Before the
Federal Communications Commission
Washington, DC

In the Matter of	)	
	)	
Effects of Communications Tower on Migratory Birds	)	**WT Docket No. 03-187**
	)	
	)	
	)	

To: The Commission

REPLY COMMENTS

Island Airwaves, Inc., by its attorney, hereby submits Reply Comments in the above-referenced proceeding. With respect thereto, the following is stated:

Island Airwaves is the owner of a number of towers in the State of Hawaii. Further, in conjunction with a "Notice of Violations Under the Endangered Species Act and Notice of Intent to File a Citizen Suit" ("NOIS") filed by the Forest Conservation Council on April 9, 2004, Island Airwaves has been working with the FCC in submitting information to the effect of certain particular towers on endangered species. This included submitting two "Biological Assessments" in reference to two of its towers, copies of which are attached hereto.

Contrary to the broad assessments made by certain of the Comments, this issue does not warrant a frantic, over-broad reaction from the FCC. As stated in previous information filed with the FCC, although the possibility of "endangered species" of birds were identified near certain of Island Airwaves' towers, when closer examination was made, it was found that actual incidents of migration at the specific locations were rare; the species involved were not likely to be affected by the tower lighting or guy wires; or the likelihood that the specific habitat surrounding the tower would support the species was low. In general, it was determined that there was little scientific evidence that such birds involved in those specific areas were susceptible to colliding with towers or guy wires. It is believed that the same results would be found at the majority of towers throughout the United States.

Tower owners already are now sensitive to the issue being discussed in this proceeding. In the case of Island Airwaves, petitioners identified certain specific species of concern for Island Airwaves and its experts to consider. For example, to ensure that there are no unknown impacts on bird or bird flyways, Island Airwaves conferred with a state biologist on the Big Island of Hawaii, where the towers are located. The only groundings of which he has heard in recent times involved seabirds (about 20 per year), most of which occurring when seabirds in general (not just Dark Rumped Petrals) run into brightly lighted cruise ships at night and, to a lesser extent, tugs, personal boats, etc. He acknowledged that while there are some shoreline groundings or deaths of water birds as well, those do not necessarily involve any of the endangered species, and often times simply involved humans (*i.e.*, children) killing birds with rocks. With regard to the Hawaiian Goose (Nene), in particular, while that bird has been sighted flying in flocks in Puu Waimea through the saddle to the prison, and then down the Hilo shoreline area, this tower is not located on the Hilo (east) side of the Island. Therefore, there is no way that even conceivably Island Airwaves was causing problems to the Hawaiian Goose (Nene).

In must be understood that in certain coastal areas, guyed towers are essential – free standing towers are not as capable as withstanding hurricane force winds as are guyed towers. Moreover, not all towers are necessarily in areas in which ill effects to endangered species are at all likely – a "one size fits all" approach clearly would not be warranted as a result of this proceeding. Generally, mandating that the use of medium intensity white strobe lights for nighttime conspicuity is to be considered the preferred lighting system over red obstruction lighting systems to the maximum extent possible without compromising aircraft navigation safety is a well-reasoned, modest approach. However, unduly limiting the use of guy wires is not. Similarly, requiring that towers be less than 200 feet, as some parties propose, would be destructive to the long-term communications infrastucture. However, mandating a certain sensitivity to location of towers, *i.e.*, near wetlands, could possibly be appropriate, as would be encouraging co-location. Finally, *requiring* that all towers go routinely be subjected to

submission of Environmental Assessments prior to the construction of new towers, again, would incredibly delay the in many cases the institution of the service to the public, and would not be in the public interest.

An incredible number of identical comments have been submitted in this proceeding. This proceeding should be evaluated on scientific data, and not based on the sheer numbers of interested parties or anecdotal information. There is no scientific evidence that the vast number of towers have harmed endangered species, and without such evidence, the most reactionary of the Commission's proposals should not be adopted.

WHEREFORE, for the reasons stated above, it is respectfully requested that this these Reply Comments be accepted and considered in this proceeding.

Respectfully submitted,

ISLAND AIRWAVES, INC.

By: _____
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Its Attorney

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May 23, 2007

Attachment A

BIOLOGICAL ASSESSMENT
FOR THE
OPERATION AND MAINTENANCE
OF ISLAND AIRWAVES TOWER
ASR No. 1211321, FCC File No. A0352919
(Kaloko, HI)

Prepared for:

Island Airwaves Inc.

And

The Wireless Telecommunications Bureau,

Federal Communications Commission

I. INTRODUCTION

A. Purpose of the Biological Assessment.

The purpose of this Biological Assessment ("BA") is to address the potential effects of the ongoing operation and maintenance of an Island Airwaves, Inc. ("Island Airwaves") tower, ASR No. 1211321, FCC File No. A0352919, ("Tower") on any species or critical habitats listed or proposed under the Endangered Species Act ("ESA"), 16 U.S.C. 1531 *et seq.* The BA also is part of the informal ESA consultation process initiated for the Tower in 2004. Species biology, presence, and effects determinations for this BA were prepared utilizing data and information assembled by Paul Kerlinger, Ph.D, Curry & Kerlinger, L.L.C. Other preparers of the BA include Patrick W. Ryan, Perkins Coie LLP.

The Tower is an existing 300 foot (92.4 meters) lattice self-supported telecommunication tower located on the east side of Huehue Street, approximately 3,200 feet north of Kaloko Drive/Huehue Street intersection in the Kaloko Mauka Subdivision, Increment 5, Kaloko, North Kona, Hawaii. See Figures 1 & 2. The tower was constructed and became operational in June 2000 following its registration by the Federal Communications Commission ("FCC"). The Tower, along with a 220 square foot equipment building, a propane gas tank with generator, and two parking spaces on 10,000 square foot area of the subject parcel (20 acres). The Tower is more fully described in Section II below.

Pursuant to Section 7(a)(2) of the ESA, federal agencies are obligated to ensure their actions, and actions they license or authorize, are not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. 16 U.S.C. § 1536(a)(2). Federal actions include a broad variety of activities funded, authorized, or carried out by federal agencies, including the granting of licenses. 50 C.F.R. § 402.02. When a federal agency proposes an action (such as issuing a license) that may affect a listed species or its critical habitat, it must consult with U.S. Fish and Wildlife Service ("USFWS" or "Service") either formally or informally.

In accordance with Section 7 of the ESA, the FCC is required to consult with the Service to ensure that its actions will not jeopardize the continued existence of federally-listed or proposed species or result in adverse modification of designated critical habitat. For purposes of informal Section 7 consultations, including the preparation of biological assessments, the FCC programmatically designated its license and registration applicants as "non-federal representatives" of the agency in 2002.

A biological assessment evaluates the potential effects of an action on federally-listed species or designated critical habitat, and determines whether the species or habitat is likely to be adversely affected by the action. A biological assessment may also evaluate effects on federally proposed species, but this is at the action agency's discretion unless the project would jeopardize the continued existence of the federally proposed species. A biological assessment is considered part of the informal consultation process for non-major federal construction projects, such as the Tower.

When a federal agency determines, through a biological assessment or other review, that its action is not likely to adversely affect a listed species, the federal agency may proceed with the action under review with the Service's written concurrence. If the federal action agency determines that the subject action is likely to adversely affect a listed species or its designated critical habitat, the agency submits a request for formal consultation to the Service. A formal consultation results in a biological opinion, written by the Service, which contains an incidental take statement if the federal action is reasonably certain to result in the otherwise prohibited "take" of a listed species.

This BA is prepared in accordance with the requirements set forth under Section 7 of the ESA and implementing regulations (16 U.S.C. § 1536, 50 C.F.R. pt. 402), and ESA guidance contained in the Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service, 1998). Utilizing the best science and commercial data available, the BA evaluates the effects to federally listed and proposed species from the operation and the maintenance of the Tower, as described in the Description of the Proposed Action below.

B. Species Covered in this Document.

The Service has identified three federally-listed species that may be present within the vicinity of the Tower (Table 1). The potential effects to these species are addressed in this BA, and summarized below.

Table 1. List of federally listed and proposed species, their federal status, and critical habitats examined in this BA.

SPECIES	CURRENT STATUS	CRITICAL HABITAT
Birds		
Newell's Shearwater (*Puffinus auricularis newelli*)	Threatened	N/A
Hawaiian Hawk (*Buteo solitarius*)	Endangered	N/A
Mammals		
Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)	Endangered	N/A

Effects to these species are analyzed taking into consideration both the effect of the Proposed Action, interrelated and interdependent actions, and cumulative effects, as described below.

C. Summary of Conclusions.

Formal consultation under Section 7 of the ESA is not necessary for federally-listed species not likely to be adversely affected by a federal action. The following is a summary of the conclusions presented in this BA regarding the combined effects of the Proposed Action, interrelated and interdependent actions, and cumulative projects, on each potentially affected species and designated critical habitat. The conclusions in this BA are based on the best scientific and commercial data available and are intended to assist the Service in reaching its own determinations regarding the effects to each species and critical habitat.

Table 2. Effects Determinations.

SPECIES	EFFECTS DETERMINATION OF PROPOSED ACTION
Birds	
Newell's Shearwater (*Puffinus auricularis newelli*)	**Not Likely To Adversely Affect**
Hawaiian Hawk (*Buteo solitarius*)	**Not Likely To Adversely Affect**
Mammals	
Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)	**Not Likely To Adversely Affect**

II. PROJECT HISTORY

The Tower is an existing 300 foot (92.4 meters) steel lattice self-supported telecommunication tower located on the east side of Huehue Street, approximately 3,200 feet north of Kaloko Drive/Huehue Street intersection in the Kaloko Mauka Subdivision, Increment 5, Kaloko, North Kona, Hawaii. See Figures 1 & 2. The Tower, along with a 220 square foot equipment building, a propane gas tank with generator, and two parking spaces on 10,000 square foot area of the subject parcel (20 acres). The Tower and the radio/television stations it serves act as the Primary Civil Defense Stations in the County of Hawaii.

The tower was constructed and became operational in June 2000 following its registration by the Federal Communications Commission ("FCC"). The Tower is registered with the FCC's Antenna Structure Registration System ("ASRS"), No. 1009097, and prior to construction, was granted a Special Permit by the Planning Commission, County of Hawaii, after a public hearing and thorough review by local and state agencies, including the Dept. of Land and Natural Resources and its Division of Forestry and Wildlife. See App. 1, Att. 4; App. 2; App. 3, Att. 1.

The implementing regulations of Section 7 do not require any specific contents of a BA. 50 C.F.R. § 402.12(f). On May 27, 2005, however, the FCC provided a list of details necessary to fully describe the Tower. The FCC also indicated that information contained in prior submissions to the agency may be incorporated by reference. For convenience, these prior submissions are appended to this BA.

A. Description of the Tower

Measurements of the Tower.

The Tower is approximately 300 ft. (92.4 meters) high, with three faces on the Tower measuring twenty-two feet at the base, approximately nineteen and a half feet at 24 feet up the Tower, and approximately 36 inches at the top. The overall height of the Tower above mean sea level is approximately 5, 621 feet. The measurements of the Tower, including its site plan, are more fully described in Appendices 1 and 3, and their attachments.

Guy wires.

The Tower is self-supported and has no guy wires.

Lighting.

In compliance with FAA requirements, the Tower has a medium intensity, upward facing white strobe at the top of the Tower.

Tower Type.

The Tower is a 300 foot steel lattice self-supported tower, twenty –two feet at the base and tapering to the top.

Pictures of the Tower.

Pictures of the Tower and the surrounding area are provided in App. 3, Att. 2.

Antenna dimensions.

The Tower supports three antennas. The bottom 30 foot section of the Tower supports an 8-bay Yagi TV antenna (each bay measuring app. 6' x 24", and protruding 10" from the Tower); 130-150 feet from the bottom of the Tower supports a 4-bay UHF antenna (each bay measuring app. 4' x 18" and protruding 10" from the Tower), and the top 20 foot section of the Tower supports a 3-bay FM antenna (each bay measuring app. 2' wide and protruding app. 36" from the Tower).

B. Adjacent Lighting

The subject parcel is developed with two farm dwellings, a carport, and an agricultural shed. An existing non-Island Airwaves tower (FCC No. A0011913) is sited approximately 150 feet east of the Tower. The tower to the east has two red beacons, one at the top, and one at app. 250 feet. Island Airwaves is not aware of any unusual lighting in the area.

C. Above Ground Electrical Transmission Lines

The Tower is served by pre-existing power distribution lines that were installed to serve the residential and agricultural land uses for which the property is zoned. The power is delivered to the Tower through underground utility lines.

D. Description of Surrounding Area

The Tower is on a steep incline with a housing development approximately 150 yards below. Surrounding the Tower and uphill from it, the ground is lightly covered by brush and small to medium trees. The site of the Tower contains ohia, tree fern and a variety of shrubs and non-native vegetation. The area surrounding the Tower is zoned agricultural. The subject property also is adjacent on the northern side and east rear to the Kaupulehu forest reserve

that is in the State Land Use Conservation District. Pictures of the surrounding area are provided in App. 3, Att. 2.

III. ENVIRONMENTAL BASELINE

The *environmental baseline* includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process. 50 C.F.R. § 402.02. The environmental baseline does not include the effects of the Proposed Action. The *action area* means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

For purposes of this BA, the "action area" is defined as the entire 20 acre site for the constructed Tower and accompanying development. As described above, the Tower site is located on the east side of Huehue Street, approximately 3,200 feet north of Kaloko Drive/Huehue Street intersection in the Kaloko Mauka Subdivision, Increment 5, Kaloko, North Kona, Hawaii.

The "environmental baseline" for this BA includes the impacts from the construction and installation of the Tower and associated development on the site, including a 220 square foot equipment building, a propane gas tank with generator, and two parking spaces on a 10,000 square foot area of the subject parcel (20 acres), is enclosed with an eight foot high chain link fence. The environmental baseline does not include the effects of the Proposed Action, as described below.

A. Baseline Descriptions of Species

To describe the biological baseline conditions for the species under consideration, the following summaries of pertinent biological information regarding Newell's Townsend's Shearwater, Hawaiian Hawk, and Hawaiian Hoary Bat have been developed. For birds, the comprehensive species accounts recently published in The Birds of North America ("BNA"; *see* citations below) were the primary information source of information along with more recent information from the literature base. For all species, recovery plans and other biological information issued by the USWFS were consulted, when available.

