

# Chapter 5 Social and Economic Environment



Chapter 1  
Introduction and  
Background

Chapter 2  
Management  
Direction

Chapter 3  
Physical  
Environment

Chapter 4  
Refuge  
Biology and  
Habitats

Chapter 5  
Social and  
Economic  
Environment

Appendices  
A-K



## Chapter 5. Social and Economic Environment

### 5.1 Cultural Resources

#### 5.1.1 Introduction

Archaeological and other cultural resources are important components of our Nation's heritage. The Service is committed to protecting valuable evidence of plant, animal, and human interactions with each other and the landscape over time. These may include previously recorded or yet undocumented historic, cultural, archaeological, and paleontological resources as well as traditional cultural properties and the historic built environment. Protection of cultural resources is legally mandated under numerous Federal laws and regulations. Foremost among these are the National Historic Preservation Act (NHPA) of 1966 as amended, the Antiquities Act, the Archaeological Resources Protection Act (ARPA) as amended, and the Native American Graves Protection and Repatriation Act (NAGPRA).

Permanent settlements of the Hawaiian Islands by Polynesians are recorded as early as the 7<sup>th</sup> century Common Era (C.E.); however, initial discovery and colonization may have occurred even three to four centuries earlier. Testaments to these settlements include remnants of heiau (temple sites), burial sites, terraces which supported agriculture (e.g., irrigated cultivation of kalo), stone-lined water ditches ('auwai), and stone-walled fish ponds (loko kuapā). It is estimated that prior to the arrival of British explorer Captain James Cook in 1778, the Native Hawaiian population numbered from 250,000–1,000,000, with most settlements established below 3,000 feet.

Hawaiian pre-contact history is divided into four main periods: the Colonization Period (300–600 C.E.), the Developmental Period (600–1100), the Expansion Period (1100–1650), and the Proto-Historic Period (1650–1795). The latter two periods are when Native Hawaiian culture is thought to have developed with the ahupua'a system of land divisions as well as hierarchical social structures where chiefs (ali'i) and commoners and kapu (taboo) systems were instituted.

After the arrival of Cook, changes in Native Hawaiian culture and society occurred with increased Western contact through trade, leading to the depletion of sandalwood, diseases such as cholera and syphilis which decimated Native Hawaiian populations, and acquisition of firearms, which helped King Kamehameha unite the Hawaiian Islands. Between 1795 and 1893, there was a transition where Native Hawaiian monarchies governed and ruled the islands; the religious and kapu systems continued until 1819. Other changes during this period include the arrival of missionaries in 1820, which lead to the conversion of many Native Hawaiians to Christianity; the building of churches; banning traditional art forms, such as hula; and displacement of traditional religious and kapu systems. The growth of whaling also lead to an influx of migrant workers; trade; agricultural commodities such as cattle and chickens; and local cultivation of potatoes, onions, beans, and other vegetables and fruits. Other countries, such as Russia and England, were also present during this period.

One of the greatest changes during this time was the transformation of the land tenure system from a traditional, communal system to that of a Western system under the Māhele of 1848. Title to lands in Hawai'i were divided between the konohiki (Konohiki (chief) Lands—1,619,000 acres), King Kamehameha III (Crown Lands—984,000 acres), and the Hawaiian government (Government Lands—1,523,000 acres). All these lands, however, were subject to the rights of native tenants, an

effort to continue the traditional Hawaiian land tenure system. Native tenants, under the Kuleana Act of 1850, could petition the Land Commission for fee simple title to these lands if they could prove they had occupied and improved it (Garovoy 2005). However, few Native Hawaiians claimed their kuleana. This, along with a sale of government lands between 1850 and 1860, resulted in Native Hawaiians losing much of their lands to foreigners, who could now hold land in fee. The Native Hawaiian monarchy was changed to a constitutional monarchy in which a partly elected legislature and set of ministers carried out government business. This resulted in a shift of government from Native Hawaiian to Euro-American control. However, during King David Kalākaua's reign (1874–1891), there was a brief resurgence of Native Hawaiian culture with a Hawaiian language newspaper created, the hula and its music brought back and performed in public, as well as the building of 'Iolani Palace.

As whaling declined in the 1860s, sugar became the dominant industry, leading to a large influx of Asian immigrants and further displacement of Native Hawaiians, who had been employed as plantation workers. The first major sugar plantation was established on Kaua'i in 1835. Princeville Plantation was established in the late 1860s. Large-scale systematic growing of coffee on Kaua'i also began from 1835 to 1845. The economics and dominance of the sugar industry led to political discord and eventual overthrow of the Native Hawaiian monarchy.

In 1898, Hawai'i became a U.S. territory, partly for its strategic location with respect to Asia. Hawai'i continued to be a plantation society, along with some ranching, up until World War II (WWII), with pineapple joining sugar as a plantation commodity. During this time, the government and economy were ruled mainly by five major business corporations. The early 1900s also saw the building up of military in Hawai'i. After the bombing of Pearl Harbor in 1941 and U.S. entry into WWII, changes in Hawai'i resulted in Japanese-Americans entering politics, the rise of the labor unions, and a shift in government from the Republican Party to the Democratic Party. When Hawai'i became a state in 1959, the Admissions Act required the 1921 Hawaiian Homes Act, which set aside 200,000 acres that once belonged to the Hawaiian kingdom to lease land to Native Hawaiians, be included in the State Constitution. Since statehood, the local economy has been dominated by tourism, military, and a waning agricultural sector; the sugar and pineapple plantations began their declines in the 1950s–60s.

The late 1960s saw a revival of Native Hawaiian culture with the return of traditional hula and music. The creation and launching of the Polynesian voyaging canoe Hōkūle'a was another major milestone in this revival of Native Hawaiian culture. The 1980s saw an increase of Native Hawaiian organizations and calls for sovereignty with the establishment of Native Hawaiian language-focused schools and the Office of Hawaiian Affairs (Juvik and Juvik 1998).

### **5.1.2 Kīlauea Point NWR**

Kīlauea has a history steeped in the plantation days of old Hawai'i and WWII. It is also an area rich with stories of Pele (the volcano goddess), who had fallen in love with Lohi'au, a chief of Hā'ena. She came to the area to find a home for them, but encountered her sisters. One variation of the story has her meeting them on Kīlauea Crater and turning them into stones out of jealousy of their beauty. There is also a story related to the Menehune and Moku'ae'ae Island in which a bridge between the island and the mainland was never completed because they were unable to finish laying rocks in the channel in one night (Wichman 1998).

Native Hawaiians consider biological resources also as cultural resources. Many of the native species found in Hawai‘i are linked with traditional stories, sayings, and chants dating back to the creation chant Kumulipo. One example of this is the ‘iwa, which is known for its beauty, resourcefulness, and ability to soar high. This trait makes it also a symbol of vigilance. Praise for a graceful person is often compared to that of an ‘iwa’s flight. Additionally, many native wildlife species are also linked with deities and family genealogies.

