Newell's Shearwater
(*Puffinus auricularis newelli*)

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:

Newell's Shearwater

(*Puffinus auricularis newelli*)

TABLE OF CONTENTS

5-YEAR REVIEW
Newell's Shearwater / (*Puffinus auricularis newelli*)

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) 792-9400

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 2008 and July 2010. The Hawaiian Dark-rumped Petrel and Newell's Manx Shearwater Recovery Plan (USFWS 1983), was one source of information for this five-year review of the Newell's Shearwater (*Puffinus auricularis newelli*); considerably more recent information about the status and biology of this species were obtained from additional sources, especially from Dr. Nick Holmes of the State of Hawaii's Kauai Endangered Seabird Recovery Project. The draft five-year review was then reviewed by the Recovery Program Leader 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:
[USFWS] U.S. Fish and Wildlife Service. 2008. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 70 species in Idaho, Montana, Oregon, Washington, and the Pacific Islands. Federal Register 73(83):23264-23266.

1.3.2 Listing history

Original Listing
FR notice: U.S. Fish and Wildlife Service. 1975. Listing of Endangered and Threatened Fauna; Federal Register 40: 44149.
Date listed: September 25, 1975
Entity listed: Species
Classification: Threatened

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 2010 Recovery Data Call (September 2009)]: Declining

Recovery achieved:
1 (0-25%) [FY 2009 Recovery Data Call] (last year reported)

1.3.5 Species' Recovery Priority Number at start of this 5-year review: 3

1.3.6 Current Recovery Plan or Outline
Name of plan or outline: Hawaiian Dark-rumped Petrel and Newell's Manx Shearwater Recovery Plan

Date issued: April 25, 1983

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?
__X__ ***Yes***
_____ ***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?

__X_ *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*
_X__ *No*

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?

_X__ *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. Reduce the annual fallout of more than 1,000 Newell's manx shearwaters to less than 100 (or near 0).

This criterion has not been met. The source of fallout (and injury or death of Newell's shearwaters) is attraction to and disorientation caused by artificial lights, which leads to birds (especially fledglings), flying in circles for hours and falling exhausted to the ground or colliding with powerlines, buildings, and other structures. Once grounded, the birds are often struck by vehicles, taken by predators, or die of starvation and dehydration. Over the 28 years since the publication of the recovery plan, the numbers of "fallout birds" has indeed declined. However, a concomitant decline has been documented in passage rates of adult Newell's shearwaters detected using modified marine or "ornithological" radar during the breeding season (Holmes et al. *in litt.*, 2009). In recent years, many lights on Kauai have been shielded to reduce the exposure of Newell's shearwaters (and other night-flying seabirds) to artificial lights, but comparison of these two data sets indicates that the overall decline in numbers of birds that fall out reflects an ongoing decline in the population and not successful abatement of the light-attraction threat (Holmes et al. *in litt.*, 2009).

2. Provide long-term protection for the eight known Newell's manx shearwater nesting colonies on Kauai.

This criterion has not been met. Since the recovery plan was published, three of the eight nesting colonies on Kauai have been extirpated, probably by a combination of predators and incursion by alien invasive plants that preclude excavation of nest burrows (Holmes and Troy *in litt.*, 2008). More colonies have been located in more remote areas of the island, but to date only two receive any protection. Kilauea Point National Wildlife Refuge, which harbors roughly four breeding pairs, is dog-fenced and predator-controlled and hosts a small social attraction project to augment the colony. Upper Limahuli Valley Preserve (privately owned), which harbors perhaps dozens of pairs over 400 acres, was ungulate-fenced in 2009. The fence is strung with white polytape to increase its visibility to night-flying seabirds (and minimize collision risk), pigs have been removed from the enclosure, and predator control has recently been initiated in part of the preserve. Predator control is funded for up to 5 years as part of the Kauai Island Utility Cooperative (KIUC) Short Term Habitat Conservation Plan (HCP) as well as predator control at Hono o Na Pali Natural Area Reserve.

