

5-YEAR REVIEW

Short Form Summary

Species Reviewed: *Pteropus mariannus mariannus* (Mariana fruit bat)

Current Classification: Threatened

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2012. Endangered and Threatened Wildlife and Plants; 5-Year Status Reviews of 46 Species in Idaho, Oregon, Washington, Nevada, Montana, Hawaii, Guam, and the Northern Mariana Islands. Federal Register 77:13248-13251.

Lead Region/Field Office:

Region 1/Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawaii

Name of Reviewer:

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Marie Bruegmann, Acting Recovery Program Lead, PIFWO

Kristi Young, Programmatic Deputy Field Supervisor, PIFWO

Methodology used to complete this 5-year review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS). The review was based on current, available information since the last 5-year review for the Mariana fruit bat (USFWS 2007). The evaluation by Julia Boland, Fish and Wildlife Biologist, was reviewed by Acting Recovery Program Lead. It was subsequently reviewed and approved by the Programmatic Deputy Field Supervisor.

Background:

For information regarding the species listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species (http://ecos.fws.gov/tess_public).

Review Analysis:

Please refer to the to the previous 5-year review for the Mariana fruit bat published on September 4, 2007 (available at http://ecos.fws.gov/docs/five_year_review/doc1137.pdf), the final listing rule published on January 6, 2005 (available at http://ecos.fws.gov/docs/federal_register/fr4367.pdf), and the draft revised recovery plan published in 2009 (available at http://ecos.fws.gov/docs/recovery_plan/100330.pdf) for a complete discussion of the species' status (including biology and habitat), threats, and management efforts. No significant new information regarding the biological status has come to light since listing to warrant a change in the federal listing status of the Mariana fruit bat.

New status information:

Surveys for Mariana fruit bats suggest populations are stable or declining throughout most of their range. A notable exception to the declining trend is the island of Rota,

where the population has been increasing since 2008. The population increase on Rota is due to a sharp decrease in illegal hunting at roost sites of fruit bat maternity colonies. The decrease in illegal hunting can be attributed to an increase in enforcement of wildlife regulations that began in 2009 (CNMI 2010).

Table 1. Summary of population estimates for the Mariana fruit bat throughout the Mariana archipelago from 1983-2010.

Island	Area square mile (square kilometer)	Estimated minimum number of bats 1983-1984 ¹	Estimated number of bats 2000 ²	Estimated number of bats 2008 ³	Maximum number of bats counted 2010 ⁴
Maug	0.8 (2.0)	< 25	not surveyed	not surveyed	11
Asuncion	2.9 (7.4)	400	not surveyed	not surveyed	573
Agrihan	18.3 (47.4)	1,000	1,000	not surveyed	858
Pagan	18.4 (47.7)	2,500	1,500	not surveyed	1,017
Alamagan	4.3 (11.0)	0 ⁵	200	not surveyed	86
Guguan	1.5 (4.0)	400	350	not surveyed	226
Sarigan	1.9 (5.0)	125	200	not surveyed	157
Anatahan	12.5 (32.3)	3,000	1,000	not surveyed	150
Saipan	47.5 (122.9)	< 50	not surveyed	not surveyed	not surveyed
Tinian	39.3 (101.8)	< 25	not surveyed	0	not surveyed
Aguiguan	2.7 (7.0)	< 10	150-200	40-60	not surveyed
Rota	32.9 (85.2)	800-1,000	not surveyed	1019 ⁶	2,283 ⁸
Guam	212 (549.0)	425-500	119-179	<40 ⁷	not surveyed

¹ Wiles *et al.* 1989. Count methods: Evening dispersal counts at colonies and evening station counts of solitary fruit bats. All counts considered to be minimum estimates.

² Cruz *et al.* 2000a-f. Count methods: Evening dispersal counts at colonies, evening and morning station counts of solitary fruit bats. Data for Guam represents the range of 10 counts conducted in a separate effort in 2000 (A. Brooke pers. comm. 2007 in USFWS 2009).

³ Data for Tinian and Aguiguan from USFWS (2008). Data for Rota from CNMI (2008).

⁴ Data for Northern Islands from USGS (E. Valdez per. com. 2010). Data for Rota from CNMI (2010).

