Oceanic Hawaiian Damselfly
(Megalagrion oceanicum)

5-Year Review
Summary and Evaluation

U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
Honolulu, Hawai‘i

5-YEAR REVIEW

Species reviewed: Oceanic Hawaiian damselfly (*Megalagrion oceanicum*)

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1.0 GENERAL INFORMATION

1.1 Reviewers

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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 of the U.S. Fish and Wildlife Service (USFWS), beginning on October 2, 2018. The review is based on the final rule to list the oceanic Hawaiian damselfly, the recovery outline for the island of O‘ahu signed on July 26, 2018, current published and unpublished materials, and expert opinions and knowledge on the *Megalagrion oceanicum* species. The draft 5-year review was then reviewed by the Animal Recovery Coordinator and the Conservation and Restoration Team Manager before signature by the Field Supervisor.

1.3 Background:

1.3.1 FR Notice citation announcing initiation of this review:

[USFWS] U.S. Fish and Wildlife Service. 2017. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 138 species in Hawai‘i, Oregon, Washington, and California. Federal Register 82 (75): 18665–18668.

1.3.2 Listing history

Original Listing
FR notice: [USFWS] U.S. Fish and Wildlife Service. 2012. Endangered status for 23 species on O‘ahu and designation of critical habitat for 124 species; final rule. Federal Register 77 (181): 57648-57862.
Date listed: September 18, 2012
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: N/A

1.3.4 Review History: N/A

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

1.3.6 Current Recovery Plan or Outline

[USFWS] U.S. Fish and Wildlife Service. 2018. Recovery outline for the island of O‘ahu. U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, Honolulu, Hawai‘i. 42 pp.
https://www.fws.gov/pacific/ecoservices/endangered/recovery/documents/Oahu_Recovery_Outline_20180726.pdf
Name of plan or outline: Recovery outline for the island of O‘ahu
Date issued: July 2018
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***
__X_ ***No***

2.1.2 Is the species under review listed as a DPS?

____ ***Yes***
_X__ ***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***
__X__ ***No***

2.2 Recovery Criteria

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

____ ***Yes***
_X__ ***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?

____ ***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:
No final recovery plan for *Megalagrion oceanicum* has been developed by the time of the completion of this 5-year review.

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:
No new information on the oceanic Hawaiian damselfly (*Megalagrion oceanicum)* biology or life history has become known since the species was listed. Individuals of the immature stage of the oceanic Hawaiian damselfly are found in swiftly flowing sections of streams, usually amid rocks and gravel in streams riffles and small cascades on waterfalls (Williams, 1936, pp. 321-322; Polhemus and Asquith, 1996, p.106). While capable of swimming, the naiads usually crawl among gravel or submerged vegetation. Older naiads frequently forage out of the actual stream channel and have been observed among wet moss on rocks and wet rock walls and seeps (Williams, 1936, pp. 321-323). Adults are very bold and strong flyers, and when disturbed, frequently fly upward into the forest canopy overhanging the stream or waterfall (Williams, 1936, p.323; Polhemus, 1994, p. 48).

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:
Little is known about the abundance, population trends, and demographic features of the oceanic Hawaiian damselfly. Historically, the oceanic Hawaiian damselfly occurred on both the leeward and windward sides of the Koʻolau and Waiʻanae Mountains, and was known, but is currently extirpated, from approximately 16 general localities, including the Waiʻanae Mountains and all leeward streams of the Koʻolau Mountains (Englund and Polhemus, 1994, p. 8). The species now currently occupies 12 sites above 300 ft (100 m) in elevation on the windward side of the Koʻolau Mountains at Kahawainui, Wailele, Koloa, Kaipapaʻu, Maʻakua, upper Kaluanui, Kawaiiki, ʻŌpaeʻula, upper Helemano, Makaua, Waiheʻe, and Kahaluʻu, in the lowland mesic, lowland wet, and wet cliff ecosystems (TNC, 2007; Polhemus, 2007, pp. 237-239; HBMP, 2008; Preston, 2011, *in litt*.). The oceanic Hawaiian damselfly is constrained to portions of streams not occupied by nonnative predatory fish, that is, stream portions above geologic or manmade barriers (e.g., waterfalls, steep gradients, dry stream midreaches, or constructed diversions). No estimates of population size for the oceanic Hawaiian damselfly are available.

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):
Apparent limits of the current oceanic Hawaiian damselfly population will likely reduce genetic diversity and cause inbreeding depression.

