

Ōpe`ape`a or Hawaiian Hoary Bat
(*Lasiurus cinereus semotus*)

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: Ōpe`ape`a or Hawaiian Hoary Bat
(*Lasiurus cinereus semotus*)

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5-YEAR REVIEW
Ōpe`ape`a or Hawaiian Hoary Bat /*Lasiurus cinereus semotus*

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)
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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 (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) between June 2010 and July 2011. The Recovery Plan for the Hawaiian hoary bat (*Lasiurus cinereus semotus*) (USFWS 1998), was one source of information for this five-year review of the Ōpe`ape`a or Hawaiian hoary bat; considerably more recent information about the status and biology of this species was obtained from additional sources, especially from the research currently being conducted on this species by the U.S. Geological Survey-Biological Resources Division (USGS-BRD) on Hawaii Island. The document was then reviewed by the Recovery Program Lead and the Assistant Field Supervisor for Endangered Species before submission to the Field Supervisor for approval.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:

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: U.S. Fish and Wildlife Service. FR notice: USFWS. 1970.

Endangered species list; Federal Register 35: 16047-16048.

Date listed: October 13, 1970

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: None

1.3.4 Review History:

Species status review FY 2011 Recovery Data Call (September 2011): Uncertain

Recovery achieved:

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

1.3.5 Species' Recovery Priority Number at start of this 5-year review: 9

1.3.6 Current Recovery Plan or Outline

Name of plan or outline: Recovery plan for the Hawaiian hoary bat (*Lasiurus cinereus semotus*).

Date issued: May 11, 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
 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:

1. Interim downlisting criteria - A widespread population of Hawaiian hoary bats must be naturally reproducing and stable or increasing in size on the island of Hawaii for a minimum of 5 consecutive years before downlisting is considered.

This criterion has not been met. Currently, researchers are in the process of collecting the 5th year of data on the distribution, site occupancy of the Hawaiian hoary bat on Hawaii Island, and telemetry work to collect information on home range and movement. These data appear to indicate that the Hawaiian hoary bat is widely distributed on Hawaii Island and is naturally reproducing. However, it is not yet clear whether the species is stable or increasing in size.

2. Interim delisting criteria - Hawaiian hoary bat populations on Hawaii, Kauai, and Maui must be well distributed, naturally reproducing, and stable or increasing in size for at least 5 consecutive years following downlisting before delisting is considered.

This criterion has not been met. At this time, we don't have data from Maui on the distribution, breeding, or population status of the Hawaiian hoary bat. Over the past year, the seasonal nature of bat activity was investigated at 3 sites (of varying elevation) of northwestern Kauai. Data would be needed for at least 4 more years from additional sites at locations across the island to meet this criterion. The additional data for bats on Hawaii island needed for delisting cannot be collected until the species has been downlisted.

2.3 Updated Information and Current Species Status

2.3.1 Biology and Habitat

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

The Pacific Island Ecosystems Research Center, U.S. Geological Survey (PIERC) has been conducting studies of bat distribution, site occupancy, and demographics (using telemetry) for the last 4 years on Hawaii Island. Information collected from the bats includes home range, habitat use, prey items, and reproductive status. This bat species may fly more than 12 miles (19km) one-way in the course of a night, usually returning to its original roost site by sunrise (Bonaccorso 2010). The Hawaiian hoary bat roosts in native and non-native trees but has no strong preference for any single species, shows seasonal patterns in movements, stops foraging in even moderate rains, and establishes distinct feeding areas (Bonaccorso 2010). Lepidoptera followed by Coleoptera made up 67% and 32 % (respectively) of the food consumed by volume in fecal pellets (Bonaccorso, pers. comm. 2011). Home range use overlaps between sexes and age groups, however, there is no overlap in core-use areas among adult males suggesting territorial defense (Bonaccorso, pers. comm. 2011). A lactating female was caught July 1 and juvenile bats were observed flying in August (Bonaccorso, pers. comm. 2011). Female bats often give birth to twins and from August through the approach of

winter, mother bats continue to roost with their offspring and are observed flying in pairs or triplets (Bonaccorso 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:

PIERC researchers have collected over 4 years of data on the occupancy of bats at over 20 sites across Hawaii Island. The data indicate that the Hawaiian hoary bat has a wide distribution across the island. It is widespread at all elevations sampled from 10 to 2000 m. It has also been observed in coastal areas, above wetlands and streams, rainforest, and dry forest habitats. However, occupancy data do not give us the exact status of the population though they do indicate a seasonal pattern. Lowland sites are generally most important during the pupping season and bats appear to use upland sites more frequently during the winter and spring (Bonaccorso, pers. comm. 2011).

In addition, one year of occupancy data collected in 2010-2011 at 3 locations on northwest Kauai found high detection rates at all sites. The strongest detections occurred in all regions in September to November and lower detection rates at low elevations in the winter (C. Pinzari, pers. comm. 2011).

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

There is no new genetic information at this time. However, funds are being sought to quantify genetic variation among Hawaiian hoary bat populations on Hawaii, Maui, and Kauai to delimit population boundaries; identify management units for conservation; and describe new species, subspecies, or distinct populations in Hawaii if warranted. There is evidence from museum specimens that bats on Maui may be morphologically distinct from Hawaii and Kauai Island bats (Bonaccorso, pers. comm. 2011).