3. Develop efficient predator control methods and techniques for use in and around isolated nesting sites.

This criterion has not been met. Although aerial broadcast of rodenticides for conservation purposes has been a legally available predator control tool for several years, its implementation in Hawaii is fraught with regulatory and socio-political difficulties. Predator-proof fences are widely used in New Zealand and other countries, however these fences are expensive to build and the current technology and design specifications are incompatible with the topography and substrates of remote montane Hawaii. Methods widely in use today in remote locations to control small carnivores such as cats and mongooses (the latter occurs

on other islands but not Kauai) are the same as they have been for decades: baited cage traps and soft-jaw traps that must be checked frequently, and conibear traps that can only be used prior to the seabird breeding season to avoid risks to seabirds. The first pig-proof enclosure of a significant Newell's shearwater colony in montane Kauai was built in 2009, and the pigs have been eradicated from within the fence.

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:

Since the recovery plan was published, Ainley et al. (1997) published a compilation of life history and ecological information about Townsend's and Newell's shearwaters in a species account for the Birds of North America series. Much of the specific data in the account was collected from proxy species that are better studied. A study of two breeding pairs nesting at Kilauea Point National Wildlife Refuge from 2001 to 2007 yielded important information about breeding phenology, mate and site fidelity, chick provisioning (both adults feed the chick until fledging), and fledgling behavior (B. Zaun, U.S. Fish and Wildlife Service unpubl. data). Numerous knowledge gaps remain for Newell's shearwater, e.g., foraging and other at-sea behavior; annual and age-specific survival, especially for non-breeders; and the scope and severity of threats at sea.

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:

This species is currently monitored on the island of Kauai, where 75 to 90 percent of the population nests, but no comprehensive surveys are conducted on other islands. Analysis of at-sea data collected from 1984 to 1993 yielded an abundance estimate of 83,739 (95% confidence interval, 57,360 to 115,093) birds (Spear et al. 1995). Analysis of more recent at-sea data is underway (funded by the KIUC short term HCP) but results will not be available for another year. However, since the early 1990s, Newell's shearwater has experienced a sharp population decline on Kauai. Several separate analytic efforts describe declines in Newell's shearwater on Kauai based on population modeling and documented concurrent declines in both fallout birds and population indices generated by radar surveys (Ainley et al. 2001, Day et al. 2003). The number of fallout birds retrieved by the Save Our Shearwaters (SOS) program on Kauai has steadily declined since 1979, from an average of about 1,500 per year between 1979 and 1990 to an average of less than 350 collected between

1999 and 2010 (SOS Database 1979-2006). Day et al. (2003) reported analysis of data trends from radar surveys showing an overall decline of roughly 50-70 percent in detection rates between 1993 and 2001. The mean change from the 1993 number of radar targets from 13 sites was -59.8 ± 7.2% (SE) in 1999, -62.1 ± 5.5% in 2000, and -61.5 ± 5.4% in 2001, with all sites except one showing decreases of 38-93% in 1999, and all sites showing decreases of 31-96% in 2000, and 37-92% in 2001 (Day et al. 2003). Preliminary summaries of the results of radar studies conducted by the State on Kauai indicate a decline of approximately 75 percent between 1993 and 2008 (Nick Holms personal comm., May 12, 2009). Significant range reduction as well as overall decline is documented; three colonies documented as active between 1980 and 1994 are now abandoned (Holmes et al. *in litt.*, 2009).

Ainley et al. (2001) projected (using a Leslie model) an annual population decline of 6.1 percent, or approximately 60 percent every 10 years, when anthropogenic variables influencing Newell's Shearwater mortality (e.g., predation, light attraction, and power line collision) were included. More recent population models also indicate a steep decline (Griesemer and Holmes, in review). Because Kauai harbors the vast majority of the population of the Newell's shearwater, its status on this island is indicative of the taxon's status as a whole.

There is little data regarding shearwater use of Hawaii or Maui Islands. At least one shearwater was detected during surveys conducted in Puu O Umi Natural Area Reserve on Hawaii, however no evidence of breeding activity was detected during surveys (Deringer et al. 2011). Deringer et al. (2011) also noted that ornithological radar and visual surveys conducted at Waipio Valley in June 2011 confirm shearwaters crossing the coast in an east-to-west direction. There have been no surveys for shearwaters on Maui, but birds have been observed or heard at upper Kahakuloa-Honokohau, Kokomo-Kaupakalua, Waialua, and Kaupo Gap (I. Bordenave, USFWS, 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.):

No new information. Analysis of current genetic diversity and loss over time within the Newell's shearwater is underway at the Smithsonian Institution, but results have not yet been published.