2.3.1.4 Taxonomic classification or changes in nomenclature:
No changes in taxonomic classification have occurred.

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.):

Historically, the oceanic Hawaiian damselfly occurred on both the leeward and windward sides of the Koʻolau and Waiʻanae Mountains on Oʻahu, and was known, but is currently extirpated, from approximately 16 general localities, including the Waiʻanae Mountains and all leeward streams of the Koʻolau Mountains (Englund and Polhemus, 1994, p. 8). The species now currently occupies 12 sites above 300 ft (100 m) in elevation on the windward side of the Koʻolau Mountains at Kahawainui, Wailele, Koloa, Kaipapaʻu, Maʻakua, upper Kaluanui, Kawaiiki, ʻŌpaeʻula, upper Helemano, Makaua, Waiheʻe, and Kahaluʻu, in the lowland mesic, lowland wet, and wet cliff ecosystems (TNC, 2007; Polhemus, 2007, pp. 237-239; HBMP, 2008; Preston, 2011, *in litt*.).

In May of 2011 a supplementary aquatic insect survey was conducted in the upper midreach and headwater reaches of Kaluanui Stream, on the windward slope of the Koʻolau Mountains of eastern Oʻahu, to reconfirm the presence of several rare native *Megalagrion* damselfly species recorded from this area during a previous stream insect survey conducted in September of 1993. Surveys were made along the main stem and south headwater fork of the stream across an elevational range extending from 600-685 m asl (1975-2250 ft asl) at seven individual sampling stations. The current survey resulted in the confirmation that the oceanic Hawaiian damselfly was present. One adult was observed in the stream headwaters and immatures were located only in a single swift, clear, rocky tributary descending from a large cascading spring that emerges on the west wall of the valley (Polhemus, 2012, p. 14).

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):
Critical habitat has been identified for the oceanic Hawaiian damselfly and consists of perennial streams, swift-flowing sections and riffles of streams in lowland mesic, lowland wet, and wet cliff ecosystems on Oʻahu.

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:

Degradation, modification, and destruction of native riparian stream corridors on O‘ahu threaten the existence of the oceanic Hawaiian damselfly. The factors that contribute to these detriments are stream diversion and channelization, dewatering of aquifers, improper water well placement, introduced feral pigs (*Sus scofa*), invasive plants, hurricanes, landslides, rockfalls, flooding, and drought. The ongoing and likely increasing effects of global climate change (such as increasing temperature and changing rainfall patterns) are also likely to directly or indirectly impact the habitat of the native Hawaiian damselflies in general (USFWS, 2012).

Historically, damselflies in the genus *Megalagrion* were a common component of Hawaiian streams and wetlands at elevations ranging from sea level to the summit of the Ko‘olau Range on O‘ahu. The loss of stream habitat due to stream diversion, channelization, dewatering of their source aquifers, and vertical wells represent serious and ongoing threats to the oceanic Hawaiian damselfly for the following reasons: they reduce the amount and distribution of stream habitat available to this species; they reduce stream flow, leaving lower elevation stream segments completely dry except during storms, or leaving many streams completely dry year round, thus reducing or elimination stream habitat; and they indirectly lead to an increase in water temperature that results in physiological stress and to the loss of oceanic Hawaiian damselfly naiads. This species is particularly vulnerable to extinction due to such changes (e.g., stream diversion, channelization, and dewatering), a vulnerability which is exacerbated by their range and habitat constrictions and declines in their population numbers (USFWS, 2012, p. 57675).

Landslides can modify and destroy riparian and stream habitat by direct physical damage (e.g., rocks and debris falling in a stream, mechanical damage to riparian vegetation), and create disturbed areas leading to the invasion by nonnative plants that outcompete the native plants, as well as damage or destroy plants used by the oceanic Hawaiian damselfly for perching (USFWS, 2012, p. 57673).

Intermittent flooding events likely occurred in the stream habitats of the oceanic Hawaiian damselfly in the past, due to stochastic events such as storms and hurricanes. However, the current low numbers of individuals and populations, combined with their breeding, life-history requirements in stream habitats, and reduced ranges, of this damselfly increase its vulnerability to the threat of flooding. The impact of flooding events may be increased by channelization of stream reaches, or degradation of riparian vegetation by feral ungulates. Naiads may be washed out of streams into the surrounding terrestrial habitat or washed downstream into portions of streams that are occupied by nonnative predatory fish. Adults

perching on surrounding vegetation may be washed into flooded streams and drown (USFWS, 2012, p. 57673).