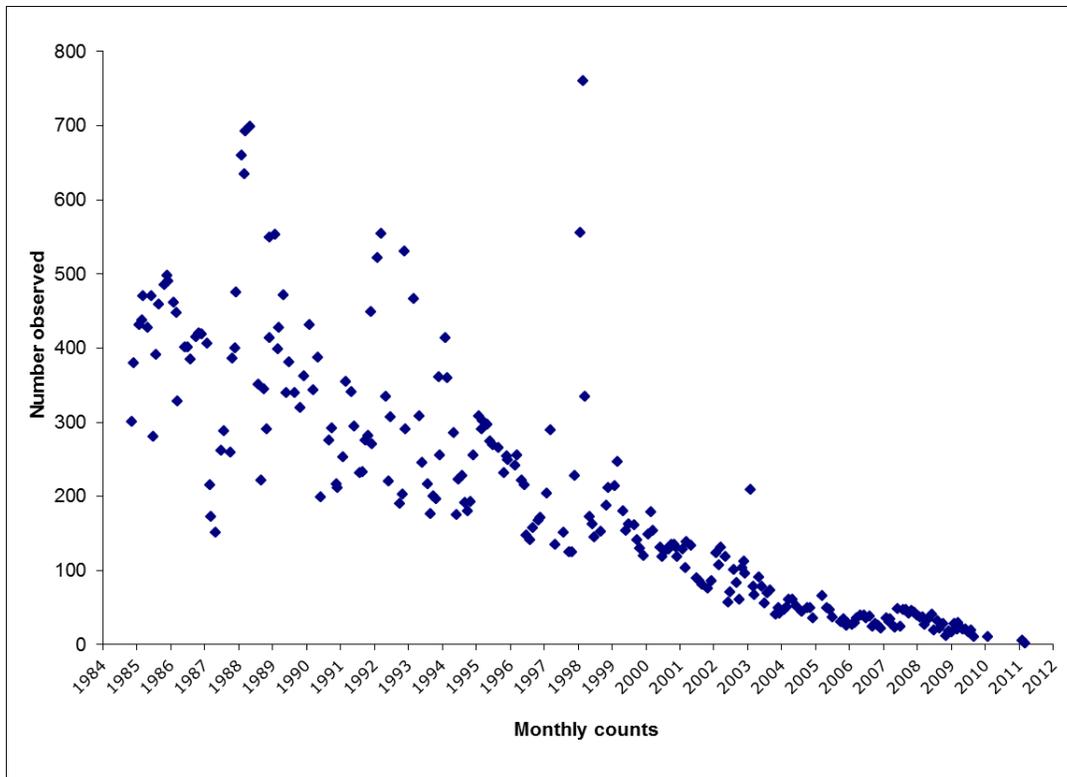
⁵ Alamagan was inadequately surveyed in 1983 and may have held some fruit bats.

⁶ Direct counts at all maternity colonies plus departure counts at extra-colonial sites in July 2008

⁷ Brooke (2008) and SWCA (2013)

⁸ Direct counts for all maternity colonies in May 2010 plus departure/arrival counts at extra-colonial sites in April 2010

Figure 1. Direct counts of fruit bats at the historical fruit bat maternity colony at Pati Point on Anderson Airforce Base from 1984-2011 (A. Brooke, pers. comm. 2014, data compiled from survey efforts of the US Navy and Guam Department of Aquatic and Wildlife Resources).



New threats: No new threats to the Mariana fruit bat have been discovered. Threats not specifically addressed in the 2009 5-year review continue to be:

- Agricultural and urban development loss or degradation of habitat – Human development is a factor in habitat loss on all inhabited southern islands. Although a conservation area containing some important habitat for Mariana fruit bats was recently established on Rota (USFWS 2011), there is not currently enough protected fruit bat habitat on Rota, Guam, Tinian, or Saipan to support substantial population recovery on any of those islands. Even if sufficient habitat is set aside in conservation to support recovery of populations, controlling illegal hunting may continue to be a challenge that limits recovery of the species.
- Ungulate degradation of habitat – Philippine sambar deer (*Rusa marianna*) and feral ungulates degrade habitat on many of the Mariana Islands. The successful eradication of feral ungulates from Sarigan and Anatahan suggests that similar projects may succeed on other islands. However, once grazing and browsing pressure is removed, the potential invasion of native forest by alien plants may be a more difficult and long-term recovery issue.
- Human disturbance – Illegal hunting is a threat to Mariana fruit bats on all islands. The fruit bat population on Rota was in steady decline before 2009 when increased law enforcement resulted in an immediate decrease in illegal hunting at maternity colonies (CNMI 2008, 2009a-b, 2010). However, illegal hunting of fruit bats on Rota continues and will likely resume to historic levels unless consistent, effective law enforcement efforts in tandem with education and outreach programs continue. Fruit bats are apparently extirpated from Tinian and

will likely soon be extirpated from Saipan and Guam, and illegal hunting is thought to have greatly contributed to the decline of those populations. As with Rota, recovery of the Mariana fruit bat on human-inhabited islands will not likely be possible without strong education programs combined with effective control of illegal hunting.

