FINDINGS AND RECOMMENDATIONS REGARDING THE PROPOSED ISSUANCE OF AN ENDANGERED SPECIES ACT SECTION 10(a)(1)(B) INCIDENTAL TAKE PERMIT FOR THE AUWAHI WIND FARM HABITAT CONSERVATION PLAN FOR THE CONSTRUCTION AND OPERATION OF THE AUWAHI WIND ENERGY GENERATION FACILITY, MAUI, MAUI COUNTY, HAWAII

The U.S. Fish and Wildlife Service (Service or USFWS) proposes to issue an Incidental Take Permit (Permit) to Auwahi Wind Energy, LLC (Auwahi Wind) under the authority of section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (Act). The Permit would have a term of 25 years. The following documents were used in preparation of this statement of findings and recommendations and are incorporated by reference as described in 40 CFR §1508.13 (2011): (1) Auwahi Wind's Final Habitat Conservation Plan (HCP) for the Construction and Operation of the Auwahi Wind Farm, Ulupalakua Ranch, Maui, Hawaii (the Project) (Tetra Tech 2012a); (2) Auwahi Wind's Final Environmental Impact Statement for the Project pursuant to Chapter 343 of the Hawaii Revised Statutes (Tetra Tech 2011); (3) the Service's Final Environmental Assessment for the Project (USFWS 2012a) pursuant to the National Environmental Policy Act; and (4) the Service's Biological Opinion for the Project (USFWS 2012b). The decision record for these findings and recommendations is on file at the Service's Pacific Islands Fish and Wildlife Office in Honolulu, Hawaii.

I. Description of the Proposed Action

The Project consists of the construction and operation of a 21-megawatt (MW) wind energy generation facility on Ulupalakua Ranch on the south aspect of Haleakala in east Maui, Hawaii. Auwahi Wind will supply wind-generated electricity to Maui Electric Company Ltd. (MECO) under the terms of a State of Hawaii Public Utilities Commission-approved power purchase agreement. Power generated by the facility will connect to the existing MECO Wailea-Kealahou 69-kilovolt (kV) transmission line at the proposed point of interconnection located approximately 1 mile (mi) east of MECO's Wailea substation. The Project includes installation and operation of eight wind turbine generators (WTGs), a battery energy storage system, an electrical collection system, an operations and maintenance facility and related infrastructure. In addition an approximately 9-mile long, 34.5-kV generator-tie line and an interconnection substation will be installed and maintained on the west aspect of Haleakala. An approximately 27-mi long construction access route between the Port of Kahului and the Project site will be used by construction vehicles.

Under the proposed action and Permit number TE64153A-0, Auwahi Wind will receive incidental take coverage for four listed species that are endemic to Hawaii and may be adversely affected by the Project. Of the four listed species, two are birds: the endangered Hawaiian petrel (uau, *Pterodroma sandwichensis)* and the endangered Hawaiian goose (nene, *Branta sandvicensis*). The third species is a mammal—the endangered Hawaiian hoary bat (opeapea, *Lasiurus cinereus semotus*). The fourth

species is Hawaii's endangered Blackburn's sphinx moth (*Manduca blackburni*). These species are hereafter referred to as "Covered Species."

Auwahi Wind seeks to avoid and minimize the take of Covered Species to the maximum extent practicable, but because take may be unavoidable, Auwahi Wind will mitigate for such take by implementing conservation actions to benefit the recovery of the Covered Species. For the Hawaiian hoary bat and Hawaiian petrel, a three-tiered approach to take and mitigation was developed based on the best available scientific information. Each tier represents a level of take and associated compensatory mitigation measures. Although the Tier 1 and 2 levels of mitigation will be implemented initially, mitigation efforts will increase to the Tier 3 level if monitoring indicates that incidental take is occurring above the Tier 2 level, up to the maximum amount of take allowed by the ITP. Mitigation project costs are estimated in the HCP. A maximum take limit has been established for the Hawaiian goose over the 25-year period. Direct impacts to Blackburn's sphinx moth are anticipated to be largely avoided and loss of Blackburn's sphinx moth habitat will be mitigated. Auwahi Wind's proposed mitigation measures were selected in collaboration with the Service, the Hawaii Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW), and the State of Hawaii Endangered Species Recovery Committee.

The HCP establishes avoidance and minimization measures, and mitigation and adaptive management procedures to avoid exceeding the take limit for each Covered Species authorized by the Permit. Avoidance and minimization measures, mitigation and adaptive management procedures, and the effects of the proposed action on the Covered Species are analyzed in depth in the HCP and the Service's Biological Opinion on this proposed permit action, both of which are incorporated herein by reference.

II. Analysis of Effects

The analysis of the likely Project impacts to Covered Species is based on the best scientific information available including population modeling, results from post-construction monitoring at other Hawaiian wind projects and field surveys conducted on the Project site.

Activities that may affect the Hawaiian petrel, Hawaiian hoary bat, and Hawaiian goose in the project area include operation of turbines and meteorological towers, generator-tie lines, and implementation of HCP mitigation, monitoring, and adaptive management measures. Activities that may affect the Blackburn's sphinx moth in the project area include ground disturbance and habitat alteration during construction.

The following five types of take involving injury and mortality of Covered Species are analyzed in the Auwahi Wind HCP: (1) direct take; (2) indirect take; (3) unobserved direct take; (4) unobserved indirect take; and (5) estimated total take. Although measures in the HCP and associated ITP describe how Auwahi Wind seeks to avoid and minimize the risk of take of Covered Species to the greatest extent practicable, some take may be unavoidable.

Hawaiian Hoary Bat

Species Background

The Hawaiian hoary bat was listed as endangered on October 13, 1970, under the Endangered Species Conservation Act of 1969. The Hawaiian hoary bat is endemic to the State of Hawaii where it is the only existing, native terrestrial mammal. The Hawaiian hoary bat is known to reside on Hawaii, Maui, Oahu, Lanai, Molokai and Kauai, with the largest populations likely on Hawaii and Kauai.

Hawaiian hoary bats have been observed year-round in a wide variety of habitats and elevations below 7,500 feet (ft) and a few sightings from limited surveys have been reported as high as 13,199 ft. Hawaiian hoary bats have been detected in both wet and dry areas of Hawaii but seem to be more abundant on the drier leeward side (Jacobs 1994) and generally less abundant in wet areas (Kepler and Scott 1990). Only three researchers have examined spatial and temporal variation in occurrence patterns of bats in Hawaii, with conflicting conclusions about possible altitudinal or regional migration (Jacobs 1994; Menard 2001; Tomich 1986).

While detailed information is lacking, threats are assumed to be the same as those that threaten many bat species in general: (1) habitat loss (availability of roost sites); (2) mortality of breeding age adults coupled with slow reproductive rate; (3) collisions with vehicles and other structures; (4) pesticide use (either directly or by impacting prey species); (5) predation by native hawks and non-native feral cats; and (6) lack of prey availability due to introduction of non-native insects. Because Hawaiian hoary bats roost in trees, roost disturbance is also a likely threat (Service 1998).

In their Northern American range, hoary bats are known to be more susceptible to collision with wind turbines than most other bat species (Erickson 2003). Most mortality has been detected during the fall migration period. Hoary bats in Hawaii do not migrate in the traditional sense, although some seasonal altitudinal movements occur. Currently it is not known how susceptible Hawaiian hoary bats are to turbine collisions; however, two Hawaiian hoary bat mortalities were observed at Kaheawa Wind Power (KWP I) in six years of operation and one bat mortality at Kahuku Wind Power Facility in the first year of operation.