2.3.1.4 Taxonomic classification or changes in nomenclature:

In a taxonomic analysis of small *Puffinus* shearwaters, Austin and coworkers recognize Newell's shearwater as a full species, *Puffinus newelli*, and add a subspecies, *P. myrtae*, from Rapa Island in French

Polynesia (Austin et al. 2004). However, the taxonomic position of Newell's shearwater relative to Townsend's shearwater (*Puffinus auricularis*) from the Revillagigedo Islands, Mexico, is still unclear. Townsend's shearwater is a critically endangered species under IUCN criteria. Newell's shearwater traditionally has been considered a subspecies of *P. auricularis*. However, differences in morphology and breeding range (Ainley et al. 1997), foraging range (Spear et al. 1995), and phenology (Martines-Gomez and Jacobsen 2004) suggest that Townsend's and Newell's shearwaters are different species. Although the genetic relationship between Townsend's and Newell's shearwater has yet to be described, it is notable that "as seven of the forms included in P. puffinus by Murphy (1952) are best treated as separate species, it is logical to tentatively treat the remaining one – *auricularis* – at the specific level as well until this can be tested" (Christidis and Boles 2008).

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.):

See section 2.2.3, criterion #2, above. Recent studies have documented a significant range contraction on Kauai, where three known colonies have disappeared in the past 10 to 15 years. (Holmes and Troy *in litt.* 2008).

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

Since publication of the recovery plan (USFWS 1983), the amount, distribution, and suitability of nesting habitat for Newell's shearwater on Kauai has been diminished (Holmes and Troy *in litt.*, 2008). Hurricane Iniki, which struck the island in September 1992, was among the most powerful hurricanes (category 4) ever to strike the Hawaiian Islands in recorded history (Wikipedia 2011). The vegetation in montane areas, the stronghold of Newell's shearwater, was severely damaged in many areas (Day and Cooper 1995). Hurricanes are part of the natural disturbance regime in the Hawaiian Islands, and in-and-of themselves do not pose a threat to the existence of native species or their habitat. Today, however, landscape-scale changes wrought by such storms facilitate the incursion of invasive plants and animals into once pristine native habitats and alter their ability to support native biota.

2.3.1.7 Other:

As described above in section 2.2.3, criterion #1, a chief threat to Newell's shearwaters is attraction to artificial lights and collision with powerlines and other structures. Since the recovery plan was published, economic

development has increased significantly on Kauai, with a concomitant increase in infrastructure and in this threat. Although new lights are shielded, this does not eliminate the treat of fallout or significantly compensate for the effects of increased urbanization (Ainley et al. 2001). Even with the SOS program, there is significant mortality of fledglings, with 2 percent to 10 percent or more of fledged shearwaters likely dying due to fallout (Ainley et al. 2001).

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:

See section 2.3.1.6. Currently suitable nesting habitat for Newell's shearwater is threatened by invasion of non-native plant species, such as strawberry guava (*Psidium cattleianum*) and rose myrtle (*Rhodomyrtus tomentosa*), that fundamentally alter the vegetation structure so that shearwaters cannot excavate burrows or even reach the ground (Holmes and Troy 1008, Holmes et al. 2009). Invasion by alien plant species has been one of several factors in the range contraction and loss of nesting colonies on Kauai noted above; the other key factor in this range contraction is predation by non-native predators (Holmes and Troy *in litt.*, 2008).

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

Not considered a threat to this species. See synthesis below.

2.3.2.3 Disease or predation:

Predation by non-native mammals (rats, cats, and pigs on Kauai; these and mongoose on other islands) and non-native barn owls remains a severe threat to this ground-nesting island seabird, which evolved in the absence of such predators. This threat affects nesting colonies even in the most remote, intact habitats on Kauai (N. Holmes, Kauai Endangered Seabird Recovery Project, pers. comm. 2010). The Newell's shearwater is a long-lived species that does not reach reproductive maturity until about age 6 and has a high incidence of non-breeding among experienced adults (Ainley et al. 2001, Telfer 1986). Therefore, the Newell's shearwater lacks resilience against the threat of predation and its effects are particularly devastating to populations.