- Nonnative snake predation – The brown treesnake is thought to prey on non-volant young bats left at the roost site during the night, thus preventing the recruitment of young bats into the breeding population. Effective control of brown treesnakes must be achieved before the Mariana fruit bat population on Guam can recover. The interdiction, control, and ultimate eradication of brown treesnakes in the archipelago are the focus of major, ongoing projects, and the Mariana fruit bat is likely to benefit from these efforts in the long term. This prognosis would change drastically if the brown treesnake were to become established widely throughout the archipelago.
- Stochastic events - Hurricane mortality and reduced viability
- Stochastic events – Lava flows – Natural disasters such as volcanic eruptions and typhoons are also a factor in habitat loss, and can be especially damaging to the viability of smaller populations of Mariana fruit bat. The significant loss of habitat on Anatahan after the volcanic eruption in 2003 resulted in the loss of a substantial fruit bat population that has not yet recovered.
- Stochastic events – Reduced viability due to low numbers (e.g., on Guam, Saipan, Tinian, Aguiguan, and Maug)

New management actions:

- Population viability monitoring and analysis – Technical assistance was obtained in 2008 to analyze fruit bat survey data from Rota and refine survey methods and the existing monitoring program (CNMI 2008, 2009a-b, 2010).
- Law enforcement and compliance – On the island of Rota, the USFWS and the Commonwealth of the Northern Mariana Islands (CNMI) Division of Fish and Wildlife (DFW) have increased law enforcement actions since 2009. With support from Service law enforcement and federal discretionary funds, CNMI Conservation Officers have participated in nine fruit bat-related arrests on Rota, all resulting in convictions. Enforcement actions have contributed to a decrease in illegal hunting, and approximate doubling of the fruit bat population on Rota.
- Monitoring protocol development – Experts were consulted to review and refine survey methods for Mariana fruit bats to develop standardized, quantitative monitoring that permits data comparison at multiple timescales. Standard operating procedures were developed for CNMI DFW (CNMI 2009a) and a monitoring protocol was developed for USFWS for fruit bat surveys in the Northern Mariana Islands (Mildenstein and Boland 2010).
- Surveys / inventories – Surveys were conducted on Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrihan, Asuncion, and Maug in 2010 (USGS 2010).
- Habitat and natural process management and restoration – The Mariana Crow Conservation Area was established on Rota through an MOA between the CNMI and the USFWS (USFWS 2011). This area encompasses 444 hectares (1097

acres) and contains some high-quality foraging and roosting habitat for Mariana fruit bats.

- Outreach and education – Discussions were initiated with CNMI DFW and CNMI Public School System (PSS) to develop outreach and education materials and opportunities to curb illegal hunting. Several education and outreach programs were funded by the USFWS, Bat Conservation International, Disney, and Lubee Bat Conservancy, and these programs were implemented on Rota through a local non-profit. An education curriculum was developed with the CNMI PSS, but has not yet been implemented.

Synthesis:

Before the Mariana fruit bat is considered for delisting, the draft revised recovery plan (USFWS 2009) proposes that stable or increasing populations should exist on three of the five southern islands (Saipan, Tinian, Aguiguan, Rota, and Guam), and six of the northern islands where Mariana fruit bats have persisted historically (Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrihan, Asuncion, and Maug). Of the six northern islands that require stable or increasing fanihi numbers, two of these must include Pagan, Anatahan, or Agrihan. Of the five southern islands, only Rota has achieved an increasing population. Of the six northern islands, the only evidence for a possibly increasing population is on Asuncion. Loss and degradation of habitat, illegal hunting, and predation by the brown treesnake are the most significant threats to the survival of this species. The final version of the Mariana fruit bat recovery plan is currently in review, and recovery criteria stated here may change upon completion of the final plan.