Estimated Take

Based on the analysis in the Auwahi Wind HCP (Tetra Tech 2012), Auwahi is requesting authorization to take up to 19 adult and eight young bats. Those analyses are herein incorporated by reference. Of this total, Tier 1 includes the death or injury of 5 adults and 2 juveniles; Tier 2 includes the death or injury of up to 10 adults and 4 juveniles; Tier 3 includes the death or injury of up to 19 adults and 8 juvenile bats. Site-specific data gathered by Auwahi supports the results presented in the Auwahi HCP. The Service concurs with Auwahi's assessment of project impact because the Auwahi Wind HCP's

fatality estimates were based on the best available information on the expected amount of Hawaiian hoary bat take.

Mitigation

Tier 1 Mitigation
Auwahi is requesting authorization to take up to five adults and two juveniles for Tier 1, which, with an estimated 30% survival rate of juveniles to adulthood (Humphrey 1982), equates to a total of six adults. Assuming a 1:1 adult sex ratio, the potential take of six adults would result in the take of up to three adults of each sex. Mitigation for bats killed by collision with project structures will be offset with habitat restoration which will, over time, increase Maui's Hawaiian hoary bat carrying capacity. To mitigate for Tier 1 take of the Hawaiian hoary bat under the Auwahi Wind HCP, Auwahi Wind shall restore 126.5 acres (ac) of pasture and non-native forest to native forest and put 126 ac into a permanent conservation easement at the Waihou Mitigation Area on Ulupalakua Ranch. This mitigation will result in 42 ac of habitat restoration and permanent conservation per male bat taken. The Service and DOFAW received the results of Home Range Tools for ArcGIS®, Version 1.1 (compiled September 19, 2007) calculations based on Hawaiian hoary bat tracking data collected by USGS-BRD Wildlife Ecologist, Dr. Frank Bonaccorso. This dataset from a two-week tracking study indicates that the mean core area of rainforest habitat on the island of Hawaii used by 14 male bats was 84.3 ac per bat and the average size of the core area utilized by the 11 females in the dataset was 41.2 ac per bat. Male bat core areas do not appear to overlap; female core areas may overlap with male core areas. A core area was defined as the area that incorporates 50% of tracked movements; therefore, the Service and DOFAW assume that the core area is a minimum habitat requirement for the Hawaiian hoary bat. By implementing habitat restoration and putting into place the permanent conservation easement, Auwahi will increase Maui's Hawaiian hoary bat carrying capacity.

Auwahi Wind's restoration of 126.5 ac of forest will increase Maui's Hawaiian hoary bat carrying capacity by an additional 1.5 male bats. This habitat is expected to also support female and juvenile bats with habitat overlapping that of the males. Restoration within the Waihou Mitigation Area will provide additional bat breeding, foraging, and dispersal habitat and will provide a forested corridor within state reserves (Kula Forest Reserve, Auwahi Forest Restoration Project, and the Kanaio Forest Reserve). The benefits of the forest restoration and the conservation easement will extend in perpetuity. Forest restoration is likely to be successful because it has been successfully implemented in similar sites.

Tier 2 Mitigation
To mitigate for Tier 2 take, Auwahi Wind shall complete radiotelemetry research to determine the core area and habitat use patterns of the Hawaiian hoary bat on Maui. Radiotelemetry research will provide basic information about the species use of dry and mesic habitats needed to better understand the conservation needs of the species. In addition, radiotelemetry research will enable Auwahi Wind to confirm the benefits of Tier 1 mitigation forest restoration.

Tier 3 Mitigation
Auwahi is requesting authorization to take an additional 9 adults and four juveniles (for a total of up to 19 adults and eight juveniles) for Tier 3, which, with an estimated 30% survival rate of juveniles to adulthood, equates to a total of 22 adults. Assuming a 1:1 adult sex ratio, the take of 22 adults would result in the take of 11 adults of each sex.

Auwahi Wind will use the results of the Tier 1 and 2 mitigation and other best available science at the time Tier 3 mitigation is needed to identify appropriate mitigation measures to be implemented that may include restoration of bat habitat or additional bat research. Should habitat restoration be deemed appropriate by the Service and DOFAW, an approximately 195-ac area has been set aside at the Waihou Mitigation Area to satisfy all or a portion of Auwahi Wind's Tier 3 bat mitigation. In addition, a pooled-partnership for bat mitigation at the Kahikinui Forest Project, or other appropriate bat mitigation site could be used with Agency approval. Tier 3 mitigation plans may be modified based on the results of Tier 2 bat habitat usage research. By implementing habitat restoration and putting into place a permanent conservation easement, it is anticipated that Auwahi Wind will increase Maui's Hawaiian hoary bat carrying capacity by 1.5 male bats and the three female bats that may overlap with the males.

Summary of the Effects of the Action on the Hawaiian Hoary Bat

Because the abundance and distribution of the Hawaiian hoary bat throughout its range is not well known, it is difficult to gauge the effect that take of Hawaiian hoary bats resulting from the proposed project may have on the population of this species. Hawaiian hoary bats foraging in otherwise unobstructed airspace in the vicinity of WTGs may be killed and injured by the turning rotor blades. No more than 19 adults and 8 young are expected to be taken over the 25-year Permit term. Although the proposed take authorization levels are likely to adversely impact the overall population of the Hawaiian hoary bat on Maui, the proposed reforestation project is likely to mitigate those impacts and should increase Hawaiian hoary bat carrying capacity on Maui. Forest restoration is likely to be successful because it has been implemented successfully in similar sites. In addition, Auwahi Wind's completion of radiotelemetry research will develop new scientific information that shall improve Hawaiian hoary bat recovery planning.

Hawaiian Petrel

Species Background

The Hawaiian petrel was listed as endangered on March 11, 1967 (USFWS 1983). Hawaiian petrels were abundant and widely distributed before humans inhabited the Hawaiian Islands; with petrel bones observed in archaeological sites throughout the State. Today Hawaiian petrels nest on at least five islands: Hawaii, Maui, Kauai, Lanai, and Molokai (Simons and Hodges 1998). As much as one quarter of the breeding population may be on Maui, and most of Maui's petrels nest along the rim of Haleakala Crater (Simons and Hodges 1998) in Haleakala National Park. Hawaiian petrels nest around

Haleakala summit primarily because the National Park Service installed an ungulate-proof fence and has maintained predator control efforts since about 1982. The primary threats to the recovery of the Hawaiian petrel are: (1) predation by non-native species; (2) habitat degradation and destruction by feral ungulates; (3) lack of nesting habitat due to invasive plants; and (4) collisions induced by attraction to urban lighting.

Based on pelagic observations, the total population including juveniles and subadults was estimated at 20,000 with a breeding population of 4,500 to 5,000 pairs in 1995 (Spear et al. 1992). There have been no total population estimates made since then. The colony on Mauna Loa is estimated to be approximately 75 breeding pairs (Hu, pers. comm. 2008). Kauai populations are difficult to assess, and Cooper and Day (1995) estimated there were between 1,400 and 7,000 individuals on that island in 1993. Ainley et al. (1997) estimated that there were 1,600 breeding pairs of Hawaiian petrel on Kauai. A breeding colony of the Hawaiian petrel was rediscovered on Lanai in 2006, near the summit of Lanaihale. Although the petrel colony was historically known to occur, its status was unknown and thought to have dramatically declined until surveys were conducted in 2006 (Penniman, pers. comm. 2007). The nesting habitat used by the Hawaiian petrel colony on Lanai is delineated by the approximate area of the uluhe ferns (*Dicranopteris linearis*). Monitoring and research on this population is ongoing, and its size has not been estimated with statistical confidence, but the population appears to be similar in abundance to the Haleakala population, where the largest number of breeding birds is currently known to exist (Penniman, pers. comm. 2011).