The Hawaiian name Kīlauea means “rising vapor clouds,” which describes the clouds of sea mist along the north coast. The Refuge lies in the ahupua‘a of Kīlauea and Kāhili. The surrounding ahupua‘a include Namahana, Kalihiwai, Kalihikai, Waiakalua, and Pīla‘a. During the talk story session for Kīlauea in November 2009, families with cultural ties to the area who were historically konohiki for fishing in the Kalihiwai ahupua‘a, told of fishermen who would look from Crater Hill to spot fish and to plan for their fishing. Families with cultural ties still practice traditional Native Hawaiian fishing at Kīlauea Point. The lighthouse was also used by community members to find bearing from both the ocean and mountains for safe return.

During the mid- to late 1400s, Kīlauea, under Mano-ka-lani-pō (an ali‘i nui or high chief), was opened up for agriculture. He created the ahupua‘a for the island (the Refuge is in the moku‘aina of Ko‘olau). By the time of the Māhele in 1848, feral cattle, which had been introduced to Kaua‘i by Captain George Vancouver in 1791, had multiplied and were causing much damage (Wichman 1998). In the late 1870s, Kīlauea Sugar Plantation Company was started and Kīlauea Town grew to support many of its functions. Though small compared to other sugar plantations, at its peak it employed 400 people and brought a mix of European, American, and Asian people into the community (in contrast, an 1847 census identified the area’s resident population at 240 (Aiken 1988)). The plantation was innovative, being one of the earliest to experiment with using trains to transport sugarcane. Tracks went to a landing on the Kīlauea Bay side of Mōkōlea Point and were used until 1942, using gasoline tractors instead of steam plows, and utilizing machines to clean sugarcane. A rock quarry was also established at Mōkōlea for road building and construction (used until 1979).

The company came to an end in the early 1970s and with this came an era of real estate development. However, opposition from the Kaua‘i County government and residents left land owner C. Brewer (who acquired controlling interest of the company in 1948) with no sales of its land surrounding Kīlauea Town until the passage in 1973 of the Comprehensive Zoning Ordinance (Kaua‘i General Plan) which clarified criteria for land sales. The zoning tried to encourage resident farmers by combining agricultural and housing use and discourage resort development and urban sprawl. However, gentleman estates still developed. Many of the former employees of the sugar plantation company were provided opportunities to buy their houses or land and gained employment through other agricultural ventures that emerged. The rise of Princeville also provided opportunities (Wilcox 1981). Several buildings in Kīlauea related to the sugar company are listed on the National Register of Historic Places and include the Kīlauea Plantation Bookkeeper’s House, Kīlauea Plantation Head Luna’s House, Kīlauea Plantation Manager’s House, and the Kong Lung Store. Kīlauea School is also registered.

With the coming of WWII, Kīlauea’s history moved from agriculture to military occupation. The current Christ Memorial Church’s Parish Hall (used as a community hall) was occupied by the U.S. Army (Wilcox 1981). The U.S. Army Corps of Engineers constructed Kīlauea Radar Station between 1941 and 1942, and the U.S. Army managed the station until the end of the war. It was considered a top secret site during the war and was one of three radar installations located on the island of Kaua‘i

that helped detect planes and submarines. The radar station was constructed on the highest point of Crater Hill and included two tunnels (one for radio and one for radio operations), an electrical generation plant, and a 200-foot radar tower (Dept. of the Army 1991). After its closure, the land was transferred to the Kīlauea Sugar Plantation Company (which used one of the tunnels to store explosives). The Crater Hill area provided pasture land for cattle and grazing until the early 1980s; a slaughter house and dairy had even been constructed at the base of the hill (operations continued until WWII). It was sold to Seacliff Plantation, which then sold it to the Refuge. Today, via SUPs, the site has telecommunication antennas for the County of Kaua‘i Civil Defense and Police Department, State of Hawai‘i Department of Transportation and Health, and a radio station. In 1988, the Refuge sought designation of this radar station as a National Historic Landmark; however, no designation has been made (Department of the Army 1991).

In January 1863, a former American whaler named Charles Titcomb purchased the entire ahupua‘a of Kīlauea, amounting to approximately 3,016 acres, under Royal Patent 2896 (signed by Kamehameha IV) for \$2,500. This land grant included the present Refuge. Titcomb founded the Kīlauea Sugar Plantation Company and cleared these lands for sugarcane. He also had a ranching operation. The Kīlauea River Valley was not planted with sugarcane (only relatively flat areas were under cultivation); however, stone walls found in the valley indicate that kalo and possibly rice were grown there in earlier times (Aiken 1988). Landings were constructed at Kāhili (or Rock Quarry) to assist with transportation of goods and people. A nearby quarry was also developed for use by the company.

Kīlauea Point (31 acres) was purchased from C. Brewer and Company by the U.S. Coast Guard to build a lighthouse as a navigational aide for the growing commercial maritime trade between Hawai‘i and Asia. Given that the Point is the northernmost tip of the main Hawaiian Island, this lighthouse could be seen for miles. Construction began in 1912 on the lighthouse and keeper’s quarters. On May 1, 1913, the 56-foot tall lighthouse officially started its use (celebrated with a lū‘au and shark shoot). Local visitors were welcomed to the site to view the technological wonder of the lighthouse. The former keepers estimated that 20 people per week visited the Point, but after Statehood, visitation increased with hotel and airline development. The lighthouse gained national recognition in June 1927 when it aided the first trans-Pacific flight from California to Hawai‘i by the U.S. Army, thereby encouraging development of commercial trans-oceanic airline service and military flights to remote regions. In 1976, the Service reached an agreement with the U.S. Coast Guard which allowed use of the 33-acre light station site for Service administrative facilities. Lighthouse use continued until 1976, at which point the U.S. Coast Guard installed an automated electronic beacon. Visitation at this time was recorded at 84,000 people annually.

In 1974, the lighthouse was placed on the Hawai‘i Register of Historic Places, and then in 1979 placed on the National Register of Historic Places. It is also listed in Kaua‘i County’s historic resources inventory. The National Register was later amended to include additional primary structures as part of the Kīlauea Point Light Station (e.g., keeper’s quarters, two assistant keeper’s quarters, oil house, landing station, derrick site, engine room, volcanic stone retaining wall, and stone stairway/moorings), three cisterns, water storage tank, storage shed/garage (Northwest Heritage Consultants 2006). The lighthouse’s second-order Fresnel lens, made in France, is one of 22 believed to exist in the U.S (and one of only seven that remain in lighthouses). The Light Station is also considered a historic district. The lighthouse itself is one of only eight surviving reinforced concrete lighthouse towers in the U.S. before 1916 concrete standards were published.