Temporary loss of habitat associated with droughts are not uncommon in the Hawaiian Islands. These drought events often desiccate streams, irrigation ditches, and reservoirs; deplete groundwater supplies; and directly removes damselfly hunting and breeding habitat. Droughts leads to an increase in the number of forest and brush fires, causing a reduction of native plant cover and habitat, and of plants used by the damselfly for perching and hunting for prey (USFWS, 2012, p. 57674).

The threats posed by conversion of wetlands and other aquatic habitat for agriculture and urban development are ongoing and are expected to continue into the future. These modified areas lack the aquatic habitat features that the oceanic Hawaiian damselfly requires for essential life-history needs, such as marshes, side pools along streams, and slow sections of perennial streams, and no longer support populations of this species (USFWS, 2012, p. 57674).

The threats posed by introduced ungulates to the oceanic Hawaiian damselfly and its habitat are serious because they cause trampling and grazing that directly impact the plants in riparian areas used by the damselfly for perching, reproduction, and hunting for prey; increase soil disturbance, leading to mechanical damage to plants in riparian areas; create open, disturbed areas conducive to weedy plant invasion and the establishment of alien plants, which results over time in the conversion of a community dominated by nonnative vegetation; and increase watershed erosion and sedimentation, which affects aquatic habitat used by the oceanic Hawaiian damselfly (USFWS, 2012, p. 57676; Wehr et al., 2018, p. 180, 185-187).

The oceanic Hawaiian damselfly may be vulnerable to extinction due to anticipated environmental changes that may result from global climate change. Environmental changes that may affect this species are expected to include habitat loss or alteration and changes in disturbance regimes (e.g., storms and hurricanes), in addition to direct physiological stress caused by increased stream water temperatures to which the native Hawaiian damselfly fauna are not adapted. The probability of a species going extinct as a result of these factors increases when its range is restricted, habitat decreases, and population numbers decline (Intergovernmental Panel on Climate Change, 2007, p. 8). The oceanic Hawaiian damselfly has limited environmental tolerances, limited ranges, restricted habitat requirements, small population sizes, and low numbers of individuals. Therefore, we would expect this species to be particularly vulnerable to projected environmental impacts that may result from changes in climate, and subsequent impacts to their habitats (Pounds *et al.*,

1999, pp. 611-612; Still *et al*., 1999, p. 610; Benning *et al.*, 2002, pp. 14246 and 14248).

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:
As was stated in the Final Listing Rule we are not aware of any threats to the oceanic Hawaiian damselfly that are attributable to overutilization for commercial, recreational, scientific, or educational purposes (USFWS, 2012, p. 57677).

2.3.2.3 Disease or predation:
Predation by nonnative animal species (nonnative fish, bullfrogs, and ants) poses a significant threat to the oceanic Hawaiian damselfly throughout its current and historical range for the reasons that follow.

Nonnative fish – Predation by nonnative fish is a serious and ongoing threat to the oceanic Hawaiian damselfly. Naiads of the oceanic Hawaiian damselfly occur under stones or mats of moss and algae in streams, where they are vulnerable to predation by nonnative fish. Current literature indicates that the extirpation of Hawaiian damselflies from nearly all of their historical lowland habitat sites on O‘ahu is the result of predation by introduced nonnative fish (Moore and Gagnè, 1982, p. 4; Liebherr and Polhemus, 1997, p. 503; Englund, 1999, pp. 235-237; Brasher, 2003, p. 1055; Englund *et al*., 2007, p. 215; Polhemus, 2007, pp. 238-239). The threats posed by continued introduction and establishment of nonnative fish in Hawaiian waters, and the possible movement of those nonnative species to new streams and other aquatic habitat, are ongoing and expected to continue into the future. This represents a serious threat to the survival of the oceanic Hawaiian damselfly (USFWS, 2012, p. 57678).

Bullfrogs – There is a strong correlation between the presence of the nonnative bullfrogs, *Rana catesbeiana*, with the absence of Hawaiian damselflies in their study of streams on all of the main Hawaiian Islands (Englund *et al*., 2007, pp. 215, 219). The bullfrogs are a threat to the oceanic Hawaiian damselfly because they are omnivorous feeders that occur in the same habitat as the damselflies on O‘ahu (McKeown, 1996, pp. 24-27; Bury and Whelan, 1984, pp. 3-7; Lever, 2003, pp. 203-204). They have a negatively correlated pattern of occurrence with native damselflies, including the oceanic Hawaiian damselfly (MISC, 2018).