It is not known if Newell's shearwater is susceptible to West Nile virus and avian flu, but it may pose a risk to Newell's shearwater if these diseases reach Hawai`i.

2.3.2.4 Inadequacy of existing regulatory mechanisms:

Over the past 30 years, existing regulatory mechanisms under the Endangered Species Act (ESA) and under State of Hawaii laws have not proven adequate to address threats or advance recovery for Newell's shearwater, and unauthorized incidental take of this species continues. At the State level, few resources exist to conduct regulatory or law enforcement actions or implement recovery actions for this species. At the Federal level, laws prohibiting unauthorized incidental take have only recently been enforced to a degree, yielding modest monetary compensation that can contribute to conservation work.

Habitat Conservation Plans (HCP), under section 10 of the ESA, can be developed to authorize unavoidable incidental take and achieve net conservation benefits for listed species. A long-term HCP for Kauai seabirds has been in development for more than a decade to address injury and mortality from light attraction and collision. This process has been fraught with delays and legal and other conflicts, and has so far yielded little mitigation for this take and little recovery benefit to the Newell's shearwater. Recently a short-term (3-5 year) HCP was authorized to help mitigate for some incidental take by Kauai Island Utility Cooperative but this HCP is inadequate to offset take in the long term. KIUC lights are now shielded and they are also funding SOS work.

There is only one state or county lighting ordinance which addresses avoidance and minimization of light attraction and fallout of Newell's shearwater on Kauai. Ordinance 894-Article 5A-Sec. 10-5A.1(o), specific to Lihue, requires shielding light fixtures in the Lihue town core area to minimize impact to Kauai shearwaters and other native birds (2009). The Hawaii state legislature was considering several bills (2011 legislative session) that would require the use of shielding and other lighting technology to reduce impacts to wildlife and light pollution, however, none of them passed. Such ordinances would be an important method of reducing this significant source of mortality for Newell's shearwater. Both Maui and Hawaii Islands have lighting ordinances that implement shielding requirements to outdoor lighting, and though not specifically for shearwaters or other birds, they likely help minimize fallouts on these islands.

Feral ungulates, such as pigs, are important predators of Newell's shearwater and destroy nesting colonies. Regulations that promote and maintain feral ungulate populations in Newell's shearwater nesting areas

are inadequate and contradictory to recovery goals.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

As described above, a major threat to Newell's shearwater is disorientation and fallout caused by light attraction and collision with structures (see for example Podolsky et al. 1998). The SOS program on Kauai has retrieved and released over 30,000 downed Newell's shearwaters since 1979 (SOS Database 1979-2006). It is generally thought that fledglings on their first flight to the sea are particularly susceptible to this threat based on the number of fledglings recovered by SOS every year (SOS Database 1979-2006). The conventional wisdom is that loss of juvenile animals typically has little population-level impact in long-lived, low fecundity ("K-selected") species such as seabirds. However, the chronic loss of fledglings in high numbers over decades has had a demonstrable population-level impact on Newell's shearwater. Climate change may also pose a threat to Newell's shearwater (Listing Factors A and E). However, current climate change models do not allow us to predict specifically what those effects, and their extent, may be for this species.

Wind farms are a new threat to shearwaters. Section 7 consultations and HCPs are approved or being planned and are likely to affect shearwaters on Oahu, Maui, Molokai, and Lanai. There have been no reported shearwater fatalities at approved wind farms to date, however at least two Hawaiian petrels (*Pterodroma sandwichensis*) have been killed at the West Maui wind farm site.

2.4 Synthesis

Threats to Newell's shearwater described in the original listing rule and the recovery plan continue largely unabated. Although shielding of lights in recent years has somewhat reduced the exposure of fledglings to this threat, the annual fallout continues. On Kauai, the Save Our Shearwaters program, with assistance from species experts and veterinarians, continually improves techniques for rehabilitating shearwaters and other seabirds that "fall out" because of light attraction or collision with structures. The effectiveness of rehabilitation activities in improving the survival of these birds is unknown; only a very small number of bands have been recovered from released birds (SOS Database 1979-2006). In the past year, the first fencing project to protect montane nesting habitat (400 acres) for this species on Kauai was completed on private land in the Upper Limahuli Valley Preserve, and predator control is underway there as part of the KIUC short-term HCP and is proposed to continue under future HCPs. Predator control will also be conducted at Hono o Na Pali Natural Area Reserve as part of the short-term HCP. However, the threat posed by introduced predators remains significant throughout the species' range. Predators take adults as well as eggs and juveniles, which is especially devastating to this long-live species which does not reach reproductive maturity until about age 6 and has a high proportion of nonbreeding adults. The two most important

factors limiting population growth are low breeding probability and high rates or predation on adults and subadults.