In 1985 the land was transferred to the Service and became a national wildlife refuge. Through the years, several of these structures have undergone restoration and renovation, including the radio beacon building, keeper's quarters, and lighthouse (particularly after Hurricane Iniki in 1992). From 2010–2013, the lighthouse underwent restoration work which included repairs to the unique cast iron roof and lantern assembly; removal of interior and exterior coatings; repairs to the concrete tower, removal of concrete blocks from where windows were formerly located; installation of new windows, corbels, and doors; and repair of the Fresnel lens; and the inclusion of additional safety measures. This restoration work, at a little over \$2 million dollars, was supported mostly by grants and fundraising done by Kīlauea Point Natural History Association (KPNHA) as well as congressionally appropriated funding. On May 4, 2013, the lighthouse was renamed the Daniel K. Inouye Kīlauea Point Lighthouse to honor the late U.S. Senator from Hawai'i who had championed and provided funds for the restoration work.

### ***Previous archaeological research***

In 1987, William K. Kikuchi surveyed the present grounds of the Refuge and areas of proposed extension. Considering the significance to Native Hawaiians of seabird nesting colonies found within the Refuge, Kikuchi extended the limits of his survey to search for associated cultural features or material. Surface remains of historic structures associated with Kīlauea Lighthouse are described, and limited subsurface testing was performed, but Kikuchi found no evidence of remains related to Native Hawaiian culture (Kikuchi 1987).

Xamanek Researches (Fredericksen and Fredericksen 1989) surveyed areas including Crater Hill and Mōkōlea Point. Land use and history of tenure is documented well, followed by detailed descriptions of historic structural remains related to the transport and loading of sugar at Mōkōlea Point, a WWII-era radar installation on Crater Hill, and Kīlauea Lighthouse. Although archaeological evidence of Native Hawaiian exploitation of seabird colonies was one object of the survey, no such remains were observed.

As part of the environmental assessment done for the Refuge's boundary expansion (USFWS 2007), a records search was conducted in May 2005 at the State of Hawai'i Historic Preservation Office in Honolulu. The search included a review of all recorded prehistoric and historic archaeological sites within a quarter-mile radius of the proposed expansion area. The file search showed that four cultural resource surveys (1996, 1997, 2000, 2001) had been completed, resulting in the recordation of nine cultural resources and notation of three sites recorded in 1928 and 1929. Of the 12 cultural resource sites, one site, a possible burial, was located within the expansion area. Three sites that are in closest proximity to, but outside the expansion area, included a historic burial site and agricultural complexes.

Previously recorded sites in closest proximity to the 2007 boundary expansion area included a historic burial site, agricultural sites, and a heiau, as described below. The earliest archaeological study was conducted by T.G. Thrum in 1906; it focused on Kaua'i heiau sites. The Kipapa Heiau, was recorded in 1928–1929 by W.C. Bennett and is described as follows: "Kipapa Heiau was situated on the end of the first bluff east of Kīlauea River in Kāhili section." It was described by Thrum as "A large heiau of some 300 by over 100 feet in size, paved, walls 5 feet high, standing in cane field in partial ruins." Since that time, stones have been removed. This site is located outside the proposed expansion area, to the east. According to information cited from personal communication in the cultural resource survey report by Burgett et al. (2000), the Kipapa Heiau was reportedly destroyed.

Of the four cultural resource survey reports, the survey conducted by Burgett et al. (2000) recorded three sites that are also located outside but in proximity to the expansion area. These sites include:

- A large pre-contact and early post-contact dryland agricultural site located on the slopes above Kīlauea River. Features were studied and described. Based on subsurface testing, no significant cultural deposits were observed, and thus no further work was deemed necessary.
- A possible burial identified by the landowner. The exact location of the site is unknown, but is suggested by the landowner to be located near the base of a slope of a natural bench.
- A late prehistoric/early historic agricultural site consisting of berms separating the remnants of pond fields that were once used for the cultivation of taro and rice. If development is to occur within this site, data recovery (i.e., subsurface auguring) to locate pond field deposits and surface mapping of extant features was recommended.

A preliminary records search by the State Historic Preservation Officer (SHPO) found no sites currently listed in the National Register of Historic Sites in the expansion area. A site visit was conducted with the SHPO on May 11, 2005, on Parcel 3, a 162-acre parcel known as “Kīlauea Falls Ranch.” According to the SHPO, very little is known about the historical uses of this parcel. No extensive archaeological surveys have been conducted in the study area because extensive development has never been proposed. One house site and adjacent lo‘i kalo terraces were identified in a lowland portion of Parcel 3. An associated ditch may be present but no clear rock lining of a ditch was observed. Other lo‘i terraces most likely exist at higher elevations in the large valley on the southwestern end of the parcel, but no surveys have been performed to confirm (USFWS 2007). Maps identifying these parcels and related cultural resources can be found in the 2007 Land Conservation Plan and Environmental Assessment (USFWS 2007).

Cultural Surveys Hawai‘i, Inc., carried out studies for Kīlauea Falls Ranch on the west side of Kīlauea River (also known as Kāhili Stream) (Shideler et al. 2007 and 2008). The studies identified a total of 62 features within of 5 sites. Four of these five sites are primarily or exclusively agricultural terraces. The only exception at these four sites was interpreted as a temporary habitation related to the agricultural terraces. The inventory survey (Shideler et al. 2008) concluded that the approximately 60–70 inches of annual rainfall within that project area made cultivation possible without irrigation. While Shideler et al. concluded that there may well have been pre-contact ponded field (lo‘i) taro cultivation along the flood plain, the vagaries of hurricane, tsunami, and flood may have made such planting down by the river precarious. It was suggested that cultivation up on the steep slope may have been more secure. The propensity of the Kīlauea/Kāhili Stream to flood may have encouraged development on the steep slope. Particularly relevant in the Kīlauea Falls Ranch study was the documentation of a dense cluster of 55 archaeological features including 53 soil-retaining terraces and two possible habitation areas.

In 2013, a systematic pedestrian survey was completed within the approximately 6.67-acre Nihoku Ecosystem Restoration project area at Crater Hill. No surface cultural resources were observed during the survey (Hammatt and Shideler 2013).

The 1980 North Shore Development Plan Update (which includes Kīlauea) identified additional historic and scenic features:

- Kauapea Beach;
- Crater Hill;
- Kīlauea River Estuary and Bay;
- Kīlauea Slippery Slides;
- Kīlauea Episcopal Church;
- Kīlauea Language School;
- Old Hospital Building and Dispensary;
- Old Plantation Office Building;
- Plantation stone houses;
- Kapinao Heiau;
- Mountains behind Kīlauea.

## 5.2 Refuge Facilities

Facilities described are those that support visitor services, law enforcement, administration, maintenance, and biological management at the Refuge. Historic structures and facilities managed by the Refuge are described in the previous section.

Located 23 miles north of Līhu‘e and 2 miles north of the town of Kīlauea, the Refuge lies at the end of Kīlauea Road, a narrow County Road that ends in a cul-de-sac (turnaround). This area (hereafter also referred to as the Overlook) has six paved, painted parking stalls as well as information displays about the native wildlife and plants that can be seen in the area. Approximately 20 additional vehicles can be accommodated along a dirt/gravel section of Kīlauea Road that visitors often use as impromptu parking (Figure 5-1).