Newell's Shearwater (*Puffinus auricularis newelli*):

The Newell's Shearwater is federally listed as threatened. 40 Fed. Reg. 17590 (April 21, 1975). There is no critical habitat designated for this species.

Newell's Shearwater is a medium-sized shearwater (30-35 cm in length, with a wingspan of 76-89 cm; Harrison 1985). It is dark, sooty brown above and generally white below. Newell's Shearwater occurs year-round in the tropical waters of the eastern Pacific Ocean, largely to the east and south of the Hawaiian Islands. It forages near tuna (*Thunnus* spp.) in the open ocean, as well as other large predatory fish that push baitfish to surface waters. Newell's then captures the baitfish by pursuit-plunging, from flapping flight. The species

has a stiff-winged flight such that birds plunge into the water at a low angle of attack and then swim under water on after their prey. While swimming their wings are partially closed. Prey when caught is swallowed. Newell's Shearwaters are referred to by commercial anglers as one of the "tuna birds."

Newell's Shearwater comes ashore from the open ocean only to nest. It nests in burrows dug by these animals or in deep rock crevices at high elevations (between 160 and 1,200 m on Kauai). It is known from only about 20 nesting colonies on the larger Hawaiian Islands. Some of these colonies are as much as 14 km inland, as is the case in Kauai. Its stronghold is Kauai, where nesting habitat, mostly in forests, has not been as severely disturbed or where forests have been removed. It also does not nest where mongoose are present.

Nesting colonies have been found on Hawaii and Molokai (see range map, from Ainley et al. 1997), and breeding may occur on O'ahu, Maui, and Lana'i. Newell's Shearwater was probably a common nester when humans colonized the islands, but habitat loss due to agriculture and urbanization, as well as lava flows, has reduced the population. Also, introduced predators such as mongoose, feral cats, pigs, and Barn Owls have helped to severely reduce this species' population. Its nesting is now often only on steep slopes with an open forest canopy and dense fern understory. It also nests on canyon walls where there is little or no tree canopy. Birds climb nearby trees and rock outcrops in order to take off.

Newell's Shearwaters fly to and from their breeding colonies only at night in synchronized flights, with most birds arriving and departing within about 30 minutes of each other. Radar studies appear to indicate that birds use flight corridors, particularly river valleys through the coastal mountains, to reach their colonies. Use of flight corridors may be a result of cloudy weather that frequently occurs in the Hawaiian Islands. During clear weather, birds are known to pass over ridges and outside of river valleys on Kauai (Day and Cooper 1995).

Newell's Shearwaters are likely to be monogamous. They require several years to become sexually mature and commence breeding at about six years of age. However, younger birds that are not sexually mature (from age two) visit the nesting colonies. Adults begin visiting their breeding colonies near the end of April and return to the colony regularly until about a week before chicks fledge, which is in early November. Incidence of nonbreeding is high. About one-half of all pairs that actively use burrows actually produce eggs and young each year. Pairs reunite in their burrows at the start of the breeding season for a courtship period lasting weeks that synchronizes schedules. Nesting birds then leave the colony for a period of two weeks, as females develop their eggs and males build up fat reserves to carry them through the first turn at incubation.

On Kauai, females lay one egg during the first two weeks of June. Incubation on Kauai was 62 days. Both parents incubated equally, with the male incubating first, on or within a day of the female, who laid eggs and left the nest. Chicks are attended for their first days of life by a parent, but after a few days they are fed irregularly. This is because parents must commute distances of, on average, 1,200 km (750 miles) to feed. Fledglings leave the nest in October and their first flight away is often just after sunset. On their first seaward flight, Newell's fledglings are attracted to lights, leading to a phenomenon locally known as "fallout." Some

or many young birds are attracted to the lights of urban areas, where they mill around lights until exhausted, at which times they crash land. An organization known as Save Our Shearwaters (SOS) was founded to rehabilitate these birds before they are released at sea.

Newell's Shearwaters are estimated to number about 84,000 individuals (range 57,000-115,000; Spear et al. 1995) or about 14,600 breeding pairs. Most nest on Kauai. Cooper and Day (1994) estimated that about 63,000 adults and older subadults visit the Kauai colonies. Reynolds et al. (1997) estimates the nesting population on the island of Hawaii at a few thousand birds. It is suspected that the species' population is decreasing, mostly because of introduced predators, as well as collisions with power lines, and mortality of fledglings as a result of fallout. Also, volcanic eruptions, lava flows, and hurricanes eliminate some nests and individuals. Fewer fledglings have been recovered during fallouts in the past decade.

The overall population of Newell's Shearwaters appears to be dependent on habitat free of alien predators and other factors that have increased mortality. In particular, power lines and coastal lighting, has taken its toll. Recent unpublished data appear to indicate that power-line collisions may take 0.6-2.1% of fledglings each year in southern and eastern Kauai. An average of 1,500 fledglings per fall is recovered for rehabilitation in urban areas during fallouts. This could account for 15% or more of the reproductive output of nearby colonies each year. Another factor that may be significant is the reduction of tuna numbers and schools that has resulted from greater commercial fishing pressure. With fewer tuna to push baitfish to the surface, these shearwaters must spend more time foraging or traveling over much greater areas to find food. These changes may have resulted in reduced feeding frequency or amount of food for chicks. The result is a reduction in successful reproduction. It is important to note that these factors can work cumulatively to reduce the survivorship and reproduction of this species.

Newell's Shearwater was federally listed as threatened in 1975. Solutions to reduce mortality include control of coastal lighting, burying of power lines, and exclusion of predators from breeding colonies. Other measures are being considered, but have not been pursued at this time. Efforts are needed to survey for unknown nesting colonies.

Hawaiian Hawk (*Buteo solitarius*):

The Hawaiian Hawk is federally listed as endangered. 32 Fed. Reg. 4001 (March 11, 1967). There is no critical habitat designated for this species.

Hawaiian Hawks (locally known as 'Io) are a small, broad-winged hawk (average total length of 41 cm for males, 46 cm for females). Although restricted to the island of Hawaii, it occurs throughout that island except high elevations, the northwest, and along the southern coast (see range map, from Clarkson and Laniawe 2000). Fossil evidence reveals that the Hawaiian Hawk occurred on Kauai, Maui, and Oahu, where it now does not nest, but is considered accidental. From the 1990s surveys have estimated the Hawaiian Hawk population at 1,600 (Hall et al. 1997) and 1,233 (USFWS 1998) individuals. Survey techniques varied so there are few data to support an accurate assessment of population trends (Clarkson and Laniawe 2000). The species has high adult survival, slow maturity (late

sexual maturity), delayed breeding, and high fidelity to nesting territories. Population numbers depend on the availability of suitable native and exotic nesting habitat (Griffin 1985).

The Hawaiian Hawk is a habitat generalist, nesting and foraging in a broad range of vegetation types: native forests at higher elevations (to 1,700 m during the breeding season, but sometimes higher on Mauna Kea during winter); exotic forests near sea level; and to agricultural areas with some large trees. The bird mostly nests in native trees.

Hawaiian Hawks have adapted to feeding on introduced species, including rats, birds, and insects, which make up the large majority of its prey items. Most hunting is from perches, with birds dropping or gliding downward on prey. Diving or stooping on prey during flight is infrequent and one study recorded that behavior only 8% of the time (Griffin 1985).

Hawaiian Hawk pairs maintain territories at their nests year-round. Home ranges vary widely, depending on habitat type – from 48 ha recorded in a papaya-guava orchard to 526 ha in closed-canopy native forest, to 608 ha in mid-elevation pasture (Griffin 1985). Pairs perform courtship displays during all months, with most displays occurring during April and May, at the onset of the breeding season. Birds will rise several hundred meters using upslope breezes and rapid wing beats while circling to gain altitude. High soaring flights are also used to defend territories.

Hawaiian Hawks are monogamous and do not nest every year. Low habitat quality may influence breeding success for some pairs, but the tendency to skip a breeding season may also be influenced by the prolonged dependency period of the juveniles (see below).

One egg is generally laid (rarely two or three) from about mid-April to mid-June, and incubation lasts at least 38 days. The young bird leaves the nest at about 59 to 63 days after hatching, remains close to the nest during the first two months, and then ranges widely within the parental territory until about six months, after which time it disperses from the natal site. A radio-telemetry study tracked one juvenile 15 km by eleven months after fledging. Juveniles are known to congregate at agricultural areas. Young birds probably do not breed until at least three to four years of age.

Degradation of habitat probably affected the historical Hawaiian Hawk population in a significant way, but the absence of historical population data make this difficult to assess. Introduced diseases (such as the avian malaria that decimated Hawaiian songbirds) have apparently not affected the Hawaiian Hawk. There is also no evidence that pesticides and other contaminants (secondary poisoning from rodenticides) affect birds significantly. Harassment of nesting birds and shooting may be the most significant factors directly affecting the Hawaiian Hawk, but their levels and effects are difficult to assess.

The Hawaiian Hawk was federally listed as endangered in 1967. On the basis of breeding studies, USFWS proposed down-listing the species to threatened status in 1993, but this proposal was withdrawn, pending further population and breeding surveys. The Hawaiian Hawk Recovery Plan (USFWS 1984) recommends: 1) monitoring the population status; 2) maintaining suitable habitat for feeding and nesting, including conservation of remaining

native forest habitat; 3) enforcing the prohibition of taking; and 4) evaluating the potential impacts of changes in pesticide use.

Hawaiian Hoary Bat (*Lasiurus cinereus semotus*):

The Hawaiian Hoary Bat is federally as endangered. 35 Fed. Reg. 16047 (October 13, 1970). There is no critical habitat designated for this species.

The Hawaiian Hoary Bat is the only land mammal native to the Hawaiian Islands. It is an endemic subspecies of hoary bats that occur in North and South America. It is a medium-sized bat (wingspan of 26.9-34.6 cm) that feeds exclusively on insects caught in the air at night. Females are nearly 25-30% larger than males, averaging 17.9 grams (0.6 ounces) as compared with 14.2 grams (0.5 ounces) (USFWS 1998). Its Hawaiian name is *'ope'ape'a*.

The Hawaiian Hoary Bat occurs on Hawaii, Maui, Oahu, Kauai, and Molokai, but they are only observed regularly on Hawaii, Kauai, and Maui (USFWS 1998). Population numbers are not known with certainty, but the bat is believed to have declined in numbers over the past 100 years as a result of deforestation. On Hawaii, bats have been observed from sea level to about 4,000 m (13,200 feet; various sources cited in USFWS 1998) in both wet and dry areas of the island. Hoary bats are probably more abundant on the drier leeward side of the island (Jacobs 1994).

It appears that Hawaiian Hoary Bats forage and roost in both native and nonnative vegetation (various sources cited in USFWS 1998), so their habitat selection is not restricted to native habitats. Foraging heights are generally from one to more than 150 m (3 to 500 feet) above open areas, near native forest edge, and over open water (various sources cited in USFWS 1998). A radar study of nocturnal seabird flights on the windward side of the island of Hawaii, demonstrated Hawaiian Hoary Bats were at eight of eleven sampling sites at rates ranging from 0.03 to 0.28 bats/minute (Reynolds et al. 1997). The diet of these bats is apparently diverse, without the strong selection for moths noted in some studies of the North American subspecies (Jacobs 1993a).

Comprehensive studies of the Hawaiian Hoary Bat have not been undertaken, but studies summarized by the USFWS (1998) addressed different aspects of the bat's life history and ecology. Hawaiian Hoary Bats are solitary and roost in foliage in trees. Jacobs' (1993b) radiotelemetry research showed some roost site fidelity, with bats departing these sites shortly after sunset and returning before midnight. Menard (2001) has found that bats on the island of Hawaii may migrate elevationally, with both sexes spending the April to August breeding period in the lowlands (sea level to approx. 1,300 m), after which males move into the highlands (approx. 1,550 to 1,900 m).

Pregnant bats have been reported on Hawaii and Kauai (Kepler and Scott 1990), and breeding apparently occurs between September and December. Two young are born in May or June. Lactating females have been found between late June and early August and individuals captured September through December had completed lactating (Tomich 1986).

The Hawaiian Hoary Bat was federally listed as endangered in 1970. According to the USFWS recovery plan (1998), important threats to the Hawaiian Hoary Bat include habitat destruction (elimination of roosting sites) and may also include direct and indirect effects of pesticides, introduced insects, and disease. The principal recovery goal is to determine the bat's population status and habitat requirements, so that effective management measures can be developed.

IV. DESCRIPTION OF THE PROPOSED ACTION

The USFWS has identified three listed species to consider for effects from the Tower. As discussed previously, the impact from the construction and installation of the Tower is considered part of the environmental baseline for purposes of this BA. This BA is intended to assess the effects to ESA-listed species and critical habitats from the ongoing operation and maintenance of the Tower. The *operation* of the Tower means its post-constructed existence. Potential effects under consideration from the operation of the Towers primarily focus on avian collisions.

The *maintenance* of the Tower means the ongoing activities necessary for the continuation, safeguarding, and upkeep of the Tower. The tower is virtually unmanned and there is minimal maintenance activity at the site. Such activity includes periodic visitation by technicians and trimming of vegetation near the building and propane tank, as well as around the tower base.

V. EFFECTS OF THE PROPOSED ACTION ON SPECIAL STATUS SPECIES

The *effects of the action* that will be added to the environmental baseline are the proposed action's immediate impacts on the species (*direct effects*) and those impacts that are reasonably certain to occur in the future (*indirect effects*). They also include the effects of any "other activities that are interrelated or interdependent with" the project. 50 C.F.R. § 402.02. The test for interrelatedness or interdependentness is "but for" causation: but for the federal project, these activities would not occur. 51 Fed. Reg. 19,932 (1986).

Newell's Shearwater (*Puffinus auricularis newelli*):

For purposes of this BA, the primary potential effects to consider from the Proposed Action on the Newell's Shearwater include collisions with the Tower and disturbance of nesting areas.

The habitat at the Koloko site does not appear suitable for nesting of Newell's Shearwater. The site is on a steep slope about 150 yards from a housing development. It is vegetated with some brush, tree ferns, ohia, and small to medium sized trees. Much of the vegetation is non-native. Most of these trees are uphill from the Tower. These features are unlike the forests in which the Newell's Shearwater nests. Those forests include an open canopy with a dense understory of ferns, on the island of Hawaii. Therefore, Newell's Shearwaters are not likely to nest on or near the site because there is already too much disturbance, and the vegetation is not suitable for these birds.