Approximately 1,430 breeding pairs are known to occur in the mountains of east Maui. Approximately 1,000 Hawaiian petrel burrows have been found in Haleakala National Park, Maui (Bailey, pers. comm. 2011) and an additional 600 breeding pairs are thought to occupy unsurveyed areas of the Haleakala Crater Rim (SWCA 2011). In addition, approximately 55 breeding pairs occupy the Advanced Technology Solar Telescope (ATST) mitigation site (ATST 2010) and the Auwahi Wind project detected an additional 33 active burrows at Kahikinui (Tetra Tech 2012). Ainley (SWCA 2011, Appendix 25) estimates there is a declining population of 600 breeding pairs of Hawaiian petrels nesting in the West Maui Mountains.

Although Hawaiian petrels are not known to nest currently at the project site, the Auwahi Wind turbine structures will be constructed in airspace used by a subset of the approximately 1,430 Hawaiian petrel breeding pairs coming to shore in the east Maui mountains. East Maui's 1,430 breeding pairs constitute approximately 30% of the Hawaiian petrel's range-wide population. The highest concentration of East Maui petrel burrows is within the crater of the dormant shield volcano. Several large valleys to the north and east of the crater are the most heavily used transit routes for seabirds accessing the crater interior nest sites. Although the Auwahi Wind project site is not within a primary route used by petrels accessing nesting sites on Haleakala, Hawaiian petrel passage rates are high in the project area.

Radar surveys conducted at the Project in October 2006 and May 2010 documented mean passage rates of 12.01 (fall) and 7.31 (spring) petrel targets per hour (Hamer 2010). The

spring passage rates are expected to be higher than the fall rates because the non-breeders are still on-island during the spring. The relatively higher fall 2006 data may include an unknown number of sooty terns (Hamer pers. comm. 2010) as they were detected by observers but cannot be distinguished from targets on the radar screen. Radar surveys have also been conducted by other entities in the vicinity of where the Auwahi Wind generator-tie line crosses a ridge that is adjacent to the communication towers owned by Island Airwaves. The towers are located on the Ulupalakua Ranch within a 3-acre parcel at an elevation of approximately 4,450 ft. Radar surveys were conducted over five nights in 2007. Petrel passage rates over this area averaged 2.3 petrel targets per hour (Gall and Day 2007).

Anticipated Take

The results of fatality modeling presented in the Auwahi Wind HCP (Tetra Tech 2012) indicate a total of up to 64 adult and 23 nestling Hawaiian petrels are likely to be killed or injured, directly or indirectly, by operation of the Auwahi Wind project over the 25-year term of the proposed Permit. Those analyses are herein incorporated by reference. Of this total, Tier 1 includes the death or injury of 19 adults and seven nestling petrels; Tier 2 includes the death or injury of up to 32 adult and 12 nestling petrels; Tier 3 includes the death or injury of up to 64 adults and 23 nestlings. If the juvenile survival rate of 0.8034 (Simons 1984) is applied to fledglings for six years at-sea before adulthood, each juvenile taken is comparable to the take of 0.26 adults (and Tier 1 take is comparable to take of 21 adults, Tier 2 is comparable to take of 36 adults, and Tier 3 is comparable to take of 71 adult Hawaiian petrels). The proposed incidental take will reduce the Maui population by up to 2%.

The Service concurs with this assessment of impact because the Auwahi Wind HCP's fatality modeling results were based on the best available information on the expected amount of petrel take. Site-specific radar data gathered by Auwahi supports the results presented in the Auwahi HCP.

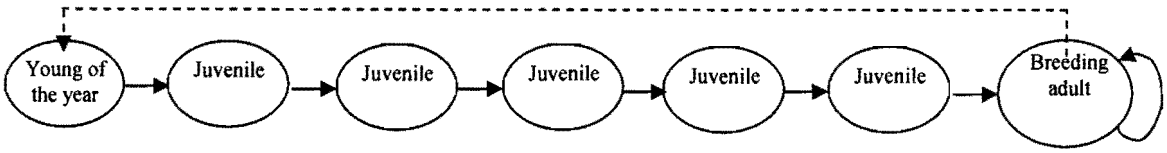
Mitigation

Take of Hawaiian petrels caused by the Auwahi Wind project will be offset by the Auwahi Wind HCP mitigation program. Predator control will be implemented to increase the survival and reproduction of breeding Hawaiian petrels on Maui to the extent needed to offset take resulting from the project. For the purposes of mitigation planning and implementation, mitigation will be implemented in tiers corresponding to the three tiers of take.

Anticipated Benefits of In-Situ Predator Control at Kahikinui Forest Project

To evaluate the benefits of predator control we adapted a deterministic matrix model developed by Tetra Tech (Tetra Tech 2012). This general model is commonly used in population ecology to calculate the population growth rate (i.e., lambda) using stage-specific information on survival and reproduction. A lambda value of 1.0 indicates a

stable population, less than 1.0, a declining population, and greater than 1.0 an increasing population. Tetra Tech created a seven-stage matrix model where stage one represents the young that survive to enter the local population, stages two through six each represent annual survival of non-breeding juveniles, and stage seven is breeding adults (Figure 1).



Note: Solid arrows represent annual survival between stages and the dashed arrow represents reproduction.

Figure 1. Hawaiian Petrel Matrix Model (Tetra Tech 2012).

Demographic values (Simons 1984) for petrel vital rates under baseline conditions and under conditions where petrels are protected by varying levels of predator control (Table 1) were input into the population model to calculate the anticipated benefits of the Auwahi Wind HCP mitigation actions.

Table 1. Hawaiian Petrel Vital Rates used in the Population Model for Current Condition and Anticipated Conditions Under Predator Control and the Associated Population Growth Rate (Lambda) for the Hawaiian Petrel.

	Survival of Breeding Adults	**Survival of Juvenile**	**Fledglings per Female**	**Female Fledgling per female**	**Lambda**
Moderate predation (No predator control)	0.850	0.8034	0.55	0.245	0.933
Mild predation (Predator trapping)	0.900	0.8034	0.60	0.300	0.978
Minimal predation (Predator exclusion fencing + trapping)	0.930	0.8034	0.72	0.360	1.009

Auwahi Wind evaluated population and net benefit projections for the Hawaiian petrel at the mitigation sites under scenarios with and without predator control as follows:

1. **The current size of the petrel breeding population was estimated for mitigation sites (i.e., population at time T):** Auwahi first estimated the number of active burrows that might be found on the mitigation sites and then adjusted this number to reflect the number of breeding pairs. The number of breeding pairs is equal to the number of breeding females, which is the starting size of the breeding population.

2. **The size of the petrel breeding population at mitigation sites was estimated over the Project's operation period of 20 years (i.e., population size at time**

T+1): For the first year, Auwahi Wind took the starting size of the breeding population and multiplied it by lambda to generate the breeding population size in the following year (T+1). For each subsequent year, Auwahi took the breeding population size in each subsequent year and multiplied it by lambda.

3. **The size of the adult petrel population (breeders + nonbreeders) was estimated at a colony:** After the population management period, the population of active breeders is adjusted upwards to account for the observation that, in any given year, 25% of the adult population at a colony does not breed (Simons 1984).

4. **The success of the predator control program will be evaluated:** At the end of the 20-year projections (i.e., the duration of the Kahikinui mitigation program proposed in this HCP), the relative benefit of a given predator control program is assessed by taking the difference in the number of adults in the unmanaged population versus to two predator control scenarios.