Progress has been made state-wide on increasing public awareness of fallout, refining survey techniques to yield better data for monitoring population trends, and on two HCPs that ultimately will provide significant funds for mitigation of incidental take (light attraction, collision). However, none of these efforts has progressed sufficiently to substantially abate threats and halt or reverse the decline in Newell's shearwater. The recently authorized short-term HCP for the Kauai Island Utility Cooperative is not expected to substantially mitigate for all anthropogenic causes of mortality and an island-wide long-term HCP has been in development for almost a decade and potential benefits will not be realized for years to come. In addition, increased urbanization is only somewhat compensated for by the increased use of shielded lights, and will likely lead to increased fallout rates.

Little progress has been made toward addressing the chief threats to or meeting the recovery criteria for Newell's shearwater. Radar studies and the number of fallout birds are showing declines of birds on Kauai. Moreover, this species has experienced a 50 to 75 percent population decline and range contraction on Kauai which harbors 75 to 90 percent of the world's population. Based on models, the projected population decline is 6.2 percent annually with anthropogenic causes of mortality and 3.2 percent annually without anthropogenic mortality. Remnant breeding colonies thought to occur on Maui and Hawaii Island are not mapped or managed. These colonies are certainly subject to predation by alien mammals, possibly are subject to the threat of light attraction and collision, and likely are dwindling as well. Therefore, Newell's shearwater now meets the definition of endangered: it is in danger of extinction throughout its range.

3.0 RESULTS

3.1 Recommended Classification:

____ **Downlist to Threatened**
_X_ **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:

Reclassification (from Threatened to Endangered) Priority Number: __6__

Reclassification (from Endangered to Threatened) Priority Number: ____
Delisting (regardless of current classification) Priority Number: ____

Brief Rationale: Newell's shearwater faces a high level of threat, the population is declining sharply, the threats are difficult and costly to mitigate, the threats are largely unmitigated, and the listed entity is currently recognized as a subspecies. The species' sharp decline and the level of threat warrant the reclassification of Newell's shearwater from threatened to endangered as it is no longer "likely to become an endangered species" but is now "in danger of extinction throughout all of its range."

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

1. Obtain new estimates of total abundance from analysis of at-sea survey data (collected by NOAA). (Listing Factors A, C, and E)
2. Continue research to refine radar survey methods to monitor population trends and response to management. (Listing Factors A, C, and E)
3. Ensure compliance with Endangered Species Act sections 7 and 10 with respect to avoiding, minimizing, and mitigating take of listed seabirds resulting from lighting, power lines, communications towers, wind turbines, and other structures. (Listing Factor E)
4. Rank potential sites for survey priority and conduct surveys using standard metrics and survey protocol developed to determine presence of breeding birds and delineate perimeter of breeding areas in different habitat types. (Listing Factors A and C)
5. Conduct site ranking for initial colony management for each species and for highest ranked colonies develop threat analyses and approximate budget to address threats. (Listing Factors A and C)
6. Undertake threat mitigation, including fencing, predator control/eradication, and habitat restoration, and monitor effects of threat mitigation. (Listing Factors A and C)
7. Develop and trial translocation methods to create safe, managed colonies. (Listing Factors A and C)
8. Conduct genetic analysis to clarify taxonomic status of Newell's and Townsend's shearwaters. Resolving this question could have significant implications for the conservation status of both taxa.

5.0 REFERENCES

Ainley, D.G., R. Podolsky, L. DeForest, G. Spencer, and N. Nur. 2001. The status and population trends of the Newell's shearwater on Kaua'i: insights from modeling. Studies in Avian Biology No. 22: 108-123.