Ants – Ants can be particularly destructive predators because of their high densities, recruitment behavior, aggressiveness, and broad range of diet (Reimer, 1993, pp. 14, 17-18). The threat of ant predation on the oceanic Hawaiian damselfly is amplified by the fact that most ant species have winged reproductive adults (Borror *et al*., 1989, p. 738) and can quickly establish new colonies in additional suitable habitats (Staples and Cowie,

2001, pp. 53-55). Naiads may be susceptible to ant predation while perching on vegetation or rocks when they crawl out of the water or seek a terrestrial location for their metamorphosis into the adult state (Polhemus, 2008, *in litt*.). Newly emerged adult damselflies are also susceptible to predation until their wings have sufficiently harden to permit flight (Polhemus and Asquith, 1996, p. 4).

2.3.2.4 Inadequacy of existing regulatory mechanisms:
The State of Hawai‘i considers all natural flowing surface water (streams, springs, and seeps) as State property (Hawai‘i Revised Statues 174c, 1987). The State Water Code has the regulatory mechanism in place to protect native Hawaiian damselflies or their habitat but water regulations have not been followed or enforced in a consistent manner by the State's Water Commission to prevent degradation of habitat. Administration of the Clean Water Act permitting program by the U.S. Army Corps of Engineers has not provided substantive protection of damselfly habitat, including any requirements for retention of adequate instream flows. This dewatering may threaten the oceanic Hawaiian damselfly if it proves to be dependent on the stream corridor. State and Federal regulatory mechanisms are not adequately controlling the spread of nonnative animal species between islands and watersheds. Predation by nonnative animal species poses a major ongoing threat to the oceanic Hawaiian damselfly. Because existing regulatory mechanisms are inadequate to maintain aquatic habitat for the damselflies and to regulate the spread of nonnative species, the inadequacy of existing regulatory mechanisms is considered to be a significant and immediate threat (USFWS, 2012, p. 57681).

2.3.2.5 Other natural or manmade factors affecting its continued existence:
Representation, resilience, and redundancy appears to be severely limited in *Megalagrion oceanicum*. The threat to the oceanic Hawaiian damselfly from limited numbers of populations and individuals is ongoing and is expected to continue into the future due to several of the following factors. This species may experience reduced reproductive vigor due to inbreeding depression; it may experience reduced levels of genetic variability, leading to diminished capacity to adapt and respond to environmental changes, thereby lessening the probability of long-term persistence; a single catastrophic event (e.g., hurricane, landslide) may result in extirpation of remaining populations and extinction of this species; and species with few known locations are less resilient to threats that might otherwise have a relatively minor impact on widely distributed species (USFWS, 2012, p. 57684).

The oceanic Hawaiian damselfly faces the threat of low numbers of population and individuals. Jordan *et al*. (2007, p. 247) conducted a genetic and comparative phylogeography analysis on four Hawaiian

Megalagrion species which demonstrated *Megalagrion* populations with low genetic diversity are at greater risk of decline and extinction than those with high genetic diversity.

Table. Threats to *Megalagrion oceanicum* and the status of ongoing conservation or management actions.

Threats	Listing Factor	Current Status	Conservation or Management Actions
Agriculture/urban development	A	Ongoing	Agriculture and urban development continue to pose a threat to the native Hawaiian damselfly's habitat through encroachment and modification of water resources.
Stream alteration	A	Ongoing	Ongoing and extensive stream diversion and channelization continues to degrade the quantity and quality of the native Hawaiian damselfly's habitat and needed seeps.
Habitat modification by pigs	A	Ongoing	Ongoing habitat destruction and degradation of riparian habitat caused by feral pigs promote the establishment and spread of nonnative plants.
Habitat modification by nonnative plants	A	Ongoing	Nonnative plants that displace native species, increase runoff, and modify the riparian community lower or destroy the capability of the habitat to support viable populations of the oceanic Hawaiian damselfly.
Stochastic events	A	Ongoing	The apparent restriction of the oceanic Hawaiian damselfly to 12 small populations puts the species at risk of extinction from catastrophic events.
Climate change	A	Ongoing	Climate change is expected to affect water levels in stream corridors. Reduced genetic diversity of the remaining populations may limit the ability of the oceanic Hawaiian damselfly to adapt.
Predation	C	Ongoing	Ants, bullfrogs and nonnative fish pose threats to the native Hawaiian damselfly adults and naiads.
Inadequate habitat protection	D	Ongoing	The State of Hawai‘i considers all natural flowing surface water (streams, springs, and seeps) as State property (Hawai‘i Revised Statues 174c, 1987). However, the State's Water Commission has not consistently enforced State Water Code regulations to protect the native Hawaiian damselfly's stream and seep habitat. This dewatering may threaten the oceanic Hawaiian damselfly if it proves to be dependent on stream corridor where it has been observed.
Limited populations	E	Ongoing	*Megalagrion oceanicum* individuals were last observed in 2011 at 2 sites. The species appears to have low representation, resiliency, and redundancy.