Based on the preliminary assessments of burrow availability and activity at Kahikinui, Tetra Tech performed an iterative series of analyses for a population of 25 breeding pairs (33 active burrows) and 33 breeding pairs (44 active burrows, as many active burrows are occupied by non-breeding birds) (Table 2). If baseline predation rates used in the model are confirmed and the proposed predator control strategy achieves the "Mild Predation" scenario, the realized benefit after 20 years is projected to range between 26 and 34 adult petrels thereby mitigating take at both the Tier 1 and much or all (depending on the survival of juveniles at-sea) of the Tier 2 level of take. If the proposed predator control strategy achieves the "Minimal Predation" scenario, the realized benefit after 20 years is projected to range between approximately 61 and 81 adult petrels (see Table 2), thereby mitigating the take impacts of most, if not all, of the Tier 3 level of take.

If the predator control for additional burrows is needed to achieve the necessary mitigation, Auwahi shall assume management of additional burrows at Kahikinui and/or at the ATST mitigation parcel (and, if needed, within Haleakala National Park). The ATST site is located on the leeward slope of the Haleakala Crater adjacent to the Kahikinui Forest Project parcel and currently supports 74 active Hawaiian petrel burrows (Service 2011b) as described below. If the National Science Foundation's ATST mitigation actions achieve a "Mild Predation" scenario, the Service (Service 2011b) estimates that 45 actively breeding pairs of Hawaiian petrels will reside at the ATST site at the time when Auwahi Wind will assume ATST site management. If the proposed predator control strategy achieves the "Mild Predation" scenario, the realized benefit after an additional 10 years is projected to be 34 adult petrels (Table 3). If Auwahi Wind's predator control strategy achieves the "Minimal Predation" scenario, the model indicates the anticipated benefit after an additional 10 years is calculated to be approximately 66 adult petrels (see Table 3). If either worst-case scenario occurs (i.e., the proposed predator control only achieves a "Mild Predation" demographic condition or Tier 3 take occurs), Auwahi Wind's commitment to mitigation at both Kahikinui and ATST (if necessary) is likely to be adequate to offset all three tiers of Hawaiian petrel take. However, if additional mitigation is needed to fully offset project take, Auwahi Wind shall implement additional predator control at Haleakala National Park.

Table 2. Hawaiian Petrel Population and Net Benefit Projections for Three Predator Control Scenarios at Kahikinui.

	33 Active Burrows			44 Active Burrows		
	Moderate Predation	**Mild Predation**	**Minimal Predation**	**Moderate Predation**	**Mild Predation**	**Minimal Predation**
Number of active burrows	33	33	33	44	44	44
% of active burrow with breeding pairs	75	75	75	75	75	75
# of breeding females	24.8	24.8	24.8	33	33	33
Year 1	24.8	24.8	24.8	33	33	33
Year 2	23.1	24.2	25.0	30.8	32.3	33.3
Year 3	21.5	23.7	25.2	28.7	31.6	33.6
Year 4	20.1	23.2	25.4	26.8	30.9	33.9
Year 5	18.8	22.6	25.7	25.0	30.2	34.2
Year 6	17.5	22.1	25.9	23.3	29.5	34.5
Year 7	16.3	21.7	26.1	21.8	28.9	34.8
Year 8	15.2	21.2	26.4	20.3	28.2	35.1
Year 9	14.2	20.7	26.6	18.9	27.6	35.5
Year 10	13.3	20.3	26.8	17.7	27.0	35.8
Year 11	12.4	19.8	27.1	16.5	26.4	36.1
Year 12	11.5	19.4	27.3	15.4	25.8	36.4
Year 13	10.8	19.0	27.6	14.4	25.3	36.7
Year 14	10.0	18.5	27.8	13.4	24.7	37.1
Year 15	9.4	18.1	28.1	12.5	24.2	37.4
Year 16	8.7	17.7	28.3	11.7	23.6	37.7
Year 17	8.2	17.3	28.6	10.9	23.1	38.1
Year 18	7.6	17.0	28.8	10.2	22.6	38.4
Year 19	7.1	16.6	29.1	9.5	22.1	38.8
Year 20	6.6	16.2	29.3	8.8	21.6	39.1
Number of Breeding Adults after 20 years	13.3	32.4	58.7	17.7	43.2	78.2
Total number of adults after 20 years	17.7	43.2	78.2	23.6	57.7	104.3
Benefit from Moderate to Mild	25.6			34.1		
Benefit from Moderate to Minimal	60.6			80.8		

Table 3. Hawaiian Petrel Population and Net Benefit Projections for Three Predator Control Scenarios for Ten Years of ATST Mitigation Site Management.

	Moderate Predation	Mild Predation	Minimal Predation
Year 11	45.0	45.0	45.0
Year 12	42.0	44.0	45.4
Year 13	39.2	43.0	45.8
Year 14	36.5	42.1	46.2
Year 15	34.1	41.2	46.6
Year 16	31.8	40.3	47.1
Year 17	29.7	39.4	47.5
Year 18	27.7	38.5	47.9
Year 19	25.8	37.7	48.3
Year 20	24.1	36.8	48.8
Number of Breeding Adults after 20 years	48.2	73.7	97.6
Total number of adults after 20 years	64.3	98.2	130.1
Benefit from Moderate to Mild	33.9		
Benefit from Moderate to Minimal	65.8		

There is some potential for seabirds to get caught in predator traps, and on rare occasions this can result in the death of the bird. Trapping and monitoring at mitigation sites will closely follow Park-established protocols including appropriate trap placement and regular monitoring. Therefore, potential adverse impacts to seabirds as a result of the proposed mitigation are not anticipated. The Park has measured a capture rate of 0.17 Hawaiian petrels captured per 100 predator traps per year (Bailey pers. comm. 2011).

Gear-cleaning procedures to reduce the introduction of invasive plants and arthropods will be strongly enforced for biologists and/or contractors that conduct predator control and monitoring efforts. If predator fencing will be installed, the final fence alignment will be surveyed by qualified specialists to ensure the fence will avoid adverse impacts to seabird burrows. All mitigation construction activities such as fence building will be conducted outside of the nesting season of the two listed seabird species to minimize impacts. To minimize the potential for birds to collide with project fencing, steel reinforced white poly-vinyl tape may be woven through fences at Agency direction. If diphacinone (or another rodenticide) is used to control rats, Hawaiian petrels are not expected to be attracted to the toxin or eat organisms that have been contaminated. Thus, the use of rodenticides is not anticipated to negatively impact seabird populations.

Summary of Effects of the Action on the Hawaiian Petrel

The results of fatality modeling presented in the Auwahi Wind HCP (Tetra Tech 2012; on pages 5-4 through 5-8) indicate a total of up to 64 adult and 23 nestling Hawaiian petrels are likely to be killed or injured, directly or indirectly, by operation of the Auwahi Wind project over the 25-year term of the proposed Permit. This impact, if not mitigated, is likely to reduce the Maui Hawaiian petrel population by approximately 2%. Auwahi

Wind proposes to implement predator control at Kahikinui and, if necessary, at the ATST mitigation site or Haleakala National Park, sufficient to offset the impacts of requested take of the Hawaiian petrel.

Although it is not currently used by Hawaiian petrels for breeding, the wind farm project site does serve as unobstructed airspace through which Hawaiian petrels traverse in their movements between their breeding area and ocean feeding grounds. The Auwahi Wind project will increase the level of obstruction within that airspace, potentially resulting in mortality of Hawaiian petrels, as discussed above. After the wind farm is constructed, airspace around the turbines will continue to be adequate for transit of the local Hawaiian petrel population.