The entrance to the public portion of the Refuge is controlled by a large, metal automatic gate. During a 1-year trial period starting February 2014, Kīlauea Point proper (hereafter also referred to as the Point) is open to the general public 5 days a week, from Tuesday to Saturday, with an entrance fee of \$5.00 per person. After the trial period is completed, the visitation days will be reassessed to see if it is possible to reopen on a 6- or 7-day a week schedule. Upon entering the Refuge, vehicles (no pedestrians allowed) descend a steep, narrow (16 feet in width), curving, paved road (0.21 miles) that leads directly to two paved parking lots and two gravel areas, which can accommodate up to 51 vehicles and 15-passenger vans. Large tour buses (25 passenger or larger) are restricted from entering the Refuge. Visitors then walk up to the main area of the Point, where a paved walkway leads them to a fee booth, a visitor center built in 1988 (which houses limited interpretive and educational displays as well as a bookstore, meeting room, minimal storage, and restrooms), and out to the Point, with the historic lighthouse and oil shed, and radio beacon building which has been converted to an interpretive site with informational displays and video. Associated with the radio beacon building, there is a garage (nonhistorical) that stores golf carts used to transport people with disabilities and supplies. Throughout this area, viewing scopes for the public to enjoy views of the seabirds, whales, and coastline and interpretive panels are available.

Two of the historic keeper’s quarters are used as administrative offices for staff. The associated garages are used as storage for supplies. The third quarter, which also has an attached garage (nonhistorical), is currently used as staff residence to provide onsite presence when the Refuge is

closed. There is limited parking for staff and volunteers and limited covered areas to protect these and Refuge vehicles from the harsh sea salt and winds.

There is also a small nursery (24 by 30 feet) used for growing native plants used in outplanting and restoration projects. Another storage shed, built after Hurricane Iniki, is also used to protect an electric vehicle, as a workshop, and maintenance storage.

Exposure on the cliff, northeasterly trade winds, and sea spray from heavy wave action (especially in the winter months) create an extremely corrosive environment for maintenance facilities. This salty environment makes most exposed metals rust at an accelerated pace. Vehicles, heavy equipment, tractor implements, outdoor fixtures on buildings, and other equipment with exposed metal do not remain functioning for more than a few years without extensive rust buildup, making repairs expensive and time consuming.

Though the two existing small maintenance facilities provide limited maintenance capability and provide cover for small equipment including grounds maintenance and other small tools, they are insufficient for larger Refuge equipment needed for Refuge management. Examples include vehicles, tractors, and tractor implements (mower decks, boom axe, grinder heads, herbicide sprayers, etc.). The lack of this equipment onsite greatly hampers the effectiveness of Refuge operations.

The Refuge maintains 2.7 miles of boundary, protective, and guard rail fencing. There are also gates that are tied into some of the fencing. At least 35 percent of this fencing is in need of replacement due to rotting posts, rusting mesh, and falling gates. Fifty percent of the fence also needs to be surveyed with the remaining 15 percent relocated for firebreak purposes and to deter trespass. Fence maintenance and assessments are critical because fences serve as the main deterrent against wildlife threats, such as predators and trespass. Regular maintenance ensures the fence is intact and any issues discovered addressed quickly (e.g., holes cut in the fence, birds which might inadvertently get caught).

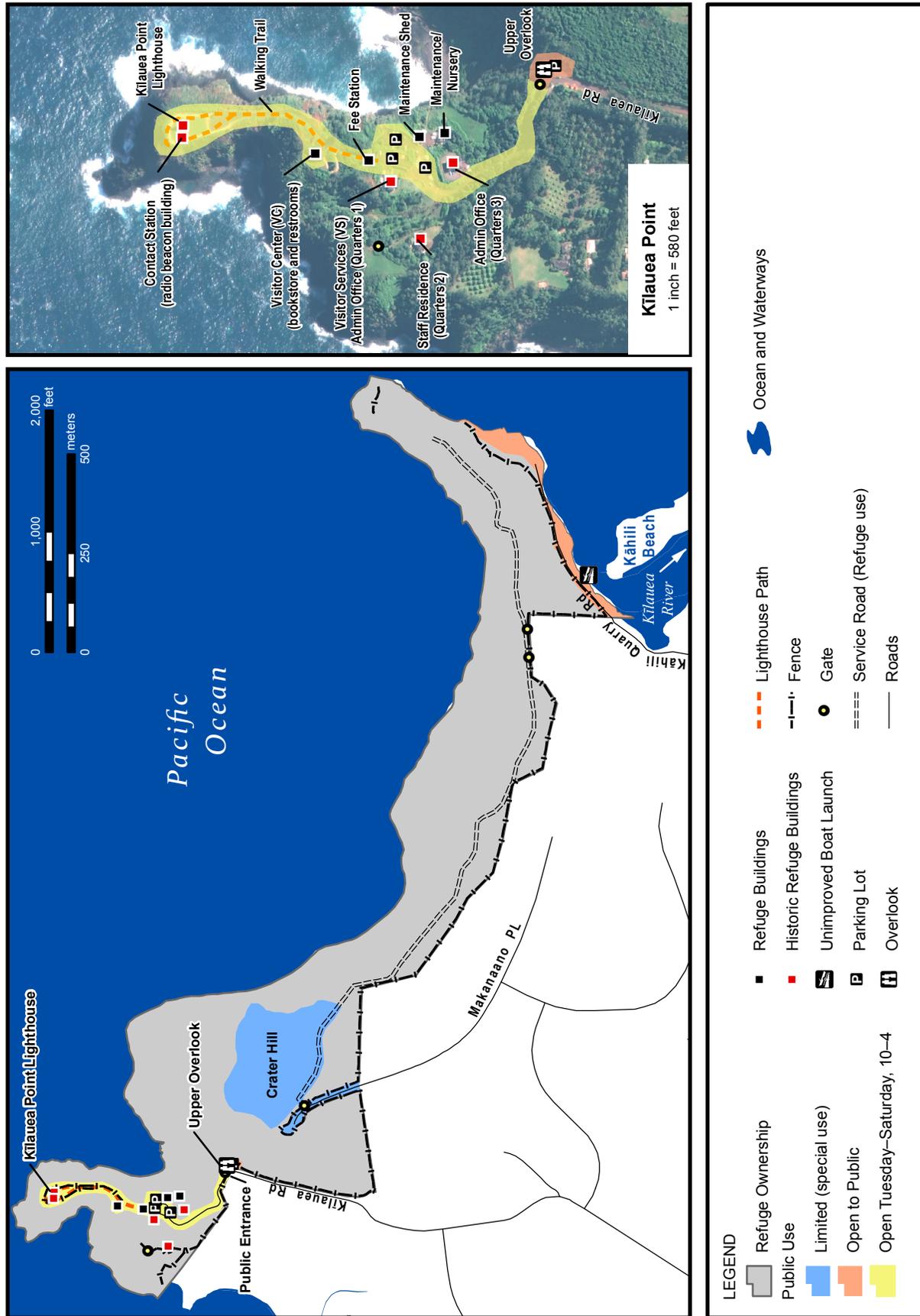
Additionally, in collaboration with several partners including the American Bird Conservancy, Kaua‘i Endangered Seabird Recovery Project (a Hawai‘i Division of Forestry and Wildlife and Pacific Cooperative Studies Unit effort), National Fish and Wildlife Foundation, and others, an approximately 2,400-foot-long predator-proof fence around 7 acres of the Refuge slightly east of Crater Hill was constructed in summer 2014.