2.3.1.4 Taxonomic classification or changes in nomenclature:

No new information.

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.):

Bonaccorso (pers. comm. 2011) found extremely high variance in the means for home range area, core-use area, and long axis across the home range of the Hawaiian hoary bat. The high intraspecific variation in home range is predicted by the Resource Dispersion Hypothesis, given the highly heterogeneous and fragmented habitat available to the bat in eastern Hawaiian Island resulting in variable spatial dispersion, patchiness in spatial distribution, and temporal availability of food resources (Carr and McDonald 1986; Bonaccorso (pers. comm. 2011).

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

No new information.

2.3.1.7 Other:

Planning is underway to determine sites to study the Hawaiian hoary bat on Maui and Kauai. Section 6 funds (\$400,000) were just recently awarded for FY 2012 for the purpose of conducting acoustic survey and telemetry on Maui Island. Additional funds will be needed to continue planning and research on Kauai.

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:

The decline of the Hawaiian hoary bat may be due primarily to the reduction in tree cover in historic times (Tomich 1986b, Nowak 1994). Tomich (1986a) suggested that declines in bat numbers on Oahu may have been due to deforestation in the early nineteenth century. Observations and specimen records suggest that bats are absent from portions of their historically occupied range, but estimates of abundance in formerly occupied areas are lacking (USFWS 1998).

Recent data indicate that Hawaiian hoary bats forage in multiple disjunct areas across a wide range of habitat and elevations. The bat often ranges over very fragmented habitats in Hawaii and likely adapted to using widely dispersed multiple core-use areas within a home range since the arrival of humans and agro-ecosystems (Bonaccorso, pers. comm. 2011).

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

Not considered a threat to this species.

2.3.2.3 Disease or predation:

It is unknown if disease or predation are a significant threat to this species. PIERC is beginning a pilot research project this year to examine blood smears and screen for viral agents from bat feces. This research has no outside funds but is being conducted on a no-cost basis within PIERC and with Eco-Trust Alliance.

2.3.2.4 Inadequacy of existing regulatory mechanisms:

Not considered a threat to this species.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

At this time, the greatest observed mortality of bats occurs from bats being caught on barb wire fences. The actual extent of this problem is unclear, as most fences are not checked with any regularity.

Wind farms are a new threat to the Hawaiian hoary bat. Section 7 consultation and Habitat Conservation Plans (HCPs) are approved or being planned and are likely to affect bats on Oahu, Maui, Molokai, and Lanai. To date, at least two Hawaiian hoary bats have been killed at the West Maui wind farm site.

Pesticide use could have an impact on the species by reducing or altering the prey population. In addition, direct impacts from contamination may be a factor as at least two federally endangered insectivorous bats have suffered mortality due to pesticide ingestion (Clark *et al.* 1978). Nonnative insects may also have altered prey availability (USFWS 1998). Coqui frogs were found to have the highest densities of any invasive terrestrial amphibian worldwide (Beard *et al.* 2009) and are capable of consuming large numbers of invertebrates and reduce total insect biomass (Bernard 2011). Although bats select prey according to preference rather than proportions of prey availability, bats were found to consume fewer Coleoptera prey at low elevations where there were dense coqui frog populations compared to areas with few to no frogs (Bernard 2011).

Climate change may also pose a threat to the Hawaiian hoary bat, as its range includes low-elevation habitat. However, current climate change models do not allow us to predict specifically what those effects, and their extent, would be for this species.

2.4 Synthesis

We still have large gaps of information about the biology, ecology, and genetics of this species. Research over the past 4 years indicates the Hawaiian hoary bat is

widespread and reproducing successfully on Hawaii Island, but its precise status there remains unclear. More recent data indicate the bat is also common in 3 sites of northwest Kauai. Additional data on the status of the bat is needed from Hawaii Island before downlisting can be considered. Data also needs to be collected from Maui and Kauai to understand its status and habitat use on those islands. In addition, threats to the bat are not well understood.

At this time, the recovery objectives for this species have not been met. Therefore, the Hawaiian hoary bat meets the definition of endangered: it remains in danger of extinction throughout its range.

3.0 RESULTS

3.1 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: N/A

Brief Rationale:

3.3 Listing and Reclassification Priority Number: N/A

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

1. Quantify genetic variation among Hawaiian hoary bat populations on Hawaii, Maui, Oahu, and Kauai to delimit population boundaries; identify management units for conservation; and describe new species, subspecies, or distinct populations in Hawaii if warranted.
2. Conduct research on the status and habitat use of the Hawaiian hoary bat on Maui and Kauai.
3. Conduct research essential to the conservation of the Hawaiian hoary bat, particularly related to habitat use, reproduction, and season distribution.

4. Determine how best to mitigate for take of the Hawaiian hoary bat.
5. Protect and manage current populations and identify and manage threats.
6. Conduct a public education program.

5.0 REFERENCES

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Personal communications:

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Ōpe`ape`a or Hawaiian Hoary Bat
(Lasiurus cinereus semotus)

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:

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Assistant Field Supervisor for Endangered Species

Approved  Date 9/30/2011
Acting Field Supervisor, Pacific Islands Fish and Wildlife Office