Furthermore, the nesting areas of this species, as per a map in Ainley et al. (1997) show that the species does not nest at or near the Tower site. It nests mostly at the far northern end of that island and in a strip along the southeastern coast of the island. It is likely that there are no nests near the Tower for many miles.

Together, the fact that the Tower site does not have habitat that could support nesting by Newell's Shearwater and that the species distribution maps do not show nesting colonies within many miles of the Tower site, indicate that the species is not likely to be found nesting at or near the Koloko site. However, shearwaters could in rare instances, fly over the site, while flying to and from the ocean and some of their inland nesting sites. A radar study by Day et al. (2003) did not show any passage of shearwaters, petrels, or other targets at west coast radar survey sites on Hawaii as opposed to more northerly and some other sites along the coast.

There is little scientific evidence that seabirds, including shearwaters, collide with towers and guy wires. Seabirds have not demonstrated a susceptibility to colliding with these structures. A report from the American Bird Conservancy (Shire et al. 2000) included the most comprehensive quantitative list of fatalities of birds at guyed communication towers. That list is a species by species account that reveals a vast majority of the birds that collide with towers are night migrating songbirds. The fatality of these songbirds at communication towers is what has received attention from bird watchers and some environmental agencies. A compilation of species from 47 studies by Shire et al. failed to demonstrate almost any risk to seabirds. Shire et al. (2000) did not summarize all papers in the literature so this author has reviewed other papers in the literature including those cited by the U.S. Fish and Wildlife Service reviews (Avery et al. 1980 and by Trapp 1998; Kerlinger 2000) that were not included in the Shire et al. (2000) compilation. Those other studies also do not provide evidence that seabirds collide with communication towers, or at least collide with communication towers regularly enough for confirmation of fatalities. Because there are thousands of communication towers that are much taller than the Tower located in areas where there are seabirds, they could be attracted to shore. However, because such events have not been documented, it is reasonable to conclude that these birds are not likely to collide with guyed communication towers. Apparently, only one seabird, a Black-capped Petrel (Shire et al. 2000), has reportedly collided with a tall, guyed communication tower. More importantly, there are no readily available accounts of seabirds in Hawaii, including Newell's Shearwater, colliding with unguyed towers such as the Island Airwaves Tower. Therefore, there is no reason to believe that Newell's Shearwaters are susceptible to colliding with communication towers.

Seabirds, such as Newell's Shearwaters among others, are attracted to bright lights, such as those common on street and highways, stadiums, and even ships. Shearwaters, when attracted to bright lights, fly in circles around the lights until they either are exhausted and land or collide with structures, including electrical transmission or distribution lines (Cooper and Day 1998). These transmission lines are often unlit. The fact that transmission lines are often oriented perpendicular to the flight path of Newell's Shearwaters and other seabirds as they fly inland to nesting colonies from the ocean in darkness, suggests they are far more risky to these birds than guyed communication towers. The normal configuration of

transmission lines is within a vertical area 2 to 6 m tall (Cooper and Day 1998). These power lines run for thousands of miles on Hawaii, whereas the Tower does not have guy wires or is directly hooked up to over head power lines. This means that, even if Newell's Shearwaters fly in the vicinity of the Tower site, the probability of them colliding with the Tower is minimal in comparison with transmission lines.

The vast majority of the collisions of birds with guyed communication towers results from the attraction of FAA or other types of lighting on or near the structure. The review by Avery et al. (1980) and many other papers in the literature have demonstrated that the red FAA lights on communication towers attract night migrating songbirds resulting in multiple fatalities in a single night. These guyed towers involved in these multiple fatality events are usually greater than 500 feet and lit with steady burning and flashing red FAA lights. That there do not seem to be multiple fatality events of seabirds at structures lit with FAA type lights, unlike the case with songbirds, strongly suggests that these lights do not attract seabirds. Thus, there is no evidence that Newell's Shearwaters are attracted to FAA medium intensity white strobe lights like those on the Tower. It is important to note that the FAA lighting on the Koloko Tower is the medium intensity white strobe of the sort that is recommended by the U.S. Fish and Wildlife Service guidelines as a safe type of lighting for towers. Together these facts suggest that Newell's Shearwaters will not be attracted to the lights of the Koloko Tower, even if they are present in the general area.

The literature does not include communication towers as a known or potential threat to Newell's Shearwater. With respect to another communication tower in the Hawaiian islands, Thomas Telfer, a retired District Wildlife Manager with the Department of Land and Natural Resources, Division of Forestry and Wildlife, State of Hawaii, concluded that FAA lighting of the type used on communication towers (red flashing combined with red steady burning) were not bright enough to attract seabirds such as Newell's Shearwater. Telfer, while working for the state of Hawaii actually searched a guyed tower having red lights on Kauai on two occasions but did not find any dead birds. His opinion was stated in an affidavit submitted on behalf of another tower owner in 2004 to the FCC. Although his comments were made in reference to a tower on Kauai, they were general with respect to the lighting and the impact of communication towers on seabirds.

To evaluate the potential impacts on birds, Island Airwaves conferred with Joey Miler, a state biologist on the Island of Hawaii. He stated that groundings in recent times involved various seabirds (about 20 per year). He further stated that these birds mostly run into brightly lit ships.

The Koloko Tower does not have any of the major risk factors of communication towers that could impact birds, including Newell's Shearwater. The tower is a relatively short tower, it has a lighting configuration that is not known to attract birds, and it has no guy wires. Therefore, it is concluded that the tower *may affect, but is not likely to adversely affect* the Newell's Shearwater.

Hawaiian Hawk (*Buteo solitarius*)

For purposes of this BA, the primary potential effects to consider from the Proposed Action on the Hawaiian Hawk include collisions with the Tower and disturbance of nesting areas.

Disturbance of nesting sites by tower maintenance is unlikely. The minimal comings and goings of technicians will not likely disturb the birds greatly. However, there are other more disturbing activities that are present near the Tower on a daily basis, including a housing development only 150 yards from the Tower.

Collision fatalities of hawks at tall, guyed communication towers are extremely rare. Using the list of fatalities assembled by Shire et al. (2000) from 47 studies conducted at guyed communication towers almost entirely taller than 500 feet in height, a total of 1 raptor (Northern Harrier), with the exception of Turkey Vultures, that was killed by a communication tower. These studies were conducted over an aggregate total of more than 150 years and were done in about two dozen states on the mainland of North America. An examination of the bird lists in the publications reviewed by Avery et al. (1980) and Trapp (1998), both published by the U.S. Fish and Wildlife Service revealed almost no fatalities. Additional studies conducted at towers in excess of 1,000 feet in height by Arthur Clark (retired biologist from the Buffalo Museum of Science, and member of the Research Committee for the U. S. Fish and Wildlife Services Communication Tower Working Group) and his research team have revealed no raptors (personal communication from Clark, which is the case for almost all studies conducted at communication towers.

Dr. Joelle Gehring of Michigan State University did find a Red-tailed Hawk dead at a 475 foot tall, guyed communication tower in Michigan. That bird was the only raptor found at 23 guyed and unguyed communication towers ranging in height from about 400 to 1,000+ feet in height during nearly two years of study.

Another source of information that suggests raptors are not susceptible to colliding with towers is the many studies conducted at wind turbine facilities. At many of these facilities, there is one or more, guyed meteorology towers that range in height from about 120-160 feet in height and have guy wires. These studies are reported in Erickson et al. (2001). Not a single dead raptor has been found at any of these sites, despite intensive year-round searches.

This author of this effects assessment (P. Kerlinger) has read virtually all reports, published and unpublished, of communication tower fatalities involving birds. To date, there appears not a single reported instance of a raptor colliding with an unguyed tower, anywhere. There also does not seem to be a single instance of a Hawaiian Hawk colliding with either a guyed or unguyed communication tower.

The Tower does not have the major risk factors of communication towers that could impact birds. The Tower is not a relatively short tower, it has lights that are not known to attract birds, and it has no guy wires. For the reasons listed above, the collision risk to raptors, including Hawaiian Hawks at communication towers is negligible and discountable. Based on the information and data that are currently available, there is likely to be no impact to Hawaiian Hawk and it is concluded that the Tower *may affect, but is not likely to adversely affect* the Hawaiian Hawk.

Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)

For purposes of this BA, the primary potential effects to consider from the Proposed Action on the Hawaiian Hoary Bat include collisions with the Tower and disturbance of nesting areas.

It is highly unlikely that the operational activities (servicing the facility and cutting vegetation away from the building, tower, and guy wires) will in any way affect Hawaiian Hoary Bats. These bats roost in trees and the maintenance schedule for the Tower does not include any tree cutting or other habitat manipulation. Therefore, the maintenance activities will in no way impact the trees in which these animals roost, nor will they have any impact on the insects that these animals eat. It is possible that these bats forage on site, but they will not be impacted by the maintenance activities as they catch and eat insects in the general area.

Collision impacts to bats, including Hawaiian Hoary Bats, have very rarely been documented. It is known that bats are killed by cars and wind turbine rotors, both of which are moving at relatively high speeds. It is common knowledge that endangered Indiana bats and other species in western Pennsylvania are regularly killed by automobiles on a federal highway. In addition, studies of wind power projects (Kerns and Kerlinger 2004; Arnett et al. 2005), have demonstrated that when wind the rotors of wind turbines are not operating (tip speeds of about 150 mph) bats do not collide with them.

Similar fatality studies at communication towers have demonstrated that bats very rarely collide with guyed or unguyed communication towers. Thus, there is a vast body of literature that suggests that bats are not as susceptible to colliding with towers and guy wires as are birds. Very few of the hundreds of references on collisions of birds with communication towers (and other tall structures) mention the presence of any dead bats. Avery et al. 1980, Trapp 1998, and Shire et al. 2000 provide exhaustive lists of study references and synopses of reports that can be gleaned for bat fatalities. There are very, very few of these studies that report any bat fatalities. It is possible that one or more fatalities were overlooked or that the surveys were not done during the appropriate season. However, as with bird fatalities, accidental findings resulted in further study and a large literature. So, it is unlikely that large numbers of dead bats would be overlooked if they were present.

One of the only references to bat fatalities at communication towers is that of Crawford and Baker (1981) who noted 54 bats of seven species recovered at a 1,000+ foot (305 m) communication tower in northern Florida. The period of study was 25 years, which means about 2 bats per year were killed by this tall, guyed tower. Guy wires at this tower extend more than 750 feet outward from the base of the tower and there is more than a mile of guy wire at that tower. The study of fatalities at this tower is perhaps the most exhaustive of any tower study. At the same tower, many thousands of dead birds (mostly night migrants) were found during the same time period. Unlike bird fatalities, bat fatalities appear to occur as isolated incidents as opposed to large-scale fatality events. In other words, most fatalities are reported as single collisions during a single night. No large-scale fatality incidents have been reported from communication towers.

A study of 3 guyed communication towers that were all in excess of 1,000 feet in height, Clark and his research team have found only 3 bats in 35 years of annual searches near Buffalo, New York (Arthur Clark, retired, Buffalo Museum of Science). The towers each had multiple red FAA lights. It is significant that there are many bats in that area and that large numbers of bats migrate through that area each year.

At an ongoing study of 23 communication towers in Michigan between about 400 and 1,050 feet, more than one-half of which are guyed and all of which are lit with FAA lights, only three bats have been found dead in nearly two years of study (Dr. Joelle Gehring, Central Michigan University, personal communication and report to the U.S. Fish and Wildlife Service Communication Tower Working Group, April 2005). The species involved were hoary bat, little brown bat, and big brown bat. One of those fatalities was at an unguyed communication towers. Because this is the only reported fatality of a bat found at an unguyed communication tower, there is also the possibility that this bat did not die as a result of a collision with the tower. Bats can and do roost on man-made structures and it could have died of natural or non-collision causes.

Studies conducted at guyed meteorology towers at wind power projects mostly about 120-160 feet in height with and without guy wires and no FAA lights, have revealed no fatalities. Overall, the number of bats found dead at communication and other guyed and unguyed towers is so small as to be discountable.

It is important to note that at all studies at which bat fatalities have been studied or reported from North America, there are more species of bats than in Hawaii and their densities/abundances are much greater than Hawaiian Hoary Bat is in Hawaii. Moreover, there are many species of bats that migrate for tens to hundreds of miles in North America, which puts them at greater risk of collision than Hawaiian Hoary Bats because they must fly over or close to thousands of towers during migration. As with songbirds, if bats were colliding with communication towers in significant numbers, they would likely be noticed and reported. Interestingly, it is during the bat migration season, mostly in August and early September that a vast majority of wind turbine fatalities are found. It is also in late August through September that searches for dead migrants are conducted at communication towers.

There does not seem to be evidence that bats are attracted to FAA lighting on wind turbines. At the West Virginia Mountaineer Wind Energy Center, the number of bats killed per turbine was the same for turbines with and without FAA flashing red lights (Kerns and Kerlinger 2004, Arnett et al. 2005). Similar comparisons exist for several other wind power sites. FAA lights have, therefore, never been documented to attract bats to communication towers and, therefore, have not caused collisions with those towers.

Based on known and documented collision risk to Hawaiian Hoary Bats and other species of bats at communication towers and other non-moving structures, it is highly unlikely that these bats will collide with the Island Airwaves Koloko Tower. Therefore the Tower *may affect, but is not likely to adversely affect* this species.

VI. CUMULATIVE EFFECTS

The effects of unrelated private, state or local activities that are reasonably certain to occur within the action area are *cumulative effects*, but do *not* include future federal actions. 50 C.F.R. § 402.02. As defined in the regulations, "effects of the action" does *not* include the "environmental baseline" and "cumulative effects." 50 C.F.R. § 402.02. Unlike the environmental baseline, however, both cumulative effects and effects of the action are considered in evaluating the impacts of the Proposed Action on a listed species or its habitat would amount to jeopardy. 50 C.F.R. § 402.14(g)(3)-(4); see also 51 Fed. Reg. 19,933 (1986).

No other private, state, or local actions are anticipated to occur within the action areas; thus, cumulative effects of any such additional projects are not considered within this BA.

VII. CONCLUSION

Based on the preceding analyses, information, and data, the Proposed Action (i.e., operation and maintenance of the Tower) *may affect, but is not likely to adversely affect* the Newell's Townsend's Shearwater (*Puffinus auricularis newelli*), Hawaiian Hawk (*Buteo solitarius*) and the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*).