Ainley, D. G., T. C. Telfer, and M. H. Reynolds. 1997. Townsend's and Newell's Shearwater (Puffinus auricularis). In The Birds of North America, No. 297 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Austin, J.J., V. Bretagnolle, and E. Pasquet. 2004. A global molecular phylogeny of the small Puffinus shearwaters and implications for systematic of the Little-Audubon's shearwater complex. Auk 121: 847-864.

Christidis, L. and W.E. Boles.2008. Systematics and Taxonomy of Australian Birds. Canberra: CSIRO Publishing.

Day, R.H. and B.A. Cooper. 1995. Patterns of movement of dark-rumped petrels and Newell's shearwaters on Kauai, Hawaii. Condor 97:1011-1027.

Day, R.H., B.A. Cooper, and T.C. Telfer. 2003. Decline of Townsend's (Newell's) shearwaters (*Puffinus auricularis newelli*) on Kauai, Hawaii. Auk 120:669-679.

Deringer, C.V., E. Haber, B. McFarland, O. Johnson, and M.L. VanZandt. 2011. Audio-visual surveying for Hawaiian petrels and Newell's shearwaters in Pu`u O `Umi Natural Area Reserve, Kohala Mountain, Hawai`i. QA-1867 Final Report. USDA-APHIS-WS-NWRC. Hilo, Hawaii. 24 pp.

Griesemer, A.M. and N.D. Holmes. In review. Newell's shearwater population modeling for HCP and recovery planning. University of Hawaii Pacific Cooperative Studies Unit and State of Hawaii Department of Land and Natural Resources Division of Forestry and Wildlife Report. 51 pp.

Holmes, N.D. and J.R. Troy. 2008. Reduction in the breeding range of Newell's shearwaters on Kaua'i, Hawaii: Evidence and insights from field surveys and GIS modeling. Poster presentation. International Albatross and Petrel Conference, Capetown, South Africa, 11-15 August 2008.

Holmes, N.D., J.R. Troy, and T. Joyce. 2009. Status and conservation of Newell's shearwaters on Kauaii, Hawaii. Oral presentation. Pacific Seabird Group Annual Meeting, Hakodate Japan, 18-26 February 2009.

Martinez-Gomez J.E. and J.K. Jacobsen. 2004. The conservation status of Townsend's shearwater *Puffinus auricularis auricularis*. Biological Conservation 116: 35-47.

Murphy, R.C. 1952. The manx shearwater as a species of world-wide distribution. American Museum Novitates 1561: 1-21.

Podolsky, R., D.G. Ainley, G. Spencer, L. de Forest, and N. Nur. 1998. Mortality of Newell's Shearwaters caused by collisions with urban structures on Kauai. Colonial Waterbirds 21:20-34.

Spear L.B., D.G. Ainley, N. Nur, S.N.G. Howell. 1995. Population size and factors affecting at-sea distributions of four endangered Procellariids in the tropical pacific. Condor 97(3):613-638.

Telfer, T.C. 1986. Newell's shearwater nesting colony establishment study on the island of Kauai. Final Report, Statewide Pittman-Robertson Program. Dept. Lands Nat. Res, State of Hawaii, Honolulu, HI

U.S. Fish and Wildlife Service. 1975. Listing of Endangered and Threatened Fauna. Federal Register 40: 44149.

U.S. Fish and Wildlife Service. 1983. Hawaiian Dark-rumped Petrel and Newell's Manx Shearwater Recovery Plan. U.S. Fish and Wildlife Service, Portland, OR. iii + 57 pp.

U.S. Fish and Wildlife Service. 2008. Endangered and threatened wildlife and plants; initiation of 5-year status reviews for 70 species in Idaho, Montana, Oregon, Washington, and the Pacific Islands. Federal Register 73(83):23264-23266.

Wikipedia. 2011. Hurricane Iniki. http://en.wikipedia.org/wiki/Hurricane_Iniki.

Signature Page
U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of **Newell's Shearwater**
(***Puffinus auricularis newelli***)

Current Classification: ___T_____

Recommendation resulting from the 5-Year Review:

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

Appropriate Listing/Reclassification Priority Number, if applicable:__6_____

Review Conducted By:
Holly Freifeld, Vertebrate Recovery Coordinator
Jess Newton, Recovery Program Leader
Assistant Field Supervisor for Endangered Species

Approved _____ Date 9/27/2011
Field Supervisor, Pacific Islands Fish and Wildlife Office