From Crater Hill to Mōkōlea Point, there are partially cemented or dirt roads used for management in areas that are closed to the general public. The Refuge owns a portion of Kāhili Quarry Road, which open to the public.

The majority of the visitor services-related signage is located at the Point and Overlook. There are also boundary signs which mark the Refuge boundary.

Other infrastructure which supports Refuge facilities and management includes water storage tanks and distribution systems, septic systems, and power distribution lines/systems.

Figure 5-1. Public Use and Maintenance and Facilities, Kīlauea Point NWR.



**The back sides of maps are blank to improve readability.**

## 5.3 Public Use Overview

### 5.3.1 Visitation Trends

The Refuge is one of the most visited in the Refuge System. The Refuge is often prominently featured in visitor guidebooks and publications geared toward tourism (e.g., drive guides, visitor maps, airline in-flight guide videos, rental car agency videos). It is estimated that one-third of visitors to Kaua‘i go to the Refuge (PB 2004), and it is the 8<sup>th</sup> most visited attraction in the state. Between 2007 and 2013, total Refuge visitation ranged from 388,000 to 500,600 with a peak of 500,600 in 2010. These numbers account for visitors who pay the entrance fee for accessing the Point, special event visitors, outreach interpretive program visitors, environmental education program participants, fishing visitors, visitor who may stop at the Refuge Overlook, and other recreational visitors.

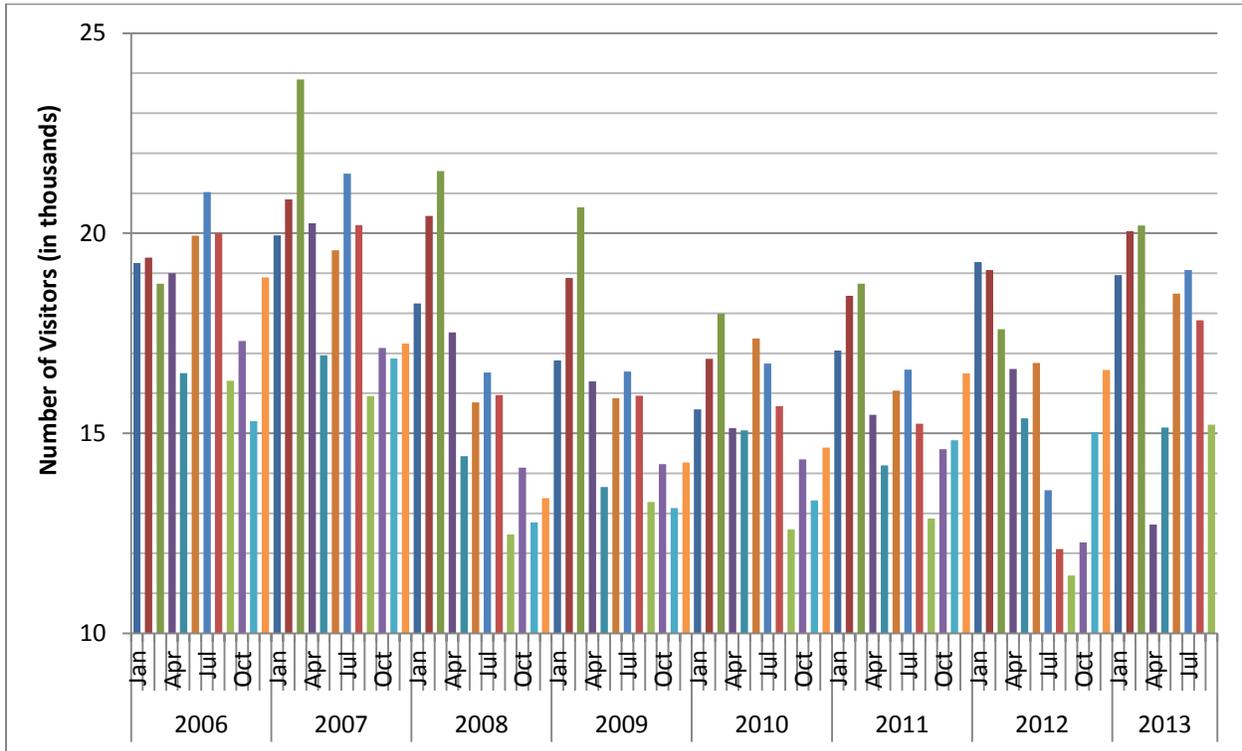
In addition to the Point itself (which is less than 10 acres), right outside the entrance gate is the Overlook, which is open to the general public at all times and is a popular scenic stop for visitors to the island. The area to the north of the lauhala tree to the coast is owned by the Refuge, while the area heading south up Kīlauea Road is owned by the County.

Areas not open to the general public include Crater Hill and Mōkōlea Point. Access to these areas is limited in order to protect breeding populations of endangered and migratory birds and other sensitive natural resources as well as for safety reasons. Access to these areas is by SUP or through special events such as those held during National Wildlife Refuge week.

Visitation to Kīlauea Point NWR is related to total visitation to the island of Kaua‘i. Tourism on the island is sensitive to global macro-economic conditions and natural disaster events. For example, as a result of the global economic downturn beginning in 2008, annual visitor arrivals to the island decreased by 20.6 percent from about 1.3 million arrivals in 2007 to about 1.0 million arrivals in 2008 (UHERO-Kaua‘i Interactive Database 2015). Correspondingly, annual visitation to Kīlauea Point fell by 16.1 percent from 230,300 visits in 2007 to 193,200 visits in 2008.

Refuge visitation is also subject to seasonal fluctuations. Figure 5-2 shows monthly visitation to Kīlauea Point NWR for the period beginning October 2005 and ending September 2013. With the exception of 2006, when June, July, and August were peak visitation months, the peak season at the Refuge is generally January to March.

**Figure 5-2. Monthly visitation to Kaua‘i and Kīlauea Point NWR (USFWS unpublished data).**



According to a traffic, visitor, and parking study (TVP study) done in 2004, peak times for utilization of the Refuge were between 10 a.m. and 2 p.m. daily, with the parking overflowing between 11 a.m. and 1 p.m. The estimated daily number of vehicles coming down to the Point parking area was 225 during peak visitation. This number is projected to increase to 260 by 2015 and 300 by 2025 under a mid-range growth rate scenario. The Overlook experiences its busiest times at 9:30–10 a.m. and 4–4:30 p.m. (the average visitor spends only 7 minutes at the Overlook (PB 2004)). Visitation seems to increase when cruise ships dock at Līhu‘e, and vehicle occupancy is higher in the summer than the spring. However, seasonal variability in visitation is not large compared to similar destinations on the mainland, with visitation peaking in winter, spring, and summer, and declining 17 percent in the fall (PB 2004). There is only parking capacity for 51 vehicles on the Point. From 2010 to 2013, the visitor center averaged about 189,963 visitors per year (USFWS 2014).

