

5-YEAR REVIEW

Short Form Summary

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

Current Classification: Threatened

Federal Register Notice announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2018. Endangered and threatened wildlife and plants; Initiation of 5-year status reviews for 156 species in Oregon, Washington, Hawai'i, Palau, Guam, and the Northern Mariana Islands. Federal Register 83(88):20088-20092.

Lead Region/Field Office:

Interior Region 12, Portland Regional Office/ Pacific Islands Fish and Wildlife Office (PIFWO), Honolulu, Hawai'i

Name of Reviewer(s):

Heather Benedict, Fish and Wildlife Biologist, PIFWO

Jacqueline Flores, Biologist and Mariana Islands Manager, PIFWO

John Vetter, Animal Recovery Coordinator, PIFWO

Megan Laut, Conservation and Restoration Team Manager, 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), beginning on December 2, 2019. The review was based on a review of current, available information since the last 5-year review for Fanihi (*Pteropus mariannus mariannus*) (USFWS 2015). The evaluation by Heather Benedict, Fish and Wildlife Biologist, was reviewed by John Vetter, Animal Recovery Coordinator. It was subsequently reviewed and approved by Megan Laut, Conservation and Restoration Team 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 at: <http://ecos.fws.gov/ecp/>.

Review Analysis:

Please refer to the previous 5-year reviews for Fanihi (*Pteropus mariannus mariannus*), 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), and the 5-year review published October 12, 2014 (available at https://ecos.fws.gov/docs/five_year_review/doc4419.pdf). For a complete review of the species' status, threats, and management efforts see <https://ecos.fws.gov/ecp0/profile/speciesProfile?sPCODE=A07X>. No significant new

information regarding the species' biological status has come to light since listing to warrant a change in the Federal listing status of Fanihi.

The Fanihi is a bat in the Pteropodidae family, a flying fox, endemic to the Mariana Islands. Adults have a gold to brown mantle coat with dark brown to black leathery wings. The nose is elongated and resembles a fox.

New status information:

Taxonomy

The taxonomic history of *Pteropus mariannus mariannus* is complex, both within the Marianas and in the rest of the range of the species in Micronesia. Various populations have been considered conspecific with separate subspecies or separate species altogether, depending on the authority. In addition, a separate subspecies (*P. m. paganensis*) has previously been proposed for populations on Pagan within the Mariana Islands. Recent genetic studies confirm that some Micronesian populations formerly included in *P. mariannus*, including *P. m. pelewensis* and *P. m. yapensis*, are indeed a genetically distinct species and are now combined into *P. pelewensis* (Almeida et al. 2014). Also, there is no evidence of a subspecies split of *P. mariannus* in the Mariana Islands (Almeida et al. 2014; Brown et al. 2011). Thus, *Pteropus mariannus* is endemic to the Mariana Islands with all populations constituting one conservation unit (Brown et al. 2011). This should also lead to the updating of the documentation listing in further regulations. The Fruit Bat working group has accepted these changes and this will inform the IUCN update of the species (DAWR 2020).

Mildenstein, (2013) created a population carrying capacity for Rota and further genetic analysis that while the same species there is a northern and southern population for fruit bat.

Typhoon Mangkhut caused significant damage to the forest on Rota in September of 2018. The Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife (DFW) monitored the bats' movements after the storm. Much higher numbers were seen after the defoliation from the storm and it is probable that the population was underestimated before the storm. Some traditional colonies were displaced by the storm and the loss of taller roosting trees (DFW 2019). The summary from DFW (2019) is as follows:

“The As Pupuenge Colony is normally restricted to departure counts due to the line of site being obscured by foliage. The loss of foliage allowed a comparison of a departure count (n=93) with a direct count (n=541 bats) immediately post-typhoon. The difference of 448 bats suggest that counts earlier in the year are likely to be a considerable underestimate of the bat numbers. The loss of roosting trees at As Pupuenge colony likely lead to the brief increase in numbers at As Akodo and Pal'ii. The extra colonial site of I Koridot, which had 6-20 bats when checked earlier in the year, also swelled temporarily to approximately 1,000 individuals post-typhoon. Unfortunately, an exact count was impossible due to wind direction and local topography. With the establishment of the colony at I

Koridot, a corresponding decrease was observed in Pali'i and As Akodo. By the beginning of November, however, all colonies on Rota were abandoned with only a few bats present at each. Instead, bats were sighted all over the island of Rota in small groups of less than 20 individuals. Reports of regular bat sightings on Guam, where bats are rarely observed, and a few reports of sightings on Saipan suggest that at least some of the bats left Rota in search of food elsewhere.”

Bats that are displaced from typhoons to Guam often do not return to Rota until months later (DAWR 2020).