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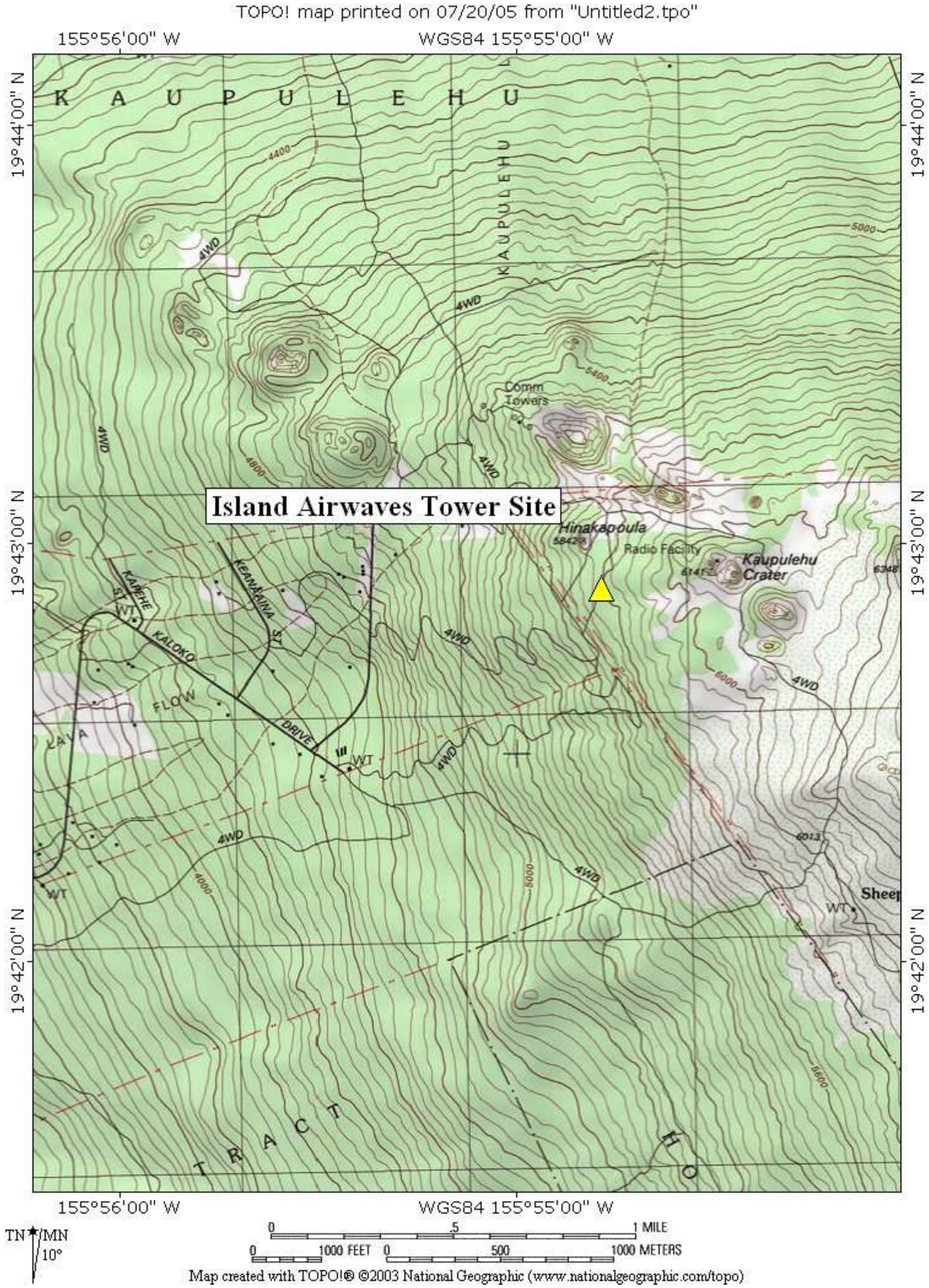
Figure 1. Location of the Island Airwaves Tower site, Island of Hawaii (wide view showing general location of tower and surrounding topography.

Figure 2. Topographic map of the Island Airwaves Tower site, including local topography and proximity to Kaupulehu Crater.



Attachment B

BIOLOGICAL ASSESSMENT
FOR THE
OPERATION AND MAINTENANCE
OF ISLAND AIRWAVES TOWER
ASR No. 1009097, FCC File No. 0352920
(Glenwood, HI)

Prepared for:

Island Airwaves Inc.

And

The Wireless Telecommunications Bureau,

Federal Communications Commission

I. INTRODUCTION

A. Purpose of the Biological Assessment.

The purpose of this Biological Assessment ("BA") is to address the potential effects of the ongoing operation and maintenance of Island Airwaves, Inc. ("Island Airwaves") tower, ASR No. 1009097, FCC File No. A0352920 ("Tower"), on any species or critical habitats listed or proposed under the Endangered Species Act ("ESA"), 16 U.S.C. 1531 *et seq*. The BA also is part of the informal consultation process initiated under Section 7 of the ESA for the Tower in 2004. Species biology, presence, and effects determinations for this BA were prepared utilizing data and information assembled by Paul Kerlinger, Ph.D, Curry & Kerlinger, L.L.C. Other preparers of the BA include Patrick W. Ryan, Perkins Coie LLP.

The Tower is an existing 313 ft. (95.6 meters) guyed telecommunication tower located to the north (Hilo side) of North Glenwood Road, approximately 1 1/2 miles west of Volcano Highway, Ola'a, Puna, Hawaii. See Figures 1 & 2. Records indicate the Tower was constructed in 1996 following its registration by the Federal Communications Commission ("FCC"). The Tower is situated on a 5.344 acre parcel, and is enclosed by an eight foot high chain link fence. The Tower is more fully described in Section II below.

Pursuant to Section 7(a)(2) of the ESA, federal agencies are obligated to ensure their actions, and actions they license or authorize, are not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. 16 U.S.C. § 1536(a)(2). Federal actions include a broad variety of activities funded, authorized, or carried out by federal agencies, including the granting of licenses. 50 C.F.R. § 402.02. When a federal agency proposes an action (such as issuing a license) that may affect a listed species or its critical habitat, it must consult with U.S. Fish and Wildlife Service ("USFWS" or "Service") either formally or informally.

In accordance with Section 7 of the ESA, the FCC is required to consult with the Service to ensure that its actions will not jeopardize the continued existence of federally-listed or proposed species or result in adverse modification of designated critical habitat. For purposes of informal Section 7 consultations, including the preparation of biological assessments, the FCC programmatically designated its tower license and registration applicants as "non-federal representatives" of the agency in 2002.

A biological assessment evaluates the potential effects of an action on federally-listed species or designated critical habitat, and determines whether the species or habitat is likely to be adversely affected by the action. A biological assessment may also evaluate effects on federally proposed species, but this is at the action agency's discretion unless the project would jeopardize the continued existence of the federally proposed species. A biological assessment is considered part of the informal consultation process for non-major federal construction projects, such as the Tower.

When a federal agency determines, through a biological assessment or other review, that its action is not likely to adversely affect a listed species, the federal agency may proceed with the action under review with the Service's written concurrence. If the federal action agency

determines that the subject action is likely to adversely affect a listed species or its designated critical habitat, the agency submits a request for formal consultation to the Service. A formal consultation results in a biological opinion, written by the Service, which contains an incidental take statement if the federal action is reasonably certain to result in the otherwise prohibited "take" of a listed species.

This BA is prepared in accordance with the requirements set forth under Section 7 of the ESA and implementing regulations (16 U.S.C. § 1536, 50 C.F.R. pt. 402), and ESA guidance contained in the Endangered Species Consultation Handbook (U.S. Fish and Wildlife Service and National Marine Fisheries Service, 1998). Utilizing the best science and commercial data available, the BA evaluates the effects to federally listed and proposed species from the operation and the maintenance of the Tower, as described in the Description of the Proposed Action below.

B. Species Covered in this Document.

The Service has identified five federally-listed species that may be present within the vicinity of the Tower (Table 1). The potential effects to these species are addressed in this BA, and summarized below.

Table 1. List of federally listed and proposed species, their federal status, and critical habitats examined in this BA.

SPECIES	CURRENT STATUS	CRITICAL HABITAT
Birds		
Newell's Shearwater (*Puffinus auricularis newelli*)	Threatened	N/A
Hawaiian Hawk (*Buteo solitarius*)	Endangered	N/A
Hawaiian Goose (*Branta (=Nesochen) sandvicensis*)	Endangered	N/A
Hawaiian (Dark-rumped) Petrel (*Ptreodrama phaeopygia sandwhichensis)*	Endangered	N/A
Mammals		
Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)	Endangered	N/A

Effects to these species are analyzed taking into consideration both the effect of the Proposed Action, interrelated and interdependent actions, and cumulative effects, as described herein.

C. Summary of Conclusions.

Formal consultation under Section 7 of the ESA is not necessary for federally-listed species not likely to be adversely affected by a federal action. The following is a summary of the conclusions presented in this BA regarding the combined effects of the Proposed Action, interrelated and interdependent actions, and cumulative projects, on each potentially affected species and designated critical habitat. The conclusions in this BA are based on the best scientific and commercial data available and are intended to assist the Service in reaching its own determinations regarding the effects to each species and critical habitat.

Table 2. Effects Determinations.

SPECIES	EFFECTS DETERMINATION OF PROPOSED ACTION
Birds	
Newell's Shearwater (*Puffinus auricularis newelli*)	**Not Likely To Adversely Affect**
Hawaiian Hawk (*Buteo solitarius*)	**Not Likely To Adversely Affect**
Hawaiian Goose (*Branta (=Nesochen) sandvicensis*)	**Not Likely To Adversely Affect**
Hawaiian (Dark-rumped) Petrel (*Ptreodrama phaeopygia sandwhichensis)*	**Not Likely To Adversely Affect**
Mammals	
Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)	**Not Likely To Adversely Affect**

II. DESCRIPTION AND HISTORY OF THE TOWER

The Tower is an existing 313 ft. (95.6 meters) guyed lattice telecommunication tower located to the north (Hilo side) of North Glenwood Road, approximately 1 1/2 miles west of Volcano Highway, Ola'a, Puna, Hawaii. See Figures 1 & 2. The Tower was constructed and became operational in January 1996. The Tower is registered with the FCC's Antenna Structure Registration System ("ASRS"), No. 1009097, and was granted a Special Permit by the Planning Commission, County of Hawaii, after a public hearing and thorough review by local and state agencies, including the Dept. of Land and Natural Resources and its Division of Forestry and Wildlife. According to requirements by the Federal Aviation Administration ("FAA"), the Tower is painted flat white with international orange.

The implementing regulations of Section 7 do not require any specific contents of a BA. 50 C.F.R. § 402.12(f). On May 27, 2005, however, the FCC provided a list of details necessary to fully describe the Tower. The FCC also indicated that information contained in prior submissions to the agency may be incorporated by reference. For convenience, these prior submissions are appended to this BA.

A. Description of the Tower

Measurements of the Tower.

The Tower is approximately 313 ft. (95.6 meters) high, with three faces on the Tower each measuring 2' 10" wide. The Tower rests on a base approximately five feet high on a concrete pier. The overall height of the Tower above mean sea level is approximately 3,050 feet. The measurements of the Tower, including its site plan, are more fully described in App. 1, pg. 1 and Att. 1; App. 2, pg. 2 and Att. 1.

Guy wires.

The Tower contains a total of twelve guy wires. The guy wires are located at intervals of 60, 140, 200, and 280 feet, with diameters of 7/16", 7/16", 9/16", and 5/8" respectively. The radius of the six guy anchors is 240 feet. The guy wires and their anchors are fully described in App. 1, pg. 1 and Att. 1; App. 2, pg. 1 and Att. 1.

Lighting.

In compliance with FAA requirements, the Tower has a low intensity red beacon at the top that is 620 watts and flashes 40 time per minute, and two similar low-intensity red lamps located at 205 feet, and two more at 205 feet. The lighting is also described in App. 2, Att. 1.

Tower Type.

The Tower is a lattice tower, with each diagonal approximately 2'6" high. The configuration of the Tower is more precisely shown in App. 1, Att. 1.

Pictures of the Tower.

Pictures of the Tower and the surrounding environment are included in App. 2, Att. 2.

Antenna dimensions.

The top twenty-foot section of the Tower contains four cellular telephone antennas (measuring app. 4' x 10", and 8" deep); the next forty-foot section contains a four-bay FM antenna (each bay measuring app. 2' tall and protruding 46" from the Tower); the next twenty-foot section contains STL dishes (measuring app. 4' x 2'); and the next forty-foot section contain twelve cellular telephone antenna (measuring app. 4' x 10", and 8" deep), and one six-foot antenna. Pictures of the towers and their antennas are provided in App. 2, Att. 2.

B. Adjacent Lighting

As more fully described below, the area immediately surrounding the Tower is zoned as agricultural, and predominately used for single family dwellings intermixed with pasture lands. See App. 2, Att. 1. Island Airwaves is not aware of any unusual lighting in the area surrounding the Tower.

C. Above Ground Electrical Transmission Lines

The power to the Tower initially flows through the pre-existing overhead distribution lines utilized to supply power to the adjacent single family dwelling and then is delivered to the Tower through underground power lines at a delivery point at least 100 feet from the Tower. The configuration of the overhead lines and the delivery point to the Tower can be seen in the pictures contained in App. 2, Att. 2.

D. Description of Surrounding Area

The area immediately surrounding the Tower is zoned agricultural, and has been used as a cattle ranch since the 1970s. The property contains a single family residence that is located over 350 feet away from the Tower. The parcel is located at an elevation of 2,580 to 2,700 feet, at least 21 miles from the nearest coastline. There is kukuyu grass along with waiwai, ohia, and palm trees. The subject property is located approximately 1½ miles from Highway 11, and cannot be observed from the highway due to the heavily forested highway buffer.

Access to the site is from North Glenwood Road, which is a single-lane County road. The surrounding properties are also zoned agricultural and average from 11,550 square feet to 42 acres with single family dwellings intermixed with open pastures. The description and pictures of the surrounding area is contained in App. 2, Atts. 1 & 2. The topography of the area is also depicted in Figure 2.

III. ENVIRONMENTAL BASELINE

The *environmental baseline* includes the past and present impacts of all Federal, state, or private actions and other human activities in the action area, the anticipated impacts of all proposed projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation in process. 50 C.F.R. § 402.02. The environmental baseline does not include the effects of the Proposed Action. The *action area* means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action.