Due to flat and declining budgets, starting in February 2014, the Service reduced the days that Kīlauea Point proper is opened to the general public from 7 to 5 days a week. The Refuge is closed Sundays and Mondays. Visitors are able to visit the Refuge from 10 a.m. to 4 p.m. on Tuesday–Saturday, except on Federal holidays, with an entrance fee of \$5.00 per person. After a trial period of 1 year, the visitation days will be reassessed to see if it would be possible to reopen on a 6 or 7 day a week schedule. The visitation trend from data collected from February through May 2014 shows that Tuesday is the highest visitation day, followed by Thursday and Wednesday.

With the passage of the Emergency Wetlands Resources Act of 1986, entrance fees were charged for the first time at the Refuge in 1987 at a rate of \$2.00 when the Refuge was opened Monday–Friday from 10 a.m. to 4 p.m. Previously, entrance was free. A fee booth was constructed and three rangers recruited and trained to manage the fee program. In the first year of the program, close to 300,000

people visited the Refuge and \$143,762 was collected (some people had free entry through the various passports program).

The Federal Lands Recreation Enhancement Act (FLREA) authorizes the Service fee authority to collect entrance fees, expanded amenity recreation fees, and special recreation permit fees through the Act's sunset date (currently September 30, 2016). Per the act, not less than 80 percent of the recreation fees and site-specific agency pass revenues collected at a specific unit or area of Federal land management agency shall remain available for expenditure, without further appropriation, until expended at that unit or area. Use of fee revenues at a specific site or area can only be used for (1) repair, maintenance, and facility enhancement related directly to visitor enjoyment, visitor access, and health and safety; (2) interpretation, visitor information, visitor service, visitor needs assessments, and signs; (3) habitat restoration directly related to wildlife-dependent recreation that is limited to hunting, fishing, wildlife observation, or photography; (4) law enforcement related to public use and recreation; (5) direct operating or capital costs associated with the recreation fee program; and (6) a fee management agreement or a visitor reservation service. No fees can be used for biological monitoring on threatened and endangered species.

In Fiscal Year 2013, \$647,735 in fee revenues were collected at the fee booth with 201,571 visitors. These fees are used to help support visitor services management of the Refuge and include repairs of interpretive exhibits and signage, maintenance of facilities, safety repairs, publication of brochures, and restoration of historic structures.

### **5.3.2 Volunteer Program**

Due to the limited number of staff, the Refuge relies on assistance from Refuge volunteers and partnership with KPNHA, the Refuge Friends Group, to provide visitor services such as interpretation and environmental education and habitat management (e.g., native plant restoration, banding birds, controlling introduced predators, and monitoring).

The volunteer program at Kīlauea Point began in 1984, a year prior to the site's designation as a national wildlife refuge. Staff recognizes that the volunteer program is a critical part of the Refuge workforce and that it benefits all programs and goals and strengthens community relations. Between 2010 and 2013, the number of volunteers ranged from 103 to 115, providing between 6,410 and 8,523 hours of service (USFWS 2014). In 1988, it should be noted that 21,923 volunteer hours were recorded.

In the Refuge's early years, volunteers were heavily involved in the habitat restoration effort, participated in biological studies, conducted most of the environmental education (EE) programs, and staffed the KPNHA bookstore before salespeople were hired. A volunteer letter-writing campaign was influential in having Crater Hill acreage donated to the Refuge in 1988, and the volunteer program received "Take Pride in America" awards in 1987, 1989, and 1992. The Point, as well as the area surrounding the Lighthouse, is staffed almost entirely by volunteers.

From 1984 to 1989, volunteers who interacted with the public were required to attend an annual 8- to 10-week training. Volunteers would gather once a week for sessions conducted by Service personnel and local experts. Sessions were pertinent to the Refuge and included such topics as orientation to the Service, Hawaiian seabirds, wildlife of the surrounding ocean, and the historic Kīlauea Lighthouse. Between 1989 and 2002 (excluding 1993 and 1994 when the Refuge was due to the 1992 Hurricane 'Iniki), only two similar, formal volunteer training courses were conducted. The 1997 sessions were

taped, resulting in a collection of training videos in the Refuge library. The annual training was initiated again in 2003.

The majority of Refuge volunteers are retired persons who live on Kaua‘i’s North Shore. Most possess college degrees and professional skills. Approximately 50 percent of volunteers live on the island year round, while the other 50 percent live on the island for several weeks or months out of the year. Therefore, there is a definite seasonal availability of Refuge volunteers. January to March sees the greatest number of volunteers, with plentiful “snowbird” volunteers. Summer attracts the fewest number of volunteers as the “snowbirds” have not yet returned and student volunteers go back to school. With 50 percent of volunteers arriving and departing the island at different times, this presents challenges in getting all volunteers back “up to speed” and causes scheduling to be time consuming. Filling gaps in volunteer coverage fall to Refuge staff and/or interns.

In 2001, a volunteer/EE coordinator position was created, with 40 percent of the position’s time devoted to volunteer management and coordination. Prior to this, volunteer coordination duties were assumed as collateral responsibilities by various Refuge staff members. In 2004, the additional responsibilities of overseeing the daily operations of the Refuge’s VS and fee programs, as well as supervising the Refuge ranger staff, were added to the position, leaving even less time for management and coordination of the volunteer program and its 140+ volunteers. The volunteer handbook needs to be overhauled. There is no training manual, and regular volunteer meetings and training have been impacted by the limited amount of staffing currently devoted to daily and ever changing volunteer management and coordination.

Refuge Friends organizations are private, independent, nonprofits formed primarily by private citizen volunteers. The Friends organization affiliated with the Refuge is KPNHA, which was established in 1984 to meet the Refuge’s commitment to volunteers. The Friends organization was the first in the Service’s Pacific Region. The initial step was to recruit a board with an interest in the Service’s conservation objectives, and with expertise and organizational ability.

A second objective was to find board members who reflected the ethnic diversity of the islands. The Service was very fortunate in assembling the first board which eventually carried the initial ideas into fruition. The board was composed of the dean of Kaua‘i Community College, principal of Kīlauea and Hanalei Elementary Schools, Kaua‘i Prosecuting Attorney, editor of the Garden Island Newspaper, a member of the County of Kaua‘i Department of Economic Development, general manager of the Sheraton Coconut Beach Hotel and a Refuge volunteer, formerly with the Denver Zoo. The board worked to develop suitable by-laws for the organization which they named Kīlauea Point Natural History Association. Once the by-laws were drawn up the organization petitioned the State of Hawai‘i for recognition as a nonprofit corporation. Once confirmed, the organization petitioned the Internal Revenue Service for status as a 501(c)(3), Non-Profit Educational Corporation. After attaining this status, the organization entered into agreement with the Service for use of a portion (approximately one-third or 300 square feet) of the current Contact Station for retail sales. The decision was made to try and develop a volunteer group which would assist with start of the sales outlet.