While Rota, which has the largest population, is surveyed annually (Figure1), most islands have not been re-surveyed recently to get more up to date population estimates across the range (Table 1). For Rota, the island has averaged 2,500-3,000 bats across 2012-2019 with peaks after major typhoons (DFW 2019), with the most recent estimate being 3,000 bats in 4 colonies (DFW 2020). Other recent estimates have found the small population on Guam increasing from ~15 in 2014 to ~82 in 2019 (DAWR 2020), the population on Alamagan increasing from 86 in 2010 to ~385 in 2017 in 3 colonies (DFW 2017), and around 249 bats on Guguan (Liske-Clarke et al. 2016).

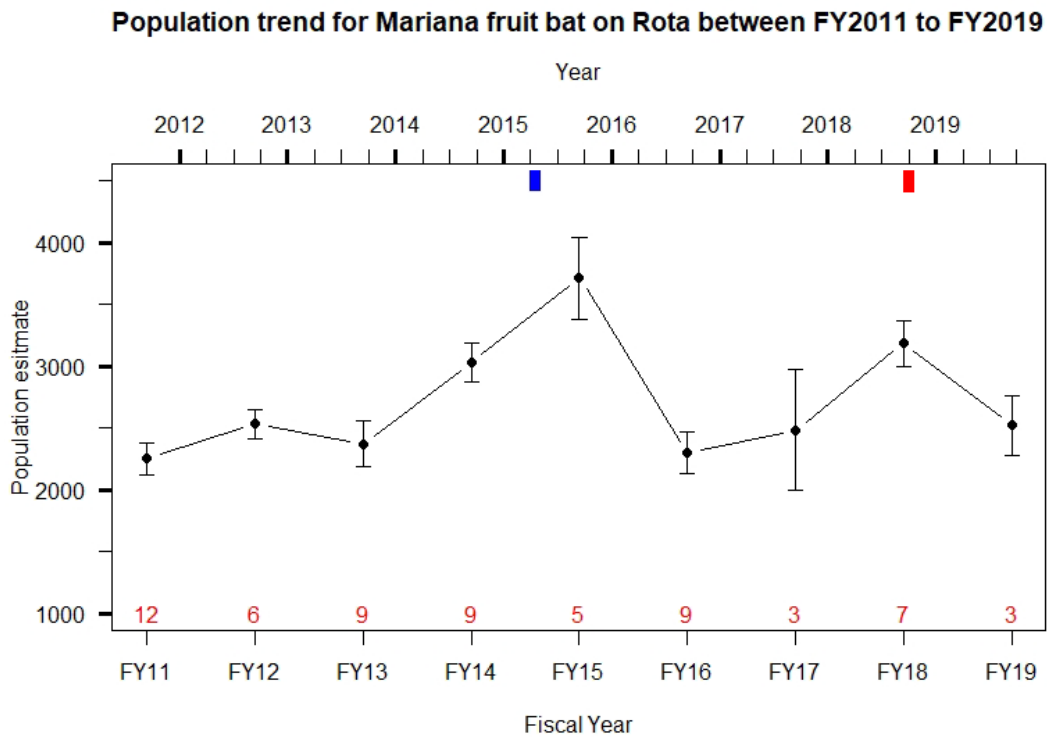


Figure 1: Mean monthly counts on Rota. Months that did not count every major colony or post colony abandonment were considered to be undercounts and excluded from the analysis. The number of months in each year that a full count was conducted is indicated by the numbers in red. Typhoon Dolphin (■) passed between Rota and Guam on the 15th of May 2015 and Typhoon Mangkhut (■) passed over Rota on the 10th of September 2018. (DFW Final Project Performance Report CNMI F18AF00809)

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	Maximum number of bats counted 2020
Maug	0.8 (2.0)	< 25	not surveyed	not surveyed	11	not surveyed
Asuncion	2.9 (7.4)	400	not surveyed	not surveyed	573	not surveyed
Agrihan	18.3 (47.4)	1,000	1,000	not surveyed	858	not surveyed
Pagan	18.4 (47.7)	2,500	1,500	not surveyed	1,017	not surveyed
Alamagan	4.3 (11.0)	0 ⁵	200	not surveyed	86	~385 ¹¹
Guguan	1.5 (4.0)	400	350	not surveyed	226	249 ¹²
Sarigan	1.9 (5.0)	125	200	not surveyed	157	not surveyed
Anatahan	12.5 (32.3)	3,000	1,000	not surveyed	150	not surveyed
Saipan	47.5 (122.9)	< 50	not surveyed	not surveyed	not surveyed	<50 ¹³
Tinian	39.3 (101.8)	< 25	not surveyed	0	not surveyed	not surveyed
Aguiguan	2.7 (7.0)	< 10	150-200	40-60	not surveyed	not surveyed
Rota	32.9 (85.2)	800-1,000	not surveyed	1019 ⁶	2,283 ⁸	~3000 ⁹
Guam	212 (549.0)	425-500	119-179	<40 ⁷	not surveyed	~82 ¹⁰

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

⁹DFW (2020)

¹⁰DAWR (2020)

¹¹DFW (2017)

¹²Liske-Clark et al. (2016)

¹³ Mildenstein, (2013)

New threats:

No new threats to the Mariana fruit bat have been identified.