Hawaiian Goose

Species Background

The Hawaiian goose was federally listed as endangered under the Endangered Species Protection Act on March 11, 1967 (USFWS 2004). Although Hawaiian geese are capable of inter-island flight, they do not migrate from the archipelago. The Hawaiian goose was once widely distributed among the main Hawaiian Islands; the fossil record indicates the prehistoric (prior to 1778) range of the Hawaiian goose was much greater than what was observed after colonization by Europeans (Banko et al. 1999). After nearly becoming extinct in the 1940s and 1950s, the population has slowly been rebuilt through captive-breeding programs. As of 2009, wild populations of Hawaiian goose exist on the islands of Hawaii (457 individuals), Maui (416 individuals), Molokai (165 individuals) and Kauai (850 to 900 individuals) (USFWS and NRCS 2010).

The current threats to Hawaiian goose recovery are: (1) predation by introduced mammals (especially mongooses, cats, rats, dogs, and feral pigs); (2) insufficient nutritional resources due to habitat degradation; (3) limited availability of suitable habitat due to habitat loss, fragmentation, and degradation; and (4) human-caused disturbance (including habituation to humans) and mortality (especially death due to road collisions). Additional factors that may be affecting Hawaiian goose recovery but require further research include: (1) behavioral problems associated with small population sizes, captive-bred birds, and loss of genetic diversity; and (2) avian disease and parasites (Service 2004; Marshall, pers. comm. 2010).

The Service published a Draft Revised Recovery Plan for the species in 2004, and initiated a 5-year Review in 2009. The overall goal of the Service's "Draft Revised Recovery Plan for the Nene or Hawaiian Goose *(Branta sandvicensis)*" is to remove the Hawaiian goose from the Federal List of Endangered and Threatened Wildlife and Plants (delisting). The plan establishes a framework within which recovery actions are undertaken to ensure the long-term survival of the Hawaiian goose and to control or reduce the threats to the species to the extent that it is no longer in danger of extinction and warrants delisting. The interim goal is to accomplish increases in population sizes and geographic distribution of Hawaiian geese concomitant with control of threats sufficient to consider reclassification or downlisting of this endangered species to

threatened status. To reach the recovery goal, there must be multiple self-sustaining Hawaiian goose populations on Hawaii, Maui Nui (Maui, Molokai, Lanai, and Kahoolawe), and Kauai, for at least 15 years. Additionally, the threats to the species must be reduced to allow for the long-term viability of these populations, and sufficient suitable habitat must be identified, protected, and managed in perpetuity on each of these islands such that the species no longer meets the definition of endangered or threatened under the Act (Service 2004).

With the exception of Kauai, most wild populations of Hawaiian geese are not self-sustaining (Marshall, pers. comm. 2010). The Service defines "self-sustaining" as maintaining or increasing established population levels without additional releases of captive-bred Hawaiian geese, although habitat manipulation, such as predator control or pasture management, may need to be continued. Downlisting may be considered separately for a subset of the Hawaiian goose population if that population subset is shown to meet the definition of a distinct population segment and satisfy additional recovery criteria set forth by the Service (Service 2004). Consideration for delisting can occur once all of the downlisting criteria have been met, and all population levels have shown a stable or increasing trend (from downlisting levels) for a minimum of 15 additional years after recovery goals have been met (Service 2004).

Captive releases have been an important part of the Hawaiian goose recovery strategy, however; the Service has determined that future releases of captive-bred Hawaiian geese must occur only at appropriate locations (i.e., sites chosen in relation to suitability of habitat in general, and uses of surrounding areas), and in conjunction with predator control, monitoring, and habitat maintenance (Marshall, pers. comm. 2010). In order for Hawaiian goose populations to survive, they must have relatively predator-free breeding areas and sufficient food resources; human-caused disturbance and mortality must be minimized and genetic and behavioral diversity maximized. At the same time, Hawaiian geese are highly adaptable, successfully utilizing a gradient of habitats, ranging from highly altered to completely natural, which bodes well for the recovery of the species (Service 2004). Since 1962, the majority of Hawaiian goose releases has occurred at Haleakala National Park on East Maui. Since 1994, Hawaiian geese have also been released at Hanaula in the West Maui mountains (Medeiros, pers. comm. 2007). Little is known about the exact distribution and movements of the birds released at Hanaula, although they have been recorded as far west as Lahaina and as far east as Haleakala National Park, indicating that at least some birds from this release site move extensively around the island (Medeiros, pers. comm. 2011).

Anticipated Take

Hawaiian geese infrequently transit the Auwahi Wind project area in their movements among the heavily used sites north of the project site. During radar surveys on May 26, 2010, seven overlapping Hawaiian goose vocalizations were heard adjacent to the project area. Geese had not historically been recorded in the project area, Ulupalakua Ranch staff have not observed them in the vicinity, and they were not observed or heard vocalizing during any other surveys conducted to date on the project site. The results of

fatality assessments presented in the Auwahi Wind HCP (Tetra Tech 2012) indicate a total of up to five adult, immature, or fledgling Hawaiian geese or eggs are likely to be killed or injured, directly or indirectly, by operation of the Auwahi Wind project over the 25-year term of the proposed action. Those modeling results are herein incorporated by reference. The Service concurs with this assessment of impact because the Auwahi Wind HCP's fatality estimates are reasonably based on the best available information regarding the expected take of the Hawaiian goose caused by this project. Site-specific data gathered by Auwahi Wind supports the results presented in the Auwahi Wind HCP.

Mitigation

Auwahi Wind shall contribute $25,000 to Haleakala National Park to build a predator-proof fenced area at the Park to support Hawaiian goose egg, gosling, and adult rescue. Hawaiian geese are particularly vulnerable to predation during nesting and before the goslings fledge and the Hawaiian goose population at the Park is subject to high predation of eggs and goslings by cats, rats, and mongoose. Mitigation for project-related take will be provided through increased Hawaiian goose reproductive success and survival at managed pen sites over that expected to occur in the absence of management. Managed pen sites have been successfully used to increase Hawaiian goose reproductive success and survival (Marshall, pers. comm. 2010). Therefore, this management activity is likely to increase the survival and reproductive success of the Hawaiian goose population at the Park, and therefore will offset Auwahi Wind's take of five Hawaiian geese.

Summary of Effects of the Action on the Hawaiian Goose

The most current statewide population estimate for the Hawaiian goose is between 1,300 and 1,500 individuals, with 416 birds on Maui (Marshall, pers. comm. 2010). Auwahi's requested take of five individuals over the 25-year Permit term represents approximately 0.3% of the range-wide population and 1.2% of the Maui population. Because the Hawaiian goose has a high rate of fecundity and birds are long-lived, this loss of five birds over the 25-year Permit period is not expected to result in a decline in the Maui population.

Proposed mitigation is likely to offset all take impacts caused by the Auwahi Wind project impacts by increasing the survival and reproductive success of Hawaiian geese at Haleakala National Park. Therefore, Maui's Hawaiian goose population is not expected to decrease as a result of project implementation.

Blackburn's Sphinx Moth

Species Background

The Blackburn's sphinx moth was listed as endangered on February 1, 2000 (USFWS 2000). In 2003, critical habitat was designated for the Blackburn's sphinx moth on the islands of Hawaii (24,597 ac), Kahoolawe (4,252 ac), Maui (six units, 23,496 ac), and

Molokai (3,105 ac) (USFWS 2003). These designations includes habitat on State and private lands totaling 55,451 ac (USFWS 2003).