The most fortunate aspect of this plan was the volunteer program, which to this day contributes significantly to Refuge programs. To raise additional capital, a membership program was initiated. A portion of the Contact Station was remodeled. Due to the limitation of space and the board’s desire to keep the inventory simple, post cards, natural history publications, and a map were the first items

carried. A year later, t-shirts were added. The first day's sales were \$30.00. Fiscal year 1984 sales indicated a gross volume of \$10,958. By 1987, it had reached \$42,791.

Early KPNHA projects included publishing of a quarterly newsletter, *Kīlauea Pointers*, supplying binoculars and spotting scopes for visitors, hosting an annual Christmas Sale, developing and publishing three to four issues of *Hawai'i Nature Focus* (a publication for school-aged children) per year, and hosting the annual volunteer awards picnic. In 1988, the Association published a 114-page book commemorating the 75<sup>th</sup> anniversary of the Kīlauea Lighthouse. In 1994, retail operations moved into the VC and over the years continued to expand. KPNHA hired its first business manager in 1996. The title changed to executive director in 2006. A bookstore manager was hired in 1997.

Today, KPNHA has two full-time employees and a variable number of part-time employees (typically at least three). The bottom floor of the VC provides office space for three of KPNHA's eight staff members, and storage for KPNHA supplies and merchandise. Recent accomplishments include leading a \$1 million capital campaign to fully restore the nearly 100-year-old Kīlauea Lighthouse. KPNHA averages 90 members a year. Although the number of members in FY10 dropped to 52, dues and donations received from these members to KPNHA's general fund are the highest in the organization's history. The reduction in membership can be explained by some individuals donating instead to the Lighthouse restoration. Bookstore sales reached a high of \$508,000 in 2008, but have dropped in recent years due to the economic decline.

### **5.3.3 Visitation and Visitor Experience**

Two visitor surveys conducted in 2003–2004 and in 2010–2011 at Kīlauea Point NWR provide a detailed overview of visitor demographics, trip characteristics, experience, and opinions about Refuge services, facilities, and recreational opportunities. The first study (Sexton et al. 2005) was conducted in support of an Alternative Transportation Study (ATS) conducted for the Refuge (Parsons Brinckerhoff 2006). The objectives of this survey were to better understand visitor trip characteristics and experience, visitor perceptions on access and transportation options, and visitor valuation of the Refuge and services provided.

The second study (USGS Data Series 643) was conducted as part of the National Wildlife Refuge Visitor Survey (Sexton et al. 2011). This standardized survey was conducted on 53 refuges across the country in order to provide refuge managers, planners, and visitor services specialists with reliable baseline data about refuge visitors and their experiences. The survey was conducted to provide information both at a national level *and* at a field station level to more effectively manage visitor services and facilities across the Refuge System, as well as to inform site-specific management and planning decisions such as CCPs, visitor services step-down plans, and transportation plans. Detail on sampling design, response rates, and sample sizes for each survey can be found in the respective reports.

Nearly all visitors to Kīlauea Point NWR are nonlocal (i.e., not from the island of Kaua'i), from the United States, and most were families. The 2003–2004 study showed that the majority of visitors to Kīlauea Point NWR spend their time at visitor attractions on the North Shore on the day they visit the Refuge. The next most frequent trip pattern includes stops on the North Shore and East Side (south of Kīlauea Point NWR to Līhu'e). About half of visitors went to three or fewer attractions on the island on the day they visited the Refuge. Nearly all visited Kīlauea Point NWR first, second, or third, with half visiting the Refuge first. Other popular stops included Hanalei Bay, Kē 'ē Beach State Park, and Hā'ena Beach State Park.

The largest incidence of travel mode used by visitors while on Kaua‘i is rental vehicle only, followed by a combination of walking and rental vehicle, or a combination of walking, boat, and rental vehicle. Nearly all visitors drive a private vehicle (rental car) to the Refuge (though private tours and taxis are also utilized). There is no public transit option available. Currently there is one fixed route from Līhu‘e to Hanalei serving Kīlauea town on approximately 1 hour headways, from 5:30 a.m. to 10:30 p.m., Monday thru Friday, and 2-hour headways on Saturdays and holidays. The last stop in Kīlauea is in the downtown, commercial shop area, about 1.5 miles from the Kīlauea Point NWR Overlook. The buses do accommodate bicycles. Kaua‘i Bus does not currently have specific plans to expand service beyond downtown Kīlauea. However, in previous Kīlauea Town planning efforts, Kaua‘i Bus has indicated consideration of installing a transit center or more permanent bus stop infrastructure within the downtown area.

Visitors first learned about the Refuge from signs on the highway and friends and relatives. Specific information sources most used to learn about the Refuge include travel guidebooks and visitor brochures. Key information sources used by visitors to find their way to Kīlauea Point NWR include signs on the highway, a road atlas or highway map, or previous knowledge.

Visitors are a nearly equal mix of male and female with an average age around 57 for males and 53 for females. Visitors have, on average, four years of college or technical school. The median level of income is \$100,000–\$149,000/year. Most are first-time visitors to Kīlauea Point NWR and typically their visit is incidental or one of other equal reasons for visiting Kaua‘i. Visitors spend an average of 2 hours at the Refuge, with the largest number of visitors spending 1 hour (compared to 26 minutes in 1988). About half of visitors to Kīlauea Point NWR have been to at least one other national wildlife refuge in the past year. Visitors participate in a variety of activities at the Refuge; the top three activities are photography, bird watching, and wildlife observation. The scenic overlooks, viewing the historic lighthouse, and viewing native seabirds and whales are important to their decision to visit. Nearly all visitors stop by the KPNHA bookstore and view the exhibits during their visit.

*I absolutely love the Kīlauea Point National Wildlife Refuge. We go there every time we go to Kaua‘i (3 times to date). The views and the birds and whale-watching are spectacular in any kind of weather...I want to thank the volunteers and the U.S. Fish and Wildlife [Service] and National Wildlife Refuge System for making this all possible. Places like Kīlauea Point Refuge are our nation’s treasures and it is so critical we nurture and honor them.*

-Survey comment from visitor to Kīlauea Point NWR

Visitors’ overall satisfaction with the services, facilities, and recreational opportunities provided at Kīlauea Point NWR is high, with 86 percent satisfied with the recreational activities and opportunities; 92 percent satisfied with the information and education about the Refuge and its resources; 95 percent satisfied with the services provided by employees or volunteers, and 93 percent satisfied with the Refuge’s job of conserving fish, wildlife, and their habitats. When asked about specific Refuge attributes, visitors reported the following regarding the importance of and their satisfaction with these attributes. All services and facilities provided at Kīlauea Point NWR received high importance and satisfaction ratings, including available, knowledgeable, and courteous employees and volunteers; convenient hours and days of operation; and information kiosks/displays and exhibits about the Refuge. Recreation opportunities provided on the Refuge also received high marks, in particular opportunities for photography and bird and other wildlife viewing. High