For purposes of this BA, the "action area" is defined as the geographic location of the Tower. As described above, the Tower is located on a 5.344-acre parcel just off North Glenwood Road, approximately 1 ½ miles from Volcano Highway. The site is identified locally by its tax map key: 1-8-76: Portion of 9, and as described in Special Permit No. 1178.

The "environmental baseline" for this BA includes the environmental impacts from the construction and installation of the Tower. The building footprint for the Tower and its accompanying structures measures approximately a 4,315 square foot portion of a 5.344 acre parcel. The environmental baseline does not include the effects of the Proposed Action, as described below.

A. Baseline Descriptions of Species

To describe the biological baseline conditions for the species under consideration, the following summaries of pertinent biological information regarding Newell's Shearwater, Hawaiian (Dark-rumped) Petrel, Hawaiian Goose, Hawaiian Hawk, and Hawaiian Hoary Bat have been developed. For birds, the comprehensive species accounts recently published in The Birds of North America ("BNA"; *see* citations below) were the primary information source of information along with more recent information from the literature base. For all species, recovery plans and other biological information issued by the U.S. Fish and Wildlife Service ("USWFS") were consulted, when available.

Newell's Shearwater (*Puffinus auricularis newelli*):

The Newell's Shearwater is federally listed as threatened. 40 Fed. Reg. 17590 (April 21, 1975). There is no critical habitat designated for this species.

The Newell's Shearwater is a medium-sized Shearwater (30-35 cm in length, with a wingspan of 76-89 cm; Harrison 1985). It is dark, sooty brown above and generally white below. Newell's Shearwater occurs year-round in the tropical waters of the eastern Pacific Ocean, largely to the east and south of the Hawaiian Islands. It forages near tuna (*Thunnus*

spp.) in the open ocean, as well as other large predatory fish that push baitfish to surface waters. Newell's then captures the baitfish by pursuit-plunging, from flapping flight. The species has a stiff-winged flight such that birds plunge into the water at a low angle of attack and then swim under water on after their prey. While swimming their wings are partially closed. Prey when caught are swallowed. Newell's Shearwaters are referred to by commercial anglers as one of the "tuna birds."

Newell's Shearwater comes ashore from the open ocean only to nest. It nests in burrows dug by these animals or in deep rock crevices at high elevations (between 160 and 1,200 m on Kauai). It is known from only about 20 nesting colonies on the larger Hawaiian Islands. Some of these colonies are as much as 14 km inland, as is the case in Kauai. Its stronghold is Kauai, where nesting habitat, mostly in forests, has not been as severely disturbed or where forests have been removed. It also does not nest where mongoose are present.

Nesting colonies have been found on Hawaii and Moloka'i (see range map, from Ainley et al. 1997), and breeding may occur on O'ahu, Maui, and Lana'i. Newell's Shearwater was probably a common nester when humans colonized the islands, but habitat loss due to agriculture and urbanization, as well as lava flows, have reduced the population. Also, introduced predators such as mongoose, feral cats, pigs, and Barn Owls have helped to severely reduce this species' population. Its nesting is now often only on steep slopes with an open forest canopy and dense fern understory. It also nests on canyon walls where there is little or no tree canopy. Birds climb nearby trees and rock outcrops in order to take off.

Newell's Shearwaters fly to and from their breeding colonies only at night in synchronized flights, with most birds arriving and departing within about 30 minutes of each other. Radar studies appear to indicate that birds use flight corridors, particularly river valleys through the coastal mountains, to reach their colonies. Use of flight corridors may be a result of cloudy weather that frequently occurs in the Hawaiian Islands. During clear weather, birds are known to pass over ridges and outside of river valleys on Kauai (Day and Cooper 1995).

Newell's Shearwaters are likely to be monogamous. They require several years to become sexually mature and commence breeding at about six years of age. However, younger birds that are not sexually mature (from age two) visit the nesting colonies. Adults begin visiting their breeding colonies near the end of April and return to the colony regularly until about a week before chicks fledge, which is in early November. Incidence of nonbreeding is high. About one-half of all pairs that actively use burrows actually produce eggs and young each year. Pairs reunite in their burrows at the start of the breeding season for a courtship period lasting weeks that synchronizes schedules. Nesting birds then leave the colony for a period of two weeks, as females develop their eggs and males build up fat reserves to carry them through the first turn at incubation.

On Kauai, females lay one egg during the first two weeks of June. Incubation on Kauai was 62 days. Both parents incubated equally, with the male incubating first, on or within a day of the female, who laid eggs and left the nest. Chicks are attended for their first days of life by a parent, but after a few days they are fed irregularly. This is because parents must commute distances of, on average, 1,200 km (750 miles) to feed. Fledglings leave the nest in October

and their first flight away is often just after sunset. On their first seaward flight, Newell's fledglings are attracted to lights, leading to a phenomenon locally known as "fallout." Some or many young birds are attracted to the lights of urban areas, where they mill around lights until exhausted, at which times they crash land. An organization known as Save Our Shearwaters (SOS) was founded to rehabilitate these birds before they are released at sea.

Newell's Shearwaters are estimated to number about 84,000 individuals (range 57,000-115,000; Spear et al. 1995) or about 14,600 breeding pairs. Most nest on Kauai. Cooper and Day (1994) estimated that about 63,000 adults and older subadults visit the Kauai colonies. Reynolds et al. (1997) estimates the nesting population on the island of Hawaii at a few thousand birds. It is suspected that the species' population is decreasing, mostly because of introduced predators, as well as collisions with power lines, and mortality of fledglings as a result of fallout. Also, volcanic eruptions, lava flows, and hurricanes eliminate some nests and individuals. Fewer fledglings have been recovered during fallouts in the past decade.

The overall population of Newell's Shearwaters appears to be dependent on habitat free of alien predators and other factors that have increased mortality. In particular, power lines and coastal lighting, has taken its toll. Recent unpublished data appear to indicate that power-line collisions may take 0.6-2.1% of fledglings each year in southern and eastern Kauai. An average of 1,500 fledglings per fall is recovered for rehabilitation in urban areas during fallouts. This could account for 15% or more of the reproductive output of nearby colonies each year. Another factor that may be significant is the reduction of tuna numbers and schools that has resulted from greater commercial fishing pressure. With fewer tuna to push baitfish to the surface, these shearwaters must spend more time foraging or traveling over much greater areas to find food. These changes may have resulted in reduced feeding frequency or amount of food for chicks. The result is a reduction in successful reproduction. It is important to note that these factors can work cumulatively to reduce the survivorship and reproduction of this species.

Newell's Shearwater was federally listed as threatened in 1975. Solutions to reduce mortality include control of coastal lighting, burying of power lines, and exclusion of predators from breeding colonies. Other measures are being considered, but have not been pursued at this time. Efforts are needed to survey for unknown nesting colonies.

Hawaiian Hawk (*Buteo solitarius*):

The Hawaiian Hawk is federally listed as endangered. 32 Fed. Reg. 4001 (March 11, 1967). There is no critical habitat designated for this species.

Hawaiian Hawks (locally known as 'Io) are a small, broad-winged hawk (average total length of 41 cm for males, 46 cm for females). Although restricted to the island of Hawaii, it occurs throughout that island except high elevations, the northwest, and along the southern coast (see range map, from Clarkson and Laniawe 2000). Fossil evidence reveals that the Hawaiian Hawk occurred on Kauai, Maui, and Oahu, where it now does not nest, but is considered accidental. From the 1990s surveys have estimated the Hawaiian Hawk population at 1,600 (Hall et al. 1997) and 1,233 (USFWS 1998) individuals. Survey

techniques varied so there are few data to support an accurate assessment of population trends (Clarkson and Laniawe 2000). The species has high adult survival, slow maturity (late sexual maturity), delayed breeding, and high fidelity to nesting territories. Population numbers depend on the availability of suitable native and exotic nesting habitat (Griffin 1985).

The Hawaiian Hawk is a habitat generalist, nesting and foraging in a broad range of vegetation types: native forests at higher elevations (to 1,700 m during the breeding season, but sometimes higher on Mauna Kea during winter); exotic forests near sea level; and to agricultural areas with some large trees. The bird mostly nests in native trees.

Hawaiian Hawks have adapted to feeding on introduced species, including rats, birds, and insects, which make up the large majority of its prey items. Most hunting is from perches, with birds dropping or gliding downward on prey. Diving or stooping on prey during flight is infrequent and one study recorded that behavior only 8% of the time (Griffin 1985).

Hawaiian Hawk pairs maintain territories at their nests year-round. Home ranges vary widely, depending on habitat type – from 48 ha recorded in a papaya-guava orchard to 526 ha in closed-canopy native forest, to 608 ha in mid-elevation pasture (Griffin 1985). Pairs perform courtship displays during all months, with most displays occurring during April and May, at the onset of the breeding season. Birds will rise several hundred meters using upslope breezes and rapid wing beats while circling to gain altitude. High soaring flights are also used to defend territories.

Hawaiian Hawks are monogamous and do not nest every year. Low habitat quality may influence breeding success for some pairs, but the tendency to skip a breeding season may also be influenced by the prolonged dependency period of the juveniles (see below).

One egg is generally laid (rarely two or three) from about mid-April to mid-June, and incubation lasts at least 38 days. The young bird leaves the nest at about 59 to 63 days after hatching, remains close to the nest during the first two months, and then ranges widely within the parental territory until about six months, after which time it disperses from the natal site. A radio-telemetry study tracked one juvenile 15 km by eleven months after fledging. Juveniles are known to congregate at agricultural areas. Young birds probably do not breed until at least three to four years of age.

Degradation of habitat probably affected the historical Hawaiian Hawk population in a significant way, but the absence of historical population data make this difficult to assess. Introduced diseases (such as the avian malaria that decimated Hawaiian songbirds) have apparently not affected the Hawaiian Hawk. There is also no evidence that pesticides and other contaminants (secondary poisoning from rodenticides) affect birds significantly. Harassment of nesting birds and shooting may be the most significant factors directly affecting the Hawaiian Hawk, but their levels and effects are difficult to assess.

The Hawaiian Hawk was federally listed as endangered in 1967. On the basis of breeding studies, USFWS proposed down-listing the species to threatened status in 1993, but this proposal was withdrawn, pending further population and breeding surveys. The Hawaiian

Hawk Recovery Plan (USFWS 1984) recommends: 1) monitoring the population status; 2) maintaining suitable habitat for feeding and nesting, including conservation of remaining native forest habitat; 3) enforcing the prohibition of taking; and 4) evaluating the potential impacts of changes in pesticide use.

Hawaiian (Dark-rumped) Petrel (*Ptreodrama phaeopygia sandwhichensis*):

The Hawaiian (Dark-rumped) Petrel is federally listed as endangered. 32 Fed. Reg. 4001 (March 11, 1967). There is no critical habitat designated for this species.

The Dark-rumped Petrel (*Pterodroma phaeopygia*) ranges across much of the tropical Pacific and nests only in the Hawaiian and Galapagos archipelagos. It is one of the so-called gadfly petrels, a group of relatively small seabirds that have an erratic, swooping flight at sea. As with the twenty-five other species in the genus *Pterodroma*, the Dark-rumped Petrel feeds almost entirely on squid, fish, and crustaceans caught close to the sea surface. These birds also do much or a majority of their foraging at night when small organisms move closer to the ocean surface. These birds average about 43 cm in length and have a wingspan of about 98 cm (Simons 1985). Dark-rumped Petrels are dark grey above, have a white forehead and are white below with dark margins on the wings. The Hawaiian subspecies of the Dark-rumped Petrel (*P. p. sandwichensis*) breeds only in the Hawaiian Islands. It overlaps in range only slightly when at sea with the Galapagos Island subspecies (*P. p. phaeopygia*) (Spear et al. 1995).

The Hawaiian Petrel is known locally as the 'Ua'a because of its vocalizations at breeding colonies. It was once abundant throughout the larger Hawaiian Islands. So common was it that Bryan (1908, 1914) reported that its evening flights to breeding colonies on Molokai darkened the sky. Today the bird's population has declined significantly as a result of substantial ecosystem modification, primarily by prehistoric human populations from Polynesia (Olson and James 1982). The bird was eaten and relished by the Polynesians, but was for the exclusive use of chiefs (Henshaw 1902). The Hawaiian Petrel's population declined more quickly with the introduction of domestic cats, black and Norway rats, disease-carrying mosquitoes, and the mongoose by European colonists. It apparently no longer nests on Oahu (Olson and James 1982).

Hawaiian Petrels only leave the open ocean to nest. Confirmed and suspected breeding colonies are rare and occur mostly at higher elevations where there is less predation pressure. Nests have been found at high elevations on Maui and Hawaii, and vocalizing birds have been recorded during the nesting season on Lanai and Molokai. In addition, grounded fledglings have been found on Kauai. Maui appears to have the largest nesting colony – 450-600 nesting pairs, located in and around Haleakalä National Park (Simons 1984, 1985; Hodges 1994). These same scientists estimate a total population of about 1,800 birds.

Recent surveys on Hawaii by Hu (1995) suggest 40-50 pairs of Hawaiian Petrels breed at 2,400 and 2,700 m ASL. These are located along the southwestern rift and on the southeastern slope of Mauna Loa Volcano. There are also breeding records from the southeast slope of the Mauna Kea Volcano (five active burrows found by Richardson and

Woodside, 1954) and from the southwestern rift of Mauna Loa and in or near Hawaii Volcanoes National Park (small groups found or suspected by Banko, 1980). On Lana'i, Shallenberger (1974) and Hirai (1978) reported a potentially sizeable population along the ridges of Kumoa Gulch at 825 m. Simons (1983) heard an estimated 50 birds calling at this location. On Moloka'i, USFWS survey teams have heard five to ten calling birds along the upper southeast corner of the Wailau Valley. On Kauai, estimates of birds flying inland in the evening (Day and Cooper 1995 and Ainley et al. 1995) appear to indicate a breeding population of hundreds to thousands of pairs. Fledglings have been picked up under coastal lights during "fallout" events involving Newell's Shearwater (see above).