The Blackburn's sphinx moth is one of Hawaii's largest native insects with a wingspan of up to 5 inches. Reports by early naturalists indicate the species was once widespread and abundant, at least during European settlement, on nearly all of the main Hawaiian Islands (Riotte 1986). Very few specimens of the moth had been seen since 1940, and after a concerted effort by staff at the Bishop Museum to relocate this species in the late 1970s, it was considered to be extinct (Gagné and Howarth 1985). In 1984, a single population was rediscovered on Maui (Riotte 1986), and subsequently, populations on Hawaii, Kahoolawe, and Lanai were rediscovered (USFWS 2005; Duvall, pers. comm., 2011). Moth population numbers are believed to be small based upon past sampling results; however, an accurate estimate of population sizes has not been determinable at this point due to the adult moths' wide-ranging behavior and its overall rarity (Medeiros, pers. comm., 1998; Van Gelder and Conant 1998). Before humans arrived, dry and mesic shrubland and forest covered a total of about 2,034,369 ac on all of the main islands, and it is likely the moth inhabited much of that area (USFWS 2005).

The Blackburn's sphinx moth has been recorded from the islands of Kauai, Kahoolawe, Oahu, Lanai, Molokai, Maui, and Hawaii, and has been observed from sea level to 5,000 ft elevation (USFWS 2005; Duvall, pers. comm. 2011). Most historical records were from coastal or lowland dry forest habitats in areas receiving less than 50 inches of annual rainfall. The primary threats to the Blackburn's sphinx moth include habitat loss and degradation from urban and agricultural development and wildfires, and direct impacts from non-native parasitoids and predators. Additional predatory threats to the Blackburn's sphinx moth include ants and introduced birds [e.g., Japanese white-eye (*Zosterops japonicus*); Van Gelder and Conant 1998] and reptiles (Van Gelder and Conant 1998). The primary threat of parasitism to the Blackburn's sphinx moth is from non-native braconid, ichneumonid, and trichogrammatid wasps and tachinid flies (Howarth 1983; Gagne and Howarth 1985).

Actions needed to recover the Blackburn's sphinx moth include the following (USFWS 2005):

- Site/area/habitat protection – Protection, management, and restoration of Blackburn's sphinx moth habitat and wild *Nothocestrum* spp. host plant populations.
- Monitoring protocol development – Development and implementation of a detailed long-term monitoring program.
- Reintroduction/ translocation – Re-establish and augment wild moth populations within the species' historic range through captive propagation, if necessary.
- Captive propagation protocol development – Continue efforts to develop and refine captive propagation techniques for the species.
- Threats research – Identify primary predators, competitors, and parasites of the Blackburn's sphinx moth and develop and implement appropriate control measures.
- Ungulate control – Remove ungulates and restore habitat in management units.

The Service designated critical habitat unit 9 for this species in the vicinity of the Auwahi Wind project. Although the Auwahi Wind parcel on Ulupalakua Ranch was originally considered for inclusion in the critical habitat unit, ultimately the Ulupalakua Ranch land (and the Haleakala Ranch) was excluded from the critical habitat unit because of "the landowners' ongoing conservation activities on these ranches provided more benefits for the species than would be provided by critical habitat designation" (USFWS 2005). Unit 9 contains what is likely the largest extant moth population or meta-population in the moth's range. This unit contains native aiea (*Nothocestrum latifolium*) and introduced larval host plants as well as numerous nectar-supplying plants for adults. The largest remaining stand of aiea trees in Hawaii is located on Maui in the Kanaio Natural Area Reserve (Mitchell et al. 2005) adjacent to the Auwahi Wind wind farm site. Areas within this unit may serve as a source area for local populations.

Anticipated Take and Mitigation Effects

Direct Impacts and Capture for Translocation
Pre-construction surveys will be conducted to determine the likelihood of the construction site being occupied by the Blackburn's sphinx moth (particularly larvae). Host plants will be kept cleared of Blackburn's sphinx moth larvae within the three months prior to construction. Larvae found within the project site will be removed and relocated to the same species of host plant, where possible, in the vicinity of where the moth or larvae were found but well outside of the project disturbance area. Although larvae are large and visible, and pupae are not known to occupy the soil for more than three months, direct impacts from clearing and construction activities are likely to be minimized by the pre-construction surveys and translocation actions. However, eggs, larva, pupae, or adults within the project footprint not detected in surveys may be injured or killed as a result of the Auwahi Wind project.

There is some evidence that insects may be attracted to turbines. However, because adult Blackburn's sphinx moths most likely do not fly high enough to occur within the rotor swept area of the WTGs because the moths tend to stay close to the host plants (Montgomery, pers. comm. 2011), direct mortality from colliding with the blades is unlikely to occur.

Habitat Loss
The Blackburn's sphinx moth feeds, breeds, and shelters in native and degraded habitats in the area likely to be affected by the Auwahi Wind project. The Kanaio area, where the project is located, contains what is likely the largest extant moth population or meta-population in the moth's range. This unit contains native aiea and introduced larval host plants as well as numerous nectar-supplying plants for adults. Habitat in the project area is likely to contribute to the reproductive success and survival of the Blackburn's sphinx moth in the Kanaio area. The project will permanently reduce the availability of host plants for the Blackburn's sphinx moth within the project footprint.

Auwahi Wind will permanently remove 0.3 ac of the Blackburn's sphinx moth's native habitat and 27.7 ac of degraded Blackburn's sphinx moth habitat within the project footprint. The species' non-native host plant, tree tobacco, has been observed within the project area during invertebrate and botanical resource surveys conducted in 2007, 2010, and 2011. In 2010 and 2011, aiea plants were documented within the proposed wind farm site including areas along the generator-tie line corridor. In 2008, three adult male Blackburn's sphinx moths and one larva (located on examined tobacco plants) were observed in the project area during invertebrate surveys (Montgomery 2008). No larvae were observed on the eight aiea plants examined outside the generator-tie line corridor. In March and April, 2011, an additional survey for the Blackburn's sphinx moth was conducted under wet season conditions. Seven larvae and 2 eggs were observed on tree tobacco plants adjacent to the construction access route; three additional tree tobacco showed possible evidence of moth larvae feeding activity.

Moth habitat loss caused by the Auwahi Wind project will be offset with the restoration of 5.5 ac (27.7 ac x 0.2 = 5.5 ac) of native forest. In total, 6 ac of native dryland forest restoration will be funded by Auwahi Wind at the Auwahi Forest Restoration Project site. Dryland forest restoration by the Leeward Haleakala Watershed Restoration Partnership (LHWRP) at the Auwahi Forest Restoration Project site, funded by Auwahi Wind, will entail propagation and outplanting of approximately 250 stems of aiea (an important Blackburn's sphinx moth larval host plant) per acre of mitigation in addition to outplanting other native species (USGS 2006). This dryland forest restoration action will benefit native wildlife in general, and will further enhance this habitat for the Blackburn's sphinx moth.

Summary of Effects of the Action on the Blackburn's sphinx moth

Because adult Blackburn's sphinx moths most likely do not fly high enough to occur within the rotor-swept area of the WTGs because they tend to stay close to host plants (Montgomery, pers. comm. 2011), direct mortality from the blades is unlikely. Direct impacts to the moth from vegetation clearing and construction activities will be minimized by pre-construction survey and translocation actions. However, eggs, larva, pupae, or adults within the project footprint not detected in surveys may be injured or killed as a result of the Auwahi Wind project. Auwahi Wind will permanently remove 0.3 ac of the Blackburn's sphinx moth's native habitat and 27.7 ac of degraded Blackburn's sphinx moth habitat within the project footprint. In total, 6 ac of native dryland forest restoration (an offset ratio of 2:1 for native habitat (2 acres restored for every acre disturbed) and 0.2:1 for degraded habitat) will be funded by Auwahi Wind at the Auwahi Forest Restoration Project site to mitigate the impacts of anticipated take of this species. Dryland forest restoration, using methods proposed by Auwahi Wind, has been successfully conducted at the Auwahi Forest Restoration Project site for fifteen years (Medeiros pers. comm. 2011).