Recommendations for Future Actions:

Recovery implementation for the Mariana fruit bat should include the following:

- Outreach and education – Decrease illegal hunting by developing and supporting outreach and education programs that emphasize the value of and need to protect Mariana fruit bats and other native plant and wildlife species in the Marianas.
- Law enforcement and compliance – Decrease illegal hunting by continuing to provide technical and financial assistance to CNMI DFW enforcement officers to facilitate apprehension and prosecution of poachers.
- Ungulate monitoring and control
 - Decrease habitat loss by eradicating feral ungulates on Guam and Pagan and preventing their introduction on other islands where fruit bat recovery is desired.
 - Decrease habitat loss by controlling deer in areas of high-quality fruit bat habitat.
- Habitat and natural process management and restoration
 - Improve habitat through support of native forest restoration; especially on Guam, Saipan, and Tinian.
 - Set aside enough high-quality fruit bat habitat in conservation areas to support the recovery of Mariana fruit bat populations on three of the five southern islands.
- Human interaction monitoring and management

- Limit military training in areas occupied by Mariana fruit bats to activities that will not disturb bats or their habitat.
- Limit urban development in areas occupied by or potentially used for roosting and foraging by Mariana fruit bats.
- Population monitoring and viability analysis – Continue monitoring fruit bat numbers on Anatahan to understand the fluctuation of numbers in response to volcanic activity.
- Management action effectiveness monitoring – Continue monitoring vegetation recovery on Sarigan to assess the spread of alien plants and the threat that invasive species may pose to the reestablishment of native forest.
- Population monitoring and viability analysis – Hire and ensure consistent employment of a full-time, resident DFW or Service biologist who is charged with monitoring the fruit bat population on Rota according to established protocols (CNMI 2009a; Appendix 1).
- Predator / herbivore monitoring and control – Continue and increase efforts to control brown treesnake on Guam and prevent introduction of brown treesnake populations on other Mariana Islands.

Table 2. Status and trends of the Mariana fruit bat from listing through current 5-year review.

Date	Estimated Number*	Recovery Criteria Identified in Recovery Plan	Recovery Criteria Completed?
1984 (listing as Endangered on Guam)	8761-9036	Recovery plan not yet created	NA
2004 (critical habitat); 2005 (listing as Threatened on Guam and CNMI); 2007 (5-year review)	Insufficient data	Total population increased; stable or increasing populations on 3/5 southern islands, and 6/8 northern islands	No
		A post-delisting monitoring program	No
		Habitat loss and degradation no longer a threat to the species survival	No
		Illegal hunting no longer a threat to the survival of the species	No
		Control brown treesnake on Saipan and prevent introduction to other CNMI islands	Partially; control and prevention on Saipan and Guam; limited prevention on Rota
		Negative impacts from urban development and military training are being avoided	Partially

2010 (draft revised recovery plan); 2014 (5-year review)	Insufficient data	Total population increased; stable or increasing populations on 3/5 southern islands, and 6/8 northern islands	Partially; Rota population increasing
		A post-delisting monitoring program	Partially; monitoring protocols developed for Rota and Northern Islands
		Habitat loss and degradation no longer a threat to the species survival	No
		Illegal hunting no longer a threat to the survival of the species	Partially; law enforcement efforts increased on Rota resulting in decrease of illegal hunting
		Control brown treesnake on Saipan and prevent introduction to other CNMI islands	Partially; control and prevention on Saipan and Guam; limited prevention on Rota
		Negative impacts from urban development and military training are being avoided	Partially

Table 3. Threats to the Mariana fruit bat and current conservation efforts.

Threat	Listing Factor	Current Status	Conservation/ Management Efforts
Hunting	B	ongoing	Partially; law enforcement efforts on Rota have decreased illegal hunting
Habitat loss and degradation	A	ongoing	Partially; ESA Section 7 consultations for Guam and CNMI for federally-funded development and military training
Predation (brown treesnake)	C	ongoing	Partially; control and prevention on Saipan and Guam; limited prevention on Rota
Natural disturbance, development, and military training activities	E	ongoing	Partially; ESA Section 7 consultations for Guam and CNMI for federally-funded development and military training

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW on
Mariana fruit bat (*Pteropus mariannus mariannus*)

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

Recommendation resulting from the 5-year review:

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- Delist
 Reclassify from Endangered to Threatened status
 Reclassify from Threatened to Endangered status
 No Change in listing status

for Maire M. Blugmann
Field Supervisor, Fish and Wildlife Service

Date 2014-08-12