The Hawaiian Petrel begins to arrive at its breeding sites on Maui in mid-February and all birds leave the island before the end of November (Simons 1985). It is estimated that birds are five to six years of age when first breeding, and 89% of adults breed every year (Simons 1984). Younger birds visit the colonies and engage in breeding behavior, such as digging burrows and calling. Beginning in March, birds make a penetrating, resonating call from which its local common name ('Ua'u) derived. It appears that birds vocalize while flying back and forth over the breeding colony site. Vocalizations commence one-hour after sunset and peaks two to three hours later. Most birds stop calling by 1:00 AM (Simons 1985). Vocalizations decline in April during the prelaying absence. At this time apparently monogamous adults feed heavily at sea to store nutrient and fat reserves for egg-laying and incubation. Vocalizing increases again in May as egg-laying begins and continues steadily until mid-August, when it declines abruptly. The reason for the abrupt decline is that non-breeders and failed breeders apparently leave the colony.

Breeding is highly synchronized, with eggs being laid in early May, hatching in late June-early July, and fledging in October. The cycle is similar to other seabirds, including Newell's Shearwaters. Males incubate first, arriving just after the female lays one egg. On Maui at Haleakalä, incubating birds sleep for about 95% of the time they are on eggs (Simons 1985). This is an adaptation to reduce metabolic cost in a cool, arid, high-altitude nesting environment (Simons and Whittow 1984). Chicks are more active than adults, spending less time sleeping, presumably to stay warm and to stimulate muscle and feather development.

It is estimated that adults range 1,500 km from the Hawaiian Islands during breeding season (Spear et al. 1995). Nutrition for young is concentrated in stomach oil, an adaptation to the unpredictable and widely dispersed food supply upon which *Pterodroma* Petrels and other procellariform birds rely. The Hawaiian Petrel is generally not seen in Hawaiian waters from December to March. Records in the western Pacific and off the coast of North America appear to indicate that juveniles disperse widely after fledging.

Like the Newell's Shearwater, Hawaiian Petrels appear to use flight corridors to reach their breeding sites. On Kauai, Day and Cooper (1995) measured flight altitudes at between 10 and 700 meters above ground level (AGL), with an average of 192 meters AGL.

The Hawaiian Petrel was listed as federally endangered in 1967. Its greatest threat has been predation by introduced predators such as black rat, Norway rat, domestic cat, and Indian

mongoose. Predator control at breeding colonies is critical to survival. Such control has been adopted by the National Park Service at the Haleakalä colony. However, where predators are not controlled populations are declining quickly. The current rate of predation is threatening the population in southeastern Mauna Loa and those nesting colonies may disappear in the short term (Hu and Glidden 1997).

Use of audio playbacks and artificial burrows may help concentrate nesting Hawaiian Petrels in areas that are more easily managed with respect to predators and other disturbances. Collisions with power lines and some other human structures along flight routes results in occasional mortality. A predator control fence had to be moved at the National Park Service's Haleakalä colony when it caused mortality. Another human-related source of mortality is bright lighting in coastal, which attracts recently fledged young. Some young Hawaiian Petrels are recovered in urban areas during fallouts that usually involve Newell's Shearwater (see description of Newell's Shearwater).

It is important that the size of the Kauai nesting population be determined, which may be sizeable, to serve as a guide to conservation priorities for this species and their habitats. Another priority for long term protection of Dark-rumped Petrels is control of mongoose out of Kauai, as are measures to limit the spread and effects of coastal lighting. Predator control at all colonies is essential.

Hawaiian Goose (*Branta (=Nesochen) sandvicensis*)

The Hawaiian Goose is federally listed as endangered. 32 Fed. Reg. 4001 (March 11, 1967). There is no critical habitat designated for this species.

Known to Hawaiians as Nënë, the Hawaiian Goose is considered one of the world's most isolated, sedentary, and endangered waterfowl (Banko et al. 1999). This medium-sized goose (63-69 cm long) has a black face and crown, cream-colored cheeks, a pale neck streaked with black, and a barred brown body. As with other island bird endemics, the Nënë has longer, stronger legs, a more erect posture, and reduced webbing between its toes as compared to mainland waterfowl. These adaptations are for life on islands that have limited freshwater habitats. These adaptations also allow browse higher in the vegetation on the fruits, seeds, and foliage as well as to walk and run over rugged terrain. Mainland waterfowl migrate and fly longer distances and do not need longer, stronger legs.

The Nënë is endemic to the Hawaiian Islands and probably occurred on all or most of the Hawaiian Islands (Olson and James 1991). Currently, it occurs on Hawaii, Maui, Kauai, and Molokai, a distribution determined largely by the locations of release sites of captive-bred birds (Banko et al. 1999). Estimated populations are 349 individuals on Hawaii (mainly at Hawaii Volcanoes National Park and adjacent lands), 336 on Maui (principally at Haleakalä National Park in East Maui, but birds have been reintroduced at Hana'ula in West Maui), 564 on Kauai (at Hanalei and Kïlauea Point National Wildlife Refuges, Kïpü Kai, and Nä Pali Coast), and 55 on Moloka'i (captive-bred Nënë released since December 2001 at the Puu O Hoku Ranch as part of a Safe Harbor Agreement; USFWS 2004).

Prior to human colonization of Hawaii, the Nënë probably was a grassland species that also used grassy shrublands, and dryland forest. Nesting occurred primarily in the leeward lowlands (below 700 m) during the winter months. This occurred at the same time as winter rains, which made food more available and nutritious). Birds moved to montane habitats (above 900 m) in the nonbreeding season (USFWS 2004). These traditional movement patterns may be considered migrations and have been lost because of habitat modification in the islands. It is also possible that the introduction of predators and the consequence of the necessary reintroduction of Nënës using captive stock to maintain populations have reduced their seasonal mobility.

At this time, Nënës occur at elevations ranging from sea level to 2,500 m in golf courses, pastures, and rural areas, which are nonnative grasslands. They also occur in sparsely vegetated, high-elevation lava flows; cinder deserts; native alpine grasslands and shrublands; open native and nonnative alpine shrubland-woodland community interfaces; mid-elevation (700-1,200 m) native and nonnative shrubland; and early successional cinderfall (USFWS 2004).

Some birds nest and reside below 600 m on Hawaii and Maui, although lowland habitats on these islands are largely unsuitable because of changes in vegetation and abundant predators (Banko and Elder 1990). Hawaii and Maui birds now move within mid- and high-elevation habitats. On Kauai, Nënë move between lowland agricultural and other modified habitats near the coast, generally traveling less than 13 km (Tefler 1996).

Nesting season for Nënë is during the rainy season, between October and March. Adults are monogamous and they nest on the ground. Most nesting takes place in December and goslings hatch mostly in December and January (Banko et al. 1999). In the 1980s, Nënë were recorded nesting primarily close to sites where birds were released (Banko 1988). As their numbers and density increased, birds have been dispersing, resulting in colonization new breeding areas (Woog 2000) that have expanded their nesting range in recent years.

Nënës are weak fliers because of high wing loading. Their wing area is 16% less than that of a Canadian Goose. Nevertheless, they are capable of both inter-island and high altitude flight. Birds generally fly within 100 m of the ground, unless launching from high ridges and sailing over valleys. The flight pattern is described as steep and spiraling with acrobatic "barrel rolls" having been observed (Banko at al. 1999). Because of their high wing loading and relatively short wings, they are not aerodynamically adept. Inter-island records are few, with 10 Nënë recorded having flown from Maui to Hawaii and one Nënë flew in the opposite direction (Banko and Elder 1990). Daily flights between roosting and feeding sites are well recorded on Hawaii, where birds regularly flew less than 10 km, generally departing in the morning (7:30 to 9:30 AM) with a return flight in the late afternoon (4:30 to 6:30 PM) during a ten-week period between June and September. These flights are less predictable later in the season (Banko et al. 1999). In the nesting season, birds molt after which they cannot fly. However, adults and goslings can climb, walk, and run well over lava and steep terrain, as well as through the dense vegetation.

Primary limiting factors affecting the Nënë are predation by introduced animals, insufficient nutritional resources for breeding females and goslings, limited availability of suitable habitat, and human-caused disturbance and mortality (USFWS 2004). USFWS singles out collisions with automobiles as a significant source of human-caused mortality, but it does not mention collisions with power lines as a factor. Other limiting factors are associated with small population sizes, captive origination of many birds, and genetic homogeneity. Avian disease may also be a factor. The USFWS main recovery objectives are: 1) Self-sustaining populations on Hawaii, Maui Nui (Maui, Molokai, Länai, Kaho'olawe), and Kauai; and 2) Identification of sufficient suitable habitat, that is protected and managed to sustain the targeted Nënë population levels on each island. The second objective includes predator control, improving lowland habitats so they are suitable to these birds, improving nutrition via habitat management, and limiting human-caused disturbance and mortality. Captive propagation and reintroduction will continue to be integral to the recovery program.

Hawaiian Hoary Bat (*Lasiurus cinereus semotus*):

The Hawaiian Hoary Bat is federally as endangered. 35 Fed. Reg. 16047 (October 13, 1970). There is no critical habitat designated for this species.

The Hawaiian Hoary Bat is the only land mammal native to the Hawaiian Islands. It is an endemic subspecies of Hoary Bats that occur in North and South America. It is a medium-sized bat (wingspan of 26.9-34.6 cm) that feeds exclusively on insects caught in the air at night. Females are nearly 25-30% larger than males, averaging 17.9 grams (0.6 ounces) as compared with 14.2 grams (0.5 ounces) (USFWS 1998). Its Hawaiian name is *'ope'ape'a*.

The Hawaiian Hoary Bat occurs on Hawaii, Maui, Oahu, Kauai, and Molokai, but they are only observed regularly on Hawaii, Kauai, and Maui (USFWS 1998). Population numbers are not known with certainty, but the bat is believed to have declined in numbers over the past 100 years as a result of deforestation. On Hawaii, bats have been observed from sea level to about 4,000 m (13,200 feet; various sources cited in USFWS 1998) in both wet and dry areas of the island. Hoary bats are probably more abundant on the drier leeward side of the island (Jacobs 1994).

It appears that Hawaiian Hoary Bats forage and roost in both native and nonnative vegetation (various sources cited in USFWS 1998), so their habitat selection is not restricted to native habitats. Foraging heights are generally from one to more than 150 m (3 to 500 feet) above open areas, near native forest edge, and over open water (various sources cited in USFWS 1998). A radar study of nocturnal seabird flights on the windward side of the island of Hawaii, demonstrated Hawaiian Hoary Bats were at eight of eleven sampling sites at rates ranging from 0.03 to 0.28 bats/minute (Reynolds et al. 1997). The diet of these bats is apparently diverse, without the strong selection for moths noted in some studies of the North American subspecies (Jacobs 1993a).

Comprehensive studies of the Hawaiian Hoary Bats have not been undertaken, but studies summarized by the USFWS (1998) addressed different aspects of the bat's life history and ecology. Hawaiian Hoary Bats are solitary and roost in foliage in trees. Jacobs' (1993b)

radiotelemetry research showed some roost site fidelity, with bats departing these sites shortly after sunset and returning before midnight. Menard (2001) has found that bats on the island of Hawaii may migrate elevationally, with both sexes spending the April to August breeding period in the lowlands (sea level to approx. 1,300 m), after which males move into the highlands (approx. 1,550 to 1,900 m).

Pregnant bats have been reported on Hawaii and Kauai (Kepler and Scott 1990), and breeding apparently occurs between September and December. Two young are born in May or June. Lactating females have been found between late June and early August and individuals captured September through December had completed lactating (Tomich 1986).

The Hawaiian Hoary Bat was federally listed as endangered in 1970. According to the USFWS recovery plan (1998), important threats to the Hawaiian Hoary Bat include habitat destruction (elimination of roosting sites) and may also include direct and indirect effects of pesticides, introduced insects, and disease. The principal recovery goal is to determine the bat's population status and habitat requirements, so that effective management measures can be developed.

IV. DESCRIPTION OF THE PROPOSED ACTION

The USFWS has identified five listed species to consider for effects from the Tower. As discussed previously, impacts from construction and installation of the Tower is considered part of the environmental baseline for purposes of this BA. This BA is intended to assess the effects to ESA-listed species and critical habitats from the ongoing operation and maintenance of the Tower. The *operation* of the Tower means its post-constructed existence. Potential effects under consideration from the operation of the Towers primarily focus on avian collisions.

The *maintenance* of the Tower means the ongoing activities necessary for the continuation, safeguarding, and upkeep of the Tower. The tower is virtually unmanned and there is minimal maintenance activity at the site. Such activity includes periodic visitation by technicians and minimal trimming of vegetation near and around the tower base and guy anchors.

V. EFFECTS OF THE PROPOSED ACTION ON SPECIAL STATUS SPECIES

The *effects of the action* that will be added to the environmental baseline are the proposed action's immediate impacts on the species (*direct effects*) and those impacts that are reasonably certain to occur in the future (*indirect effects*). They also include the effects of any "other activities that are interrelated or interdependent with" the project. 50 C.F.R. § 402.02. The test for interrelatedness or interdependentness is "but for" causation: but for the federal project, these activities would not occur. 51 Fed. Reg. 19,932 (1986).

Newell's Shearwater (*Puffinus auricularis newelli*)

For purposes of this BA, the primary potential effects to consider from the Proposed Action on the Newell's Shearwater include collisions with the Tower and disturbance of nesting areas.

The habitat at the Glenwood site does not appear suitable for nesting of Newell's Shearwater. The site is a mixture of pasture (cows and horses) and is classified as "Other Important Agricultural Lands." The vegetation includes kukuyu grass and waiwai, ohia, and palm trees. There are feral pigs on the property at times as well. There are also houses in the vicinity. Together these features are unlike the forests in which the Newell's Shearwater nests. Those forests include an open canopy with a dense understory of ferns, on the island of Hawaii. Therefore, Newell's Shearwaters are not likely to nest on or near the site because there is already too much disturbance, and the soils and vegetation would not be appropriate for these birds.

Furthermore, the nesting areas of this species, as per a map in Ainley et al. (1997) show that the species does not nest at or near the Tower site. It nests to the south of the Tower in a strip along the shoreline on Hawaii, and at the far northern end of that island. It appears to nest in Puna Forest Preserve and Hawaii Volcanoes National Park, both of which are located to the south of the Tower site.

Together, the fact that the Tower site does not have habitat that could support nesting by Newell's Shearwater and that the species distribution maps do not show nesting colonies within many miles of the Tower site, indicate that the species is not likely to be found nesting at or near the Glenwood site. However, Shearwaters could fly over the on unusual or rare occasions, while flying to and from the ocean and their inland nesting sites. A radar study by Day et al. (2003) did not show high passage rates of shearwaters, petrels, or other targets at eastern and southeastern survey sites on Hawaii as opposed to more northerly sites along the coast. It is possible that these birds do not fly over the Glenwood site because the site is further inland from the nesting areas that exist near the southeastern coastline. Direct flights from the ocean would not likely cross the tower site.