New management actions:

- DFW implemented several projects to support monitoring efforts:
 - Mariana Fruit Bat Spatial Use and Movement Patterns was carried out in conjunction with the concurrently funded: Mariana Fruit Bat Monitoring Program (Project 2), which provided monitoring of colonies and assisted in identifying events and conditions in which orphaned or injured bats may require additional assistance from DFW
 - Fruit Bat Rescue and Rehabilitation Program FY 2018 (Project 6), which provided rehabilitation and rescue of Mariana Fruit bats. Due to difficulties of procurement of equipment an extension was obtained for FY2019.
 - During FY2019 “Fruit Bat Monitoring and Management FY 2019” (Project 2) supported this project
 - Officer training needs were identified by Mildenstein, 2013.

Synthesis:

Recent surveys and population estimates (DAWR 2020; DFW 2017; DFW 2020; Mildenstein 2013) suggest the *P. m. mariannus* population is stable overall. However there is insufficient survey frequency and only Rota has sufficient population numbers to meet recovery criteria. Many of the islands have not been surveyed during the last five year period due to difficult access to the islands and a lack of funding. Although the species is stable overall, its range is contracting due to development, and if the subspecies is considered to be a new species the range will naturally change from that as well to only encompass the Mariana islands. In addition, all threats are not being sufficiently managed throughout all of the populations (Table 2). Thus *P. m. mariannus* still meets the definition of threatened.

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 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 by 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.
- Surveys/inventories – Survey all islands annually hopefully in a short time frame to reduce potential migration or displacement from storms.
- 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.
- 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 1. Trends in status of Fanihi since listing.

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
2020 (5-year Review)	Population stable on Rota, and Alamagan and Guguan. Other islands not surveyed.	Total population increased; stable or increasing populations on 3/5 southern islands, and 6/8 northern islands	Partially; Alamagan and Rota population but not to necessary numbers or with adequate survey frequency.
		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
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Table 2. Threats to Fanihi and ongoing 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
Ungulates – degradation of habitat and herbivory	A, C, E	Ongoing	Partially, some habitat areas fenced
Predation (brown treesnake)	C	Ongoing	Partially; control and prevention on Saipan and Guam; limited prevention on Rota
Development, and military training activities	E	Ongoing	Partially; ESA Section 7 consultations for Guam and CNMI for federally funded development and military training
Climate change	A, E	Increasing	
Inadequate Regulation and enforcement	D	Ongoing	There is a lack of consequences for poaching events.

References:

See previous 5-year review for a full list of references (USFWS 2014).

Almeida, F.C., N.P. Giannini, N.B. Simmons, and K.M. Helgen, 2014. Each flying fox on its own branch: A phylogenetic tree for Pteropus and related genera (Chiroptera: Pteropodidae), *Molecular Phylogenetics and Evolution* 77: 83-95.

Brown, V.A., Brooke, A., Fordyce, J.A., McCracken, G.F., 2011. Genetic analysis of populations of the threatened bat Pteropus mariannus. *Conserv. Genet.* 12, 933–941.

[DAWR] Guam Department of Aquatic and Wildlife Resources. 2020. Fanihi Quarterly Meeting Minutes. January 13, 2020.

[DFW] Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife. 2017. “Wildlife and Vegetation Surveys: Alamagan 2017,” n.d., 69. Report by Christopher Murray, Jill Liske-Clark, Steve Mullin, Robert Ulloa, Douglas Page, and Brad Eichelberger.

- [DFW] Commonwealth of the Northern Mariana Islands Division of Fish and Wildlife. 2019. Annual Project Performance Report Commonwealth of the Northern Mariana Islands F18AF00809 (Final Performance Report) FY 2018. Guilbert, Joshua; M. Robert S. Ulloa, Charles A. Mendiola;
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- Liske-Clark, J., B. Chagnon, S. Mullin, and B. Eichelberger. 2016. Wildlife and vegetation surveys, Guguan 2016. Technical Report #16, CNMI Division of Fish and Wildlife, Saipan, MP. 99 pp.
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- Mildenstein, Tammy L. 2013. "FINAL REPORT Mariana Fruit Bat Conservation and Capacity Building on Rota," June 2013. Cooperative Agreement Number: N40192-11-2-8005. Prepared for NAVFAC-Marianas.
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**U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of
Mariana fruit bat, Fanihi (*Pteropus mariannus mariannus*)**

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

Recommendation resulting from the 5-year review:

<u> </u>	Delisting
<u> </u>	Reclassify from Endangered to Threatened status
<u> </u>	Reclassify from Threatened to Endangered status
<u> X </u>	No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable:

Name of Reviewer(s):

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Date _____