2.4 Synthesis

The oceanic Hawaiian damselfly, *Megalagrion oceanicum*, is an endangered endemic species historically found on the island of Oʻahu. The biology of the oceanic Hawaiian damselfly is not well understood. Observations of adults suggest breeding may take place along streams corridors. Individuals of the immature stage of the oceanic Hawaiian damselfly are found in swiftly flowing sections of streams, usually amid rocks and gravel in streams riffles and small cascades on waterfalls. While capable of swimming, the naiads usually crawl among gravel or submerged vegetation. Older naiads frequently forage out of the actual stream channel and have been observed among wet moss on rocks and wet rock walls and seeps. Adults are very bold and strong flyers, and when disturbed, frequently fly upward into the forest canopy overhanging the stream or waterfall.

Historically, the oceanic Hawaiian damselfly occurred on both the leeward and windward sides of the Koʻolau and Waiʻanae Mountains on Oʻahu, and was known, but is currently extirpated, from approximately 16 general localities, including the Waiʻanae Mountains and all leeward streams of the Koʻolau Mountains. The species now currently occupies 12 sites above 300 ft (100 m) in elevation on the windward side of the Koʻolau Mountains at Kahawainui, Wailele, Koloa, Kaipapaʻu, Maʻakua, upper Kaluanui, Kawaiiki, ʻŌpaeʻula, upper Helemano, Makaua, Waiheʻe, and Kahaluʻu, in the lowland mesic, lowland wet, and wet cliff ecosystems. Comprehensive surveys of the oceanic Hawaiian damselfly are needed to determine if the species remains extant.

Current threats to the *Megalagrion oceanicum* include nonnative predatory fish species, bullfrogs, and ants, and lack of population representation, resiliency, and redundancy due to its apparent low population number (Table). Currently, existing regulations are inadequate to protect this species from introduction of nonnative species and to maintain their aquatic and riparian habitat. A Recovery Outline that included *Megalagrion oceanicum* was published in July 2018. Threats identified in the Final Listing Rule, the Recovery Outline, and this 5-Year Review are not sufficiently managed throughout the range of the species. Therefore, the oceanic Hawaiian damselfly meets the definition of endangered as 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*
__X__ **No change is needed**

3.2 New Recovery Priority Number:

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

- Conduct targeted surveys for *Megalagrion oceanicum* to determine the distribution of the species.
- Based on survey results, stabilize and protect extant populations of *Megalgrion oceanicum* and develop and implement a recovery plan.
- Identify the primary habitat features and characteristics necessary for *Megalagrion oceanicum* recovery.
- Identify and evaluate the primary biological characteristics necessary for *Megalagrion oceanicum* recovery.
- Maintain and protect the habitat of *Megalagrion oceanicum*.
- Refine and calibrate the indices for invertebrate communities that are used for monitoring programs to improve stream habitat.
- Eliminate or manage nonnative predators of *Megalagrion oceanicum.*
- Survey, document, and manage threats to *Megalagrion oceanicum*.

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Oceanic Hawaiian Damselfly
(*Megalagrion oceanicum*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
_X__ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: _____

Review Conducted By:
Charmian Dang, Fish and Wildlife Biologist, PIFWO
Megan Laut, Animal Recovery Coordinator and Conservation & Restoration Team Manager, PIFWO

FIELD OFFICE APPROVAL:

for MEGAN LAUT Digitally signed by MEGAN LAUT
Date: 2019.08.05 10:09:51 -10'00'

Field Supervisor, Pacific Islands Fish and Wildlife Office