There is little scientific evidence that seabirds, including shearwaters, collide with towers and guy wires. Seabirds have not demonstrated a susceptibility to colliding with these structures. A report from the American Bird Conservancy (Shire et al. 2000) included the most comprehensive quantitative list of bird fatalities at guyed communication towers. That list is a species by species account that reveals a vast majority of the birds that collide with towers are night migrating songbirds. The fatality of these songbirds at communication towers is what has received attention from bird watchers and some environmental agencies. A compilation of species from 47 studies by Shire et al. failed to demonstrate almost any risk to seabirds. Shire et al. (2000) did not summarize all papers in the literature so this author has reviewed other papers in the literature including those cited by the USFWS reviews (Avery et al. 1980 and by Trapp 1998; Kerlinger 2000) that were not included in the Shire et al. (2000) compilation. Those other studies also do not provide evidence that seabirds collide with communication towers, or at least collide with communication towers regularly enough for confirmation of fatalities. Because there are thousands of communication towers that are much taller than the Glenwood Tower located in areas where there are seabirds, they could

be attracted to shore. However, because such events have not been documented, it is reasonable to conclude that these birds are not likely to collide with guyed communication towers. Apparently, only one seabird, a Black-capped Petrel (Shire et al. 2000), has reportedly collided with a tall, guyed communication tower. More importantly, there are no readily available accounts of seabirds in Hawaii, including Newell's Shearwater, colliding with towers. Therefore, there is no reason to believe that Newell's Shearwaters are susceptible to colliding with communication towers.

Seabirds, such as Newell's Shearwaters among others, are attracted to bright lights, such as those common on street and highways, stadiums, and even ships. Shearwaters, when attracted to bright lights fly in circles around the lights until they either are exhausted and land or collide with structures, including electrical transmission or distribution lines (Cooper and Day 1998). These transmission lines are often unlit. The fact that transmission lines are often oriented perpendicular to the flight path of Newell's Shearwaters and other seabirds as they fly inland to nesting colonies from the ocean in darkness, suggests they are far more risky to these birds than guyed communication towers. The normal configuration of transmission lines is within a vertical area 2 to 6 m tall (Cooper and Day 1998). These power lines run for thousands of miles on Hawaii, whereas the guy wires of the Tower extend only about 200 feet from the base of the tower. This means that, even if Newell's Shearwaters fly in the vicinity of the Glenwood Tower site, the probability of them colliding with the Tower or its guy wires is exceedingly small in comparison with transmission lines.

The vast majority of the collisions of birds with guyed communication towers results from the attraction of FAA or other types of lighting on or near the structure. The review by Avery et al. (1980) and many other papers in the literature have demonstrated that the FAA lights on communication towers attract night migrating songbirds resulting in multiple fatalities in a single night. These guyed towers involved in these multiple fatality events are usually greater than 500 feet and lit with steady burning and flashing red FAA lights. That there do not seem to be multiple fatality events of seabirds at structures lit with FAA type lights, unlike the case with songbirds, strongly suggests that these lights do not attract seabirds. Thus, there is no evidence that Newell's Shearwaters are attracted to FAA lights like those on the Tower, i.e., a low intensity red beacon at the top that is 620 watts and flashes 40 time per minute, and two similar low-intensity red lamps located at 205 feet, and two more at 205 feet.

The literature does not include communication towers as a known or potential threat to Newell's Shearwater. With respect to another communication tower in the Hawaiian islands, Thomas Telfer, a retired District Wildlife Manager with the Department of Land and Natural Resources, Division of Forestry and Wildlife, State of Hawaii, concluded that FAA lighting of the type used on communication towers (red flashing combined with red steady burning) were not bright enough to attract seabirds such as Newell's Shearwater. Telfer, while working for the state of Hawaii, actually searched a tower on Kauai on two occasions but did not find any dead birds. His opinion was stated in an affidavit submitted on behalf of another tower owner in 2004 to the FCC. Although his comments were made in reference to a tower on Kauai, they were general with respect to the lighting and the impact of communication towers on seabirds.

It is concluded that the Tower *may affect, but is not likely to adversely affect* the Newell's Shearwater.

Hawaiian (Dark-rumped) Petrel (*Pterodroma phaeopygia sandwichensis*):

For purposes of this BA, the primary potential effects to consider from the Proposed Action on the Hawaiian (Dark-rumped) Petrel include collisions with the Tower and disturbance of nesting areas.

The habitat at the Glenwood site does not appear suitable for nesting of Hawaiian Petrels. The site is a mixture of pasture (cows and horses) and is classified as "Other Important Agricultural Lands." The vegetation includes kukuyu grass and waiwai, ohia, and palm trees. There are feral pigs on the property at times as well. There are also houses in the vicinity. Together these features are unlike the high elevation montane forests in which the Hawaiian Petrel nests. Hawaiian Petrels, therefore, are not likely to nest on or near the site.

More importantly, the nesting areas of this species, according to a distribution map published in Ainley et al. (1997) show that the species does not nest at or near the Tower site. It nests to the north and west of the tower in mountainous areas with much higher elevations.

Together, the fact that the Tower site does not have habitat that could support nesting by Hawaiian Petrel and that the species' nesting colony distribution is not within several miles of the Tower site, indicate that these petrels are not likely to nest at or near the Glenwood Tower site. Petrels, however, could fly over the Glenwood site on occasion as they fly between the ocean and their high elevation nesting sites. A radar study by Day et al. (2003) did not show high passage rates of shearwaters, petrels, or other targets at eastern and southeastern survey sites on Hawaii as opposed to more northerly sites along the coast. Direct flights from the ocean might cross the Tower site.

There is little scientific evidence that seabirds, including petrels, collide with towers and guy wires. Seabirds have not demonstrated a susceptibility to colliding with these structures. A report from the American Bird Conservancy (Shire et al. 2000) included the most comprehensive quantitative list of fatalities of birds at guyed communication towers. That list is a species by species account that reveals a vast majority of the birds that collide with towers are night migrating songbirds. The fatality of these songbirds at communication towers is what has received attention from bird watchers and some environmental agencies. A compilation of species from 47 studies by Shire et al. failed to demonstrate almost any risk to seabirds. Shire et al. (2000) did not summarize all papers in the literature so this author has reviewed other papers in the literature including those cited by the U.S. Fish and Wildlife Service reviews (Avery et al. 1980 and by Trapp 1998; Kerlinger 2000) that were not included in the Shire et al. (2000) compilation. Those other studies also do not provide evidence that seabirds collide with communication towers, or at least collide with communication towers regularly enough for confirmation of fatalities. Because there are thousands of communication towers that are much taller than the Glenwood Tower located in areas where there are seabirds, they could be attracted to shore. However, because such events have not been documented, it is reasonable to conclude that these birds are not likely

to collide with guyed communication towers. Apparently, only one seabird, a Black-capped Petrel (Shire et al. 2000), has reportedly collided with a tall, guyed communication tower. More importantly, there are no readily available accounts of seabirds in Hawaii, including the Hawaiian Petrel, colliding with towers. Therefore, there is no reason to believe that this species is susceptible to colliding with communication towers.

Hawaiian Petrels, among other seabirds, are attracted to bright lights, such as streetlights on highways and parking lots, stadiums, and on ships. Seabirds, when attracted to bright lights fly in circles around the lights until they are exhausted and land or collide with structures, including electrical transmission or distribution lines (Cooper and Day 1998). These transmission lines are often unlit. The fact that transmission lines are often oriented perpendicular to the flight path of Hawaiian Petrel, and other seabirds, as they fly inland to nesting colonies from the ocean in darkness, makes them far more risky than guyed communication towers. The normal configuration of transmission lines is within a vertical area 2 to 6 m tall (Cooper and Day 1998). These power lines run for thousands of miles on Hawaii, whereas the guy wires of the Tower extend only about 200 feet from the base of the tower. This means that, even if Hawaiian Petrels fly in the vicinity of the Island Airwaves Glenwood Tower site, the probability of them colliding with the Tower or guy wires is exceedingly small in comparison with transmission lines.

The vast majority of the collisions of songbirds with guyed communication towers results from the attraction of FAA or other types of lighting on or near the structure. The review by Avery et al. (1980) and many other papers in the literature have demonstrated that the FAA lights on communication towers attract night migrating songbirds resulting in multiple fatalities in a single night. These guyed towers involved in these multiple fatality events are usually greater than 500 feet and lit with steady burning and flashing red FAA lights. That there do not seem to be multiple fatality events of seabirds at structures lit with FAA type lights, unlike the case with songbirds, strongly suggests that these lights do not attract seabirds. Thus, there is no evidence that Hawaiian Petrels are attracted to FAA lights like those on the Tower.

The literature does not include communication towers as a known or potential threat to Hawaiian Petrels. With respect to another communication tower in the Hawaiian Islands, Thomas Telfer, a retired District Wildlife Manager with the Department of Land and Natural Resources, Division of Forestry and Wildlife, State of Hawaii, concluded that FAA lighting of the type used on communication towers (red flashing combined with red steady burning) were not bright enough to attract seabirds. Telfer, while working for the state of Hawaii also conducted searches at a tower on Kauai on but did not find any dead birds. His opinion was stated in an affidavit submitted on behalf of another tower in 2004 to the FCC. Although his comments were made in reference to a tower on Kauai, they were general with respect to the lighting and the impact of communication towers on seabirds.

It is concluded that the tower *may affect, but is not likely to adversely affect* the Hawaiian Petrel.

Hawaiian Goose (*Branta sandvicensis*)

For purposes of this BA, the primary potential effects to consider from the Proposed Action on the Hawaiian Goose include collisions with the Tower and disturbance of nesting areas.

The habitat at the Tower site does not appear to be highly suitable for nesting of Hawaiian Geese, although there is some suitable foraging habitat onsite. Geese could feed on the grassland portions of this site, although the presence of livestock and other agricultural practices may not permit this. Most importantly, the site seems to be just outside or near the boundary of the known geographic range of Hawaiian Geese. These geese occur within and adjacent to the nearby (ca. 5-6 miles) Hawaiian Volcanoes National Park. So, the range of this species comes close to the tower site and may include other nearby properties. These findings suggest that Hawaiian Geese are not likely to be found at the Island Airwaves Glenwood Tower site, except perhaps on rare occasions.

It is important to note that waterfowl, including geese, do not seem to be susceptible to collisions with communication towers of any kind, nor are they terribly susceptible to colliding with other structures. The American Bird Conservancy (Shire et al. 2000) has compiled a species list of bird fatalities at guyed communication towers in the continental United States. That list is by species and demonstrated that the vast majority of birds that collide with towers are night migrating songbirds. The summary of 47 studies by Shire et al. failed to demonstrate any risk to Canada, Snow, or other types of geese. Although Shire et al. (2000) did not include all papers, an examination by this author of the papers cited in the U.S. Fish and Wildlife Service reviews (Avery et al. 1980 and by Trapp 1998) and more recent papers (Kerlinger 2000) that were not included in the Shire et al. (2000) review, reveals that ducks and geese collide with communication towers only on very rare occasions. Because there are tens of thousands of communication towers, many of which are much taller than the Tower, and located in areas where there are millions of waterfowl, it is reasonable to assume that these birds are not likely to collide with guyed towers. These communication towers are within both the migratory pathways of waterfowl and near foraging and nesting areas of these birds, so waterfowl regularly fly near such structures. There is no reason to believe that Hawaiian Geese are susceptible to colliding with communication towers.

It is important to note that a majority of the collisions of birds with communication towers results from attraction by FAA or other types of lighting. The review by Avery et al. (1980) and many other papers in the literature have demonstrated that the FAA lights on communication towers attract night migrating songbirds. The fatality events involving multiple fatalities in a single night at communication towers greater than 500 feet are caused by attraction of birds to the steady burning and flashing red lights. The fact that there have never been fatality events involving large numbers of waterfowl, unlike songbirds, suggests that these birds are not attracted to the lights of communication towers. Thus, there is no reason to believe that Hawaiian Geese would be attracted to the Island Airwaves Glenwood Tower.

Another reason that collisions are not likely to occur is Hawaiian Geese are more sedentary than they were historically. They no longer make flights from nesting areas in the lowlands to montane habitats, in which they spent the nonbreeding season. These historical movements (elevational migrations) are no longer reported. If such movements occurred,

these birds might traverse the ridgeline on which the tower is located. However, because they do not occur and because the habitat at the tower site is not suitable for nesting, these birds will not be found at the Tower site except, perhaps, in very rare instances.

For the reasons listed above, it is highly improbable that Hawaiian Geese will collide with this particular communication tower. Based on the information and data that are currently available, there is likely to be little or no impact to Hawaiian Geese. Therefore, it is concluded that the tower *may affect, but is not likely to adversely affect* the Hawaiian Goose.

Hawaiian Hawk (*Buteo solitarius*)

For purposes of this BA, the primary potential effects to consider from the Proposed Action on the Hawaiian Hawk include collisions with the Tower and disturbance of nesting areas.

Disturbance of nesting sites by tower maintenance is unlikely. These birds nest in trees and the Glenwood Tower is in an agricultural field and there are homes nearby.

Collision fatalities of hawks at communication towers are extremely rare. Using the list of fatalities assembled by Shire et al. (2000) from 47 studies conducted at guyed communication towers almost entirely taller than 500 feet in height, a total of 1 raptor (Northern Harrier), with the exception of Turkey Vultures, that was killed by a communication tower. These studies were conducted over an aggregate total of more than 150 years and were done in about two dozen states. An examination of the bird lists in the publications reviewed by Avery et al. (1980) and Trapp (1998), both published by the U.S. Fish and Wildlife Service revealed almost no fatalities. Additional studies conducted at towers in excess of 1,000 feet in height by Clark and his research team have revealed no raptors, which is the case for almost all studies conducted at communication towers.

Dr. Joelle Gehring of Michigan State University did find a Red-tailed Hawk dead at a 475 foot tall, guyed communication tower in Michigan. That bird was the only raptor found at 23 guyed and unguyed communication towers ranging in height from about 400 to 1,000+ feet in height during nearly two years of study.