III. Public Comment

The Service determined that this ITP action qualifies for an environmental assessment (EA) under the National Environmental Policy Act (NEPA), as provided by the Department of Interior Manual (516 DM2, Appendix 1 and 516 DM 6, Appendix 1). The EA was made available for public review through publication of a Notice of Availability in the *Federal Register* on October 5, 2011 (76 *FR* 61735- 61736). The notice and supporting documents were mailed to agencies and private organizations with interest in the proposed action. Publication of the notice initiated a 45-day comment period.

The Service received no comments in response to the notice for the proposed action during the public comment period.

IV. Incidental Take Permit Criteria – Analysis and Findings

Section 10(a)(2)(A) of the Act specifically mandates that "no Permit may be issued by the Secretary authorizing any taking referred to in paragraph (1)(B) unless the Permittee therefore submits to the Secretary a conservation plan that specifies—(i) the impact which will likely result from such taking; (ii) what steps the Permit will take to minimize and mitigate such impacts, and the funding that will be available to implement such steps; (iii) what alternative actions to such taking the Permittee considered and the reasons why such alternatives are not being utilized; and (iv) such other measures as the Secretary may requires as being necessary or appropriate for the purposes of the plan."

Section 10(a)(2)(B) of the Act mandates that the Secretary shall issue a Permit if he finds

> "..after opportunity for public comment, with respect to a Permit application and the related conservation plan that – (i) the taking will be incidental; (ii) the Permittee will, to the maximum extent practicable, minimize and mitigate the impacts of such taking; (iii) the Permittee will assure that adequate funding for the plan will be provided; (iv) the taking will not appreciably reduce the likelihood of survival and recovery of species in the wild; and (v) the measures, if any, required under subparagraph (A)(iv) will be met; and he has received such other assurances as he may require that the plan will be implemented..."

In accordance with 16 U.S.C. § 1539(a)(2)(B), the Service makes the following findings:

1. The taking of federally listed species will be incidental.

The take of Covered Species within the Auwahi Wind project area will be incidental to the otherwise lawful construction and operation of the proposed 21-MW wind energy generation facility.

2. The Permittee will, to the maximum extent practicable, minimize and mitigate the impacts of taking federally listed species.

The Service finds that the Auwahi Wind HCP is likely to minimize and mitigate the impacts of take of the Covered Species from the construction and operation of the proposed wind energy generation facility to the maximum extent practicable. The

Service also finds that the HCP represents the most practicable alternative to minimize and mitigate take impacts to the Covered Species.

The Service's (2004b) Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines (Service 2004b) have been incorporated into the HCP. Under the provision of the HCP, Auwahi Wind sufficiently minimizes the risk of take by considering the biological requirements of the Covered Species in: (1) facility design; (2) facility location; (3) facility operation; (4) placement and design of transmission lines; (5) marking guy-wires and towers; (6) restrictions on construction activities; (7) lighting plans; (8) pre-construction surveys; (9) re-vegetation plans; (10) wildlife monitoring; and (11) enforcement of on-site vehicular speed limits. These minimization measures are discussed in detail in the HCP and the Biological Opinion which are incorporated herein by reference.

Auwahi Wind proposes to offset project-related take impacts and provide a net conservation benefit in accordance with Hawaii State law to the Covered Species through the implementation of the HCP mitigation measures. These mitigation measures were selected in collaboration with biologists from the Service, DOFAW, Auwahi Wind, and Tetra Tech, and with members of the Endangered Species Recovery Committee. The Applicant is proposing mitigation measures that include: (1) predator control at Kahikinui and, if necessary, at the ATST mitigation site or at Haleakala National Park, to the extent needed to fully offset requested take of the Hawaiian petrel; (2) construction of predator-proof pens to enhance Hawaiian goose breeding success at Haleakala National Park; (3) native forest restoration to increase Hawaiian hoary bat habitat; (4) surveys to document the distribution and abundance of the Hawaiian hoary bat; and (5) habitat restoration to offset project-related habitat loss and to benefit the recovery of the Blackburn's sphinx moth. This HCP incorporates adaptive management provisions to allow for modifications to the mitigation and monitoring measures as knowledge is gained during project implementation.

3. The Permittee will ensure adequate funding for implementation of the HCP and provide procedures for dealing with unforeseen circumstances.

Auwahi Wind warrants that it has, and will expend, the funds identified in Chapter 6 of the HCP, as such funds may be necessary to fulfill its obligations under the HCP. If such funding is not sufficient to provide the necessary conservation, Auwahi Wind shall nonetheless be responsible for ensuring that the necessary mitigation is completed. Auwahi Wind shall also provide assurance of adequate funding in the form of a letter of credit in the amount of $1,857,300 within 60 days from the date of the issuance of the ITP. Auwahi Wind shall promptly notify the Service of any material change in their financial ability to fulfill the obligations outlined in the Auwahi Wind HCP.

Pursuant to the Service's "No Surprises" regulations [50 CFR 17.22(b)(5) and 17.32(b)(5)], the HCP includes reasonable and appropriate procedures to address unforeseen circumstances. In the event of unforeseen circumstances affecting the Covered Species, Auwahi Wind will not be required to provide additional land, water, or

financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for the species covered by the HCP without their consent and provided that proper implementation of the HCP has occurred.

4. The taking will not appreciably reduce the likelihood of the survival and recovery of the federally listed species in the wild.

The proposed action to issue an ITP to Auwahi Wind was reviewed by the Service pursuant to the requirements section 7(a)(2) of the Act. The Service's Biological Opinion concluded that approval of Auwahi Wind's Permit application is not likely to jeopardize the continued existence of the endangered Hawaiian hoary bat, Hawaiian petrel, Hawaiian goose, and Blackburn's sphinx moth. This conclusion was based on consideration of the following factors:

Because the abundance and distribution of the Hawaiian hoary bat throughout its range is not well known, it is difficult to gauge the effect that take of Hawaiian hoary bats resulting from the proposed project may have on the population of this species. Hawaiian hoary bats foraging in otherwise unobstructed airspace in the WTG vicinity may be killed and injured by the turning rotor blades. No more than 19 adults and 8 young are expected to be taken over the 25-year permit term. The proposed take of the Hawaiian hoary bat on Maui is expected to be offset by the proposed forest restoration project, which should increase Hawaiian hoary bat carrying capacity on Maui. Forest restoration is likely to be successful because it has been successfully implemented at similar sites. In addition, Auwahi Wind's completion of radio telemetry research will improve Hawaiian hoary bat recovery planning.

The results of fatality modeling presented in the Auwahi Wind HCP (Tetra Tech 2012) indicate a total of up to 64 adult and 23 nestling Hawaiian petrels are likely to be killed or injured, directly or indirectly, by operation of the Auwahi Wind project over the 25-year term of the proposed Permit. Although it is not currently used for Hawaiian petrel breeding, the wind farm project site does serve as unobstructed airspace through which Hawaiian petrels traverse in their movements between their breeding area and ocean feeding grounds. The WTGs will increase the level of obstruction within the airspace and likely cause mortality of Hawaiian petrels, as discussed above. Of the total, Tier 1 includes the take of 19 adults and 7 nestling petrels; Tier 2 includes the take of up to 32 adult and 12 nestlings; Tier 3 includes the take of up to 64 adults and 23 nestlings. Project-related incidental take will reduce the Maui Hawaiian petrel population by approximately 2%.

