is sufficient information to develop a proposed listing rule for this species. We find that this species is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

For species that are being removed from candidate status:

___ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

- Complete development of a candidate conservation agreement with the Office of Mauna Kea Management

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8*
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

The wekiu bug is primarily threatened by habitat loss due to development of astronomy facilities on the summit of Mauna Kea. However, there are several cinder cones within the Mauna Kea Science Reserve, as well as two other cinder cones located in the NAR, where the wekiu bug occurs that are not currently undergoing development nor is development planned. The threats, though ongoing, do not occur across the entire range of the wekiu bug, and, therefore, are considered to be moderate magnitude.

Immediacy of Threats:

The immediacy of the threats is imminent in some part of the Weiku bug's range because ongoing development is occurring.

___ Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted?

No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *Nysius weikiuicola* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING

We conducted literature searches for recent articles on this subspecies and contacted relevant experts. State officials with the Department of Land and Natural Resources, Bishop Museum, and University of Hawaii researchers were contacted regarding the current status of this species. No additional information on the species' status was provided over the past year.

This level of monitoring is appropriate to update the status of the species because a thorough literature search was conducted as well as relevant experts contacted.

List of Experts Contacted:

Name	Date	Affiliation
Sheila Conant	February 8, 2010	University of Hawaii
Jesse Eiben	February 8, 2010	University of Hawaii
Stephanie Nagata	February 8, 2010	Office of Mauna Kea Management

The wekiu bug is included in the list of species in Hawaii's 2005 Comprehensive Wildlife Conservation Strategy (Mitchell *et al.* 2005). In addition, in March 2007, the State of Hawaii initiated a separate strategic plan focusing exclusively on invertebrates. It is expected that the wekiu bug will be one of the species covered by the new plan (Mitchell *et al.* 2005).

COORDINATION WITH STATES

On February 11, 2010, we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. No response was received.

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Eiben, Jesse., University of Hawaii. Email with comments in response to request for review of candidate assessment forms. April 15, 2010.

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Nagata, S., Office of Mauna Kea Management. Phone call in response to request for review of candidate assessment forms. April 14, 2009.

Nagata, S., Office of Mauna Kea Management. Phone call in response to request for review of candidate assessment forms. December 12, 2008.

Nagata, S., Office of Mauna Kea Management. Email in response to request for review of candidate assessment forms. March 7, 2008.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:

Acting Carolyn D. Bohan 5/18/10
Regional Director, Region 1, Fish and Wildlife Service Date

Rowan W. Gould
ACTING :
Director, Fish and Wildlife Service October 22, 2010

Concur:

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: April 16, 2010
Conducted by: Lorena Wada, Pacific Islands FWO
Biologist, Prelisting and Listing Program

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: April 26, 2010
Prelisting and Listing Program Coordinator

Marilet Zablan Date: April 26, 2010
Assistant Field Supervisor, Endangered Species Division

Gina Shultz Date: April 30, 2010
Acting Field Supervisor