Another source of information that suggests raptors are not susceptible to colliding with towers is the many studies conducted at wind turbine facilities. At many of these facilities there is one or more, guyed meteorology towers that range in height from about 120-160 feet in height and have guy wires. These studies are reported in Erickson et al. (2001). Not a single dead raptor has been found at any of these sites, despite intensive year-round searches.

For the reasons listed above, the collision risk to raptors, including Hawaiian Hawks at communication towers is negligible and discountable. Hawaiian Hawks are highly unlikely to collide with the Island Airwaves Glenwood Tower or any other communication tower. Based on the information and data that are currently available, there is likely to be little or no impact to Hawaiian Hawk and it is concluded that the Tower *may affect, but is not likely to adversely affect* the Hawaiian Goose.

Hawaiian Hoary Bat (*Lasiurus cinereus semotus*)

For purposes of this BA, the primary potential effects to consider from the Proposed Action on the Hawaiian Hoary Bat include collisions with the Tower and disturbance of nesting areas.

It is highly unlikely that the operational activities (servicing the facility and cutting vegetation away from the building, tower, and guy wires) will in any way affect Hawaiian Hoary Bats. These bats roost in trees and the Glenwood Tower is located in relatively open farmland. The maintenance activities will in no way impact the trees in which these animals roost, nor will they have any impact on the insects that these animals eat. It is possible that these bats forage on site, but they will not be impacted by the maintenance activities as they catch and eat insects in the general area.

Collision impacts to bats, including Hawaiian Hoary Bats, have rarely been documented. It is known that bats are killed by cars and wind turbines, both of which are moving at relatively high speeds. It is common knowledge that endangered Indiana bats and other species in western Pennsylvania are regularly killed by automobiles on a federal highway. In addition, studies of wind power projects (Kerns and Kerlinger 2004; Arnett et al. 2005), have demonstrated that when wind the rotors of wind turbines are not operating (tip speeds of about 150 mph) bats do not collide with them.

Similar fatality studies at communication towers have demonstrated that bats very rarely collide with guyed or unguyed communication towers. Thus, there is a vast body of literature that suggests that bats are not as susceptible to colliding with towers and guy wires as are birds. Very few of the hundreds of references on collisions of birds with communication towers (and other tall structures) mention the presence of any dead bats. Avery et al. 1980, Trapp 1998, and Shire et al. 2000 provide exhaustive lists of study references and synopses of reports that can be gleaned for bat fatalities. There are very, very few of these studies that report any bat fatalities. It is possible fatalities were overlooked or that the surveys were not done during the appropriate season. However, as with bird fatalities, accidental findings resulted in further study and a large literature. So, it is unlikely that large numbers of dead bats would be overlooked if they were present.

One of the only references to bat fatalities at communication towers is that of Crawford and Baker (1981) who noted 54 bats of seven species recovered at a 1,000+ foot (305 m) communication tower in northern Florida. The period of study was 25 years, which means about 2 bats per year were killed by this tall, guyed tower. Guy wires at this tower extend more than 750 feet outward from the base of the tower and there is more than a mile of guy wire at that tower. The study of fatalities at this tower is perhaps the most exhaustive of any tower study. At the same tower, more than 25,000 dead birds were found during the same time period. Unlike bird fatalities, bat fatalities appear to occur as isolated incidents as opposed to large-scale fatality events. In other words, most fatalities are reported as single collisions during a single night. No large-scale fatality incidents have been reported from communication towers.

A study of 3 guyed communication towers that were all in excess of 1,000 feet in height, Clark and his research team have found only 3 bats in 35 years of annual searches near

Buffalo, New York (Arthur Clark, retired, Buffalo Museum of Science). The towers each had multiple red FAA lights. It is significant that there are many bats in that area and that large numbers of bats migrate through that area each year.

At an ongoing study of 23 communication towers in Michigan between about 400 and 1,050 feet, more than one-half of which are guyed and all of which are lit with FAA lights, only three bats have been found dead in nearly two years of study (Dr. Joelle Gehring, Central Michigan University, personal communication and report to the U.S. Fish and Wildlife Service Communication Tower Working Group, April 2005). The species involved were Hoary Bat, little brown bat, and big brown bat. One of those fatalities was at an unguyed communication towers. Studies conducted at guyed meteorology towers mostly about 120-160 feet in height with guy wires and no FAA lights, have revealed no fatalities. Overall, the number of bats found dead at communication and other guyed and unguyed towers is so small as to be discountable.

It is important to note that at all studies at which bat fatalities have been studied or reported from North America, there are more species of bats than in Hawaii and their densities/abundances are much greater than Hawaiian Hoary Bat is in Hawaii. Moreover, there are many species of bats that migrate in North America, which puts them at greater risk of collision than Hawaiian Hoary Bats. As with songbirds, if bats were colliding with communication towers in significant numbers, they would likely be noticed and reported. Interestingly, it is during the bat migration season, mostly in August, that a vast majority of wind turbine fatalities are found.

There does not seem to be evidence that bats are attracted to FAA lighting on wind turbines. At the West Virginia Mountaineer Wind Energy Center, the number of bats killed per turbine was the same for turbines with and without FAA flashing red lights (Kerns and Kerlinger 2004). Similar comparisons exist for several other wind power sites. FAA lights have, therefore, never been documented to attract birds to communication towers and have not caused collisions with those towers.

Based on known and documented collision risk to Hawaiian Hoary Bats and other species of bats at communication towers and other non-moving structures, it is highly unlikely that these bats will collide with the Island Airwaves Glenwood Tower. Therefore the Tower *may affect, but is not likely to adversely affect* this species.

VI. CUMULATIVE EFFECTS

The effects of unrelated private, state or local activities that are reasonably certain to occur within the action area are *cumulative effects*, but do *not* include future federal actions. 50 C.F.R. § 402.02. As defined in the regulations, "effects of the action" does *not* include the "environmental baseline" and "cumulative effects." 50 C.F.R. § 402.02. Unlike the environmental baseline, however, both cumulative effects and effects of the action are considered in evaluating the impacts of the Proposed Action on a listed species or its habitat would amount to jeopardy. 50 C.F.R. § 402.14(g)(3)-(4); see also 51 Fed. Reg. 19,933 (1986).

No other private, state, or local actions are anticipated to occur within the action areas; thus, cumulative effects of any such additional projects are not considered within this BA.

VII. CONCLUSION

Based on the preceding analyses, information, and data, the Proposed Action (i.e., operation and maintenance of the Tower) *may affect, but is not likely to adversely affect* the Newell's Shearwater (*Puffinus auricularis newelli*), Hawaiian Hawk (*Buteo solitarius*), Hawaiian (Dark-rumped) Petrel, Hawaiian Goose, and the Hawaiian Hoary Bat (*Lasiurus cinereus semotus*).

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Figure 1. Location of the Island Airwaves tower site, Island of Hawaii (wide view showing general location of tower and surrounding topography.

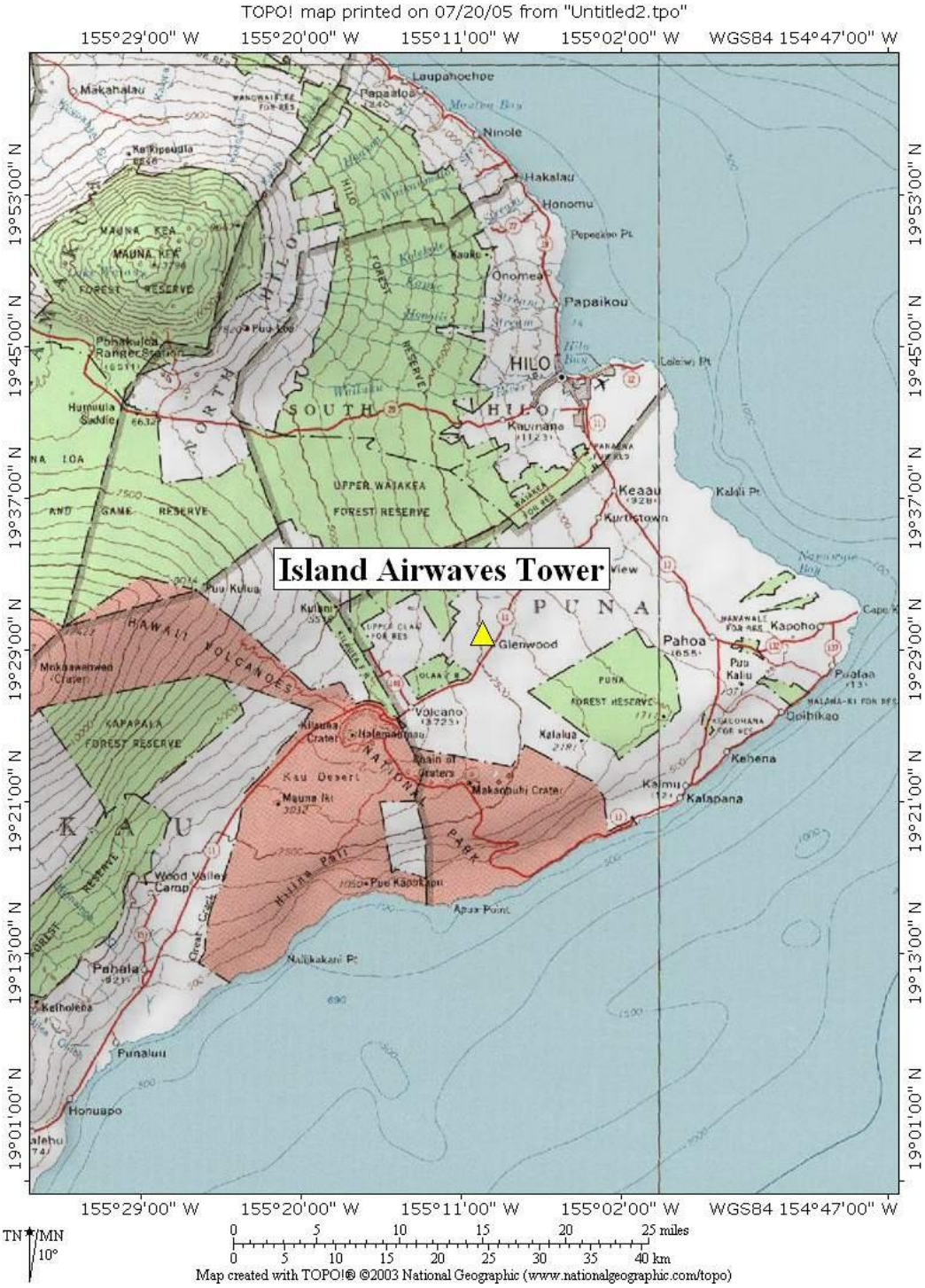
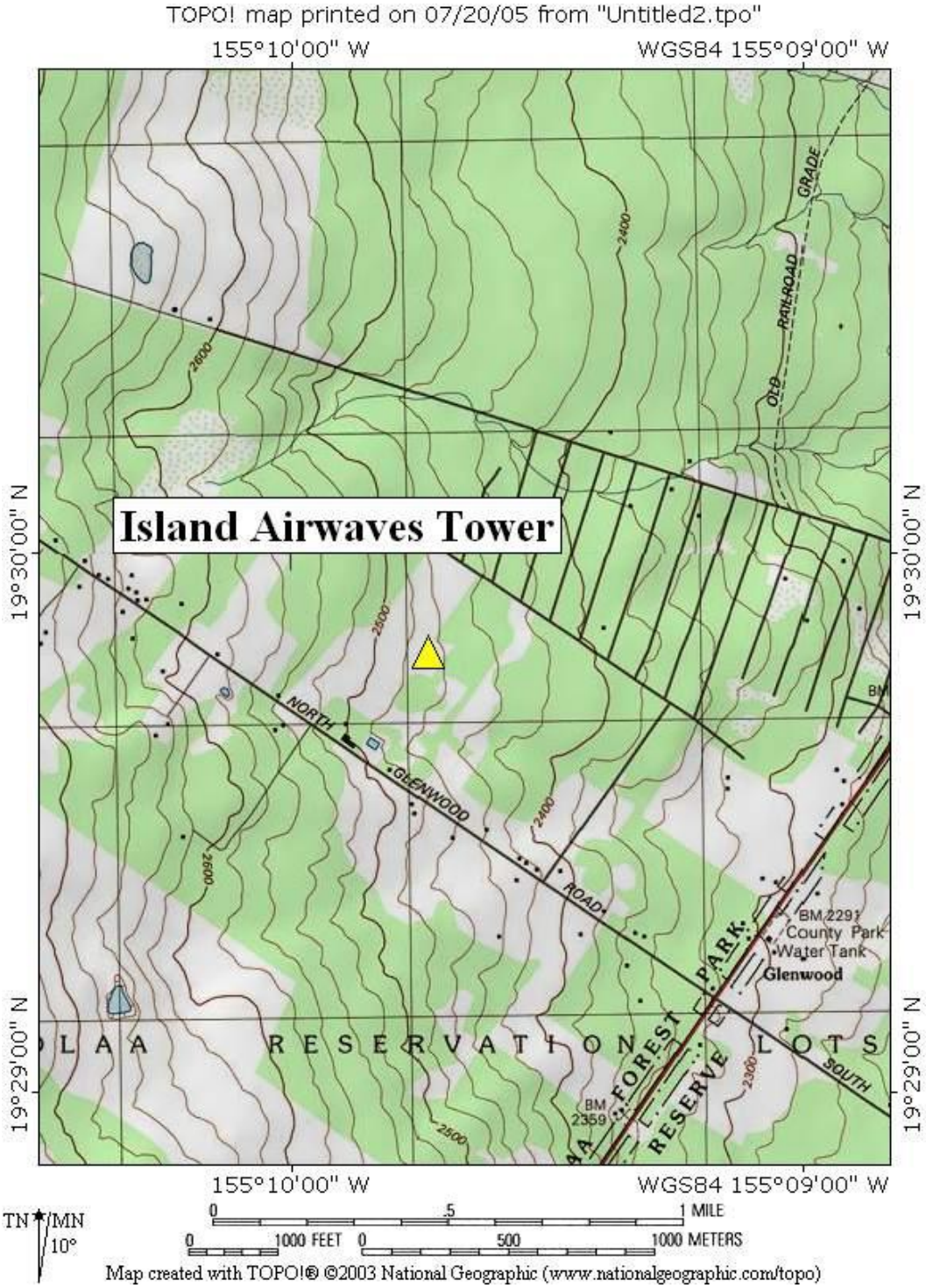
Figure 2. Topographic map of the Island Airwaves tower site including local topography and proximity to Glenwood.