Auwahi Wind shall implement predator control at Kahikinui and, if necessary, at the ATST mitigation site or at Haleakala National Park, sufficient to offset requested take of the Hawaiian petrel. Based on the preliminary assessments of burrow availability and activity at the Kahikinui Forest Project, Tetra Tech performed an iterative series of analyses for a population of 25 breeding pairs (33 active burrows) and 33 breeding pairs (44 active burrows). If baseline predation rates used in the model are confirmed and the

proposed predator control strategy achieves the "Mild Predation" scenario, the realized benefit after 20 years is projected to range between 26 and 34 adult petrels thereby mitigating take at both the Tier 1 and much or all of the Tier 2 level of take. If the proposed predator control strategy achieves the "Minimal Predation" scenario, the realized benefit after 20 years is projected to range between 61 and 81 adult petrels (see Table 2), thereby mitigating take of most if not all of the Tier 3 level of take. Predator control at Kahikinui and the ATST site is likely to be adequate to offset all Auwahi Wind take of the Hawaiian petrel because predator control similar to that proposed by Auwahi Wind has achieved these types of results in areas similar to the proposed mitigation sites.

Hawaiian geese infrequently transit the project area in their movements among the heavily used sites to the north of the project site. During radar surveys on May 26, 2010, seven overlapping Hawaiian goose vocalizations were heard adjacent to the project area. Geese had not historically been recorded in the project area, Ulupalakua Ranch staff had not observed them there, and they were not observed or heard vocalizing during any other surveys conducted to date on the project site.

The results of fatality modeling and assessments presented in the Auwahi Wind HCP (Tetra Tech 2012) indicate a total of up to five adult, immature, or fledgling Hawaiian geese or eggs are likely to be killed or injured, directly or indirectly, by operation of the Auwahi Wind project over the 25-year term of the proposed action. The Service concurs with this assessment of impact because the Auwahi Wind HCP's fatality estimates are based on the best available information on the expected amount of Hawaiian goose take. Site-specific data gathered by Auwahi Wind supports the results presented in the Auwahi Wind HCP.

Auwahi Wind shall contribute $25,000 to Haleakala National Park to build a predator-proof fenced area at the Park to increase Hawaiian goose survival and reproductive success. Hawaiian geese are particularly vulnerable to predation during nesting and before the goslings fledge and the Hawaiian goose population at Haleakala National Park is subject to high predation of eggs and goslings by cats, rats, and mongoose. This management activity will contribute to increasing survival and reproductive success of the Hawaiian goose population at the Park. Mitigation for project-related take will be provided through increased Hawaiian goose reproductive success and adult survival at managed pen sites.

The Blackburn's sphinx moth feeds, breeds, and shelters in native and degraded habitats in the area affected by the Auwahi Wind project. The Kanaio area, where the project is located, contains what is likely the largest extant moth population or meta-population in the moth's range. This unit contains native aiea and introduced larval host plants as well as numerous nectar-supplying plants for adults. Habitat in the project area is likely to contribute to the reproductive success and survival of the Blackburn's sphinx moth in the Kanaio area. The project will permanently reduce the availability of food plants for the Blackburn's sphinx moth within the project footprint.

Auwahi Wind will permanently remove 0.3 ac of the Blackburn's sphinx moth's native habitat and 27.7 ac of degraded Blackburn's sphinx moth habitat within the project footprint. The species' non-native host plant, tree tobacco, has been observed within the project area during invertebrate and botanical resource surveys conducted in 2007, 2010, and 2011. In 2010 and 2011, aiea plants were documented within the wind farm site and along the generator-tie line corridor. In 2008, three adult male Blackburn's sphinx moths and one larva (located on examined tobacco plants) were observed in the project area during invertebrate surveys (Montgomery 2008). No larvae were observed on the eight aiea plants examined outside the generator-tie line corridor. In March and April, 2011, an additional survey for Blackburn's sphinx moth was conducted during the rainy season. Seven larvae and two eggs were observed on tree tobacco plants adjacent to the construction access route; three additional tree tobacco showed possible evidence of larval feeding activity. Habitat loss caused by the Auwahi Wind project will be offset with the restoration of 5.5 ac (27.7 ac x 0.2 = 5.5 ac) of native forest. In total, 6 ac of native dryland forest restoration will be funded by Auwahi Wind at the Auwahi Forest Restoration Project site. In addition, Auwahi Wind shall also provide funding to the LHWRP for aiea outplanting in addition to other native species in the Auwahi Forest Restoration Project (USGS 2006). The LHWRP will restore dryland forests, which will benefit native wildlife in general, and will further enhance this habitat for Blackburn's sphinx moth by planting approximately 250 stems of aiea per acre of mitigation. The proposed Blackburn's sphinx moth habitat restoration is likely to be successful. Dryland forest restoration, using methods proposed by Auwahi Wind, has been successfully conducted at the Auwahi Forest Restoration Project site for fifteen years (Medeiros pers. comm., 2011).

Cumulative Effects

The Auwahi Wind Project is situated on private agricultural land on the lower slopes of Haleakala in east Maui. Widespread grazing by non-native ungulates and wildfires ignited by the public and lightning will continue to degrade Blackburn's sphinx moth habitat because most habitat on Maui is not protected by ungulate fencing or afforded adequate fire protection. Although no additional development is planned at Ulupalakua Ranch at this time, land zoned for agriculture in the vicinity of the interconnect station is likely to be reclassified to enable development of new golf course and housing projects. The development will reduce the extent of Blackburn's sphinx moth habitat. Lighting associated with this expanded development is likely to increase the risk of fallout to the Hawaiian petrel. Increased development may increase the density of mammalian predators adversely affecting the reproductive success and survival of the Hawaiian petrel, Hawaiian goose, and the Hawaiian hoary bat. Areas of mowed grass and standing water maintained in association with the new development are likely to attract the Hawaiian goose to areas where it will be exposed to vehicle strikes and increased predation. Pursuant to the Act, these impacts would need to be minimized and mitigated to the maximum extent practicable via development and implementation of Habitat Conservation Plans.

Based on the proposed minimization, mitigation, and adaptive management measures under the Auwahi Wind HCP to offset take of the Covered Species, it is the Service's biological opinion that Permit issuance for the proposed Auwahi Wind project is not likely to jeopardize the continued existence of the Covered Species.

5. Other measures, required by the Director of the Service as necessary or appropriate for purposes of the HCP, will be met.

The Auwahi Wind HCP incorporates all other elements determined by the Service to be necessary for approval of the HCP and issuance of the Permit.

6. The Service has received the necessary assurances that the HCP will be implemented.

The Implementing Agreement between Auwahi Wind and the Service will help to assure that the HCP will be implemented.

V. General Criteria and Disqualifying Factors

The Service has no evidence that the Permit application should be denied on the basis of the criteria and conditions set forth in 50 CFR 13.21(b)-(c).

VI. Recommendations on Permit Issuance

Based on the foregoing findings with respect to the proposed action, I recommend approval of the issuance of Permit number TE64153A-0 to Auwahi Wind for the incidental taking of the Covered Species in accordance with the Auwahi Wind HCP.

Feb. 23, 2012
Date

Deputy Regional Director
U.S. Fish and Wildlife Service
Region 1, Portland, Oregon

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