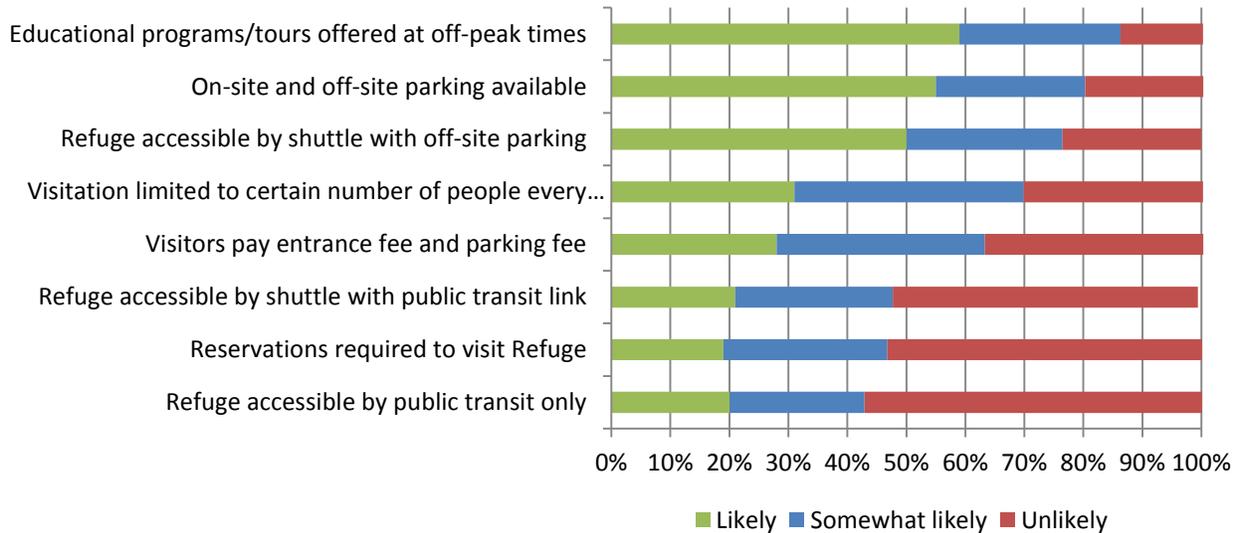
importance and satisfaction ratings indicates “keep up the good work” regarding management. Of the 79 percent of visitors who indicated that they paid a fee to enter the Refuge in 2010–2011, three-quarters agreed that the opportunities and services were at least equal to the fee they paid and nearly all felt the fee was about right, whereas 19 percent felt that the fee was too high (8 percent) or too low (11 percent).

Three-quarters or more of visitors indicated they would spend more time on the Refuge and the surrounding area if the following were offered: a self-guided hike through restored native forest for a scenic view of the lighthouse, Kīlauea Town, ocean, and surrounding mountains (at no cost); an introduction to the Refuge by Refuge staff or volunteers (at no cost). About half of visitors indicated they would spend more time for a guided hike to the summit of an extinct volcano crater to view native seabirds, other wildlife, and World War II bunkers (for a fee); and a guided history tour of Kīlauea Town (for a fee).

As part of the 2006 ATS study and the supporting 2003–2004 survey, visitors to Kīlauea Point NWR were asked about their perceptions of crowding and their preferences for access and transportation options (including a shuttle specifically). These questions were asked in an effort to address methods for improving access and transportation needs in light of identified traffic congestion and parking problems occurring in Kīlauea Town and on the Refuge. In context, visitors to Kīlauea Point NWR were familiar with using a shuttle or bus at another park, forest, or other public facility, though most indicated they did not use alternative transportation in their daily lives.

The majority of visitors did not perceive crowding to be a problem on the Refuge and there seemed to be no association between parking capacity and visitor perceptions of crowding (though winter visitors did perceive some crowding in parking areas when parking capacity was exceeded and overflow parking occurred). When asked about specific transportation-related aspects at Kīlauea Point NWR, all attributes received high marks, including safety of driving conditions, directional signs on highways, safety of Refuge entrance, directional signs on Refuge, and condition of trails/boardwalks. Visitors were asked about options for managing visitation, ranging from a reservation system and fees to off-peak hour offerings to encourage different visitation patterns. Over half of visitors indicated they were likely to visit if educational programs or guided tours were offered at off-peak times. They were also supportive of a choice of on- and offsite parking where offsite parking with a shuttle to the Refuge would cost less than parking onsite. Lastly, they were likely to visit if the Refuge were accessible only by shuttle from offsite parking. Most visitors were *not* likely to visit if the Refuge were only accessible by public transportation, if reservations were required to visit the Refuge, or if the Refuge were only accessible by a shuttle that had a public transit link to other visitor attractions on Kaua‘i (Figure 5-3).

**Figure 5-3. Likelihood of visiting Kīlauea Point NWR versus management options (Parsons Brinckerhoff 2006).**



Regarding a shuttle specifically, visitors indicated they would be willing to wait about 20 minutes to enter the Refuge by shuttle. Key factors that would affect visitors’ decision to visit the Refuge by shuttle were reliable and on-time service, the cost of the shuttle fare and offsite parking that is easy to find and near the Refuge. Visitors were willing to pay higher amounts for a Refuge entrance fee that included a shuttle and guide.

Though alternative transportation was explored more generically in the 2010–2011 survey, only a small percentage of 2010–2011 visitors felt alternative transportation at Kīlauea Point NWR would enhance their experience. However, over half of these visitors indicated that on national wildlife refuges in general, they might be likely to use several alternative transportation options, including offsite parking with trail access, a boat that goes to different points on Refuge waterways, a bus or shuttle that provides a guided tour of the Refuge, or a bus or shuttle that takes passengers to different points on the Refuge.

Bicycle and pedestrian access along the east shore of Kaua‘i between Līhu‘e and Kīlauea Point NWR is mostly limited to shared-use roadway along Highway 56 and through Kīlauea Town. There are also several local residents who access the Crater Hill area on foot or bicycle via a gated community located up Kīlauea Road, about one mile from the Overlook. There are plans for a separate bicycle and pedestrian path to go from Nāwiliwilli to Anahola along the east shore. Portions of this path, known as the Ke Ala Hele Makalae trail, are built, but even when complete, a visitor on bicycle or foot would still be over 10 miles from Kīlauea Point NWR.

### 5.3.4 Visitor Services Management Challenges

High visitation to the Refuge poses several transportation, signage, and access-related challenges for staff. Visitors to the Refuge arrive using State Highway 56 (Kūhiō Highway), turning onto Kolo County Road and then onto the 2-mile Kīlauea County Road which passes through the heart of Kīlauea Town and leads to the Refuge. Residences, as well as commercial sites, line the sides of the

road on this first half-mile stretch. After passing through the center of Kīlauea, the remaining 1.5 miles of Kīlauea Road contains a few residences and open space, and then terminates at the Refuge Overlook. Hawai‘i Department of Transportation traffic counts conducted in 2009 on Kīlauea Road found a two-way average daily traffic load of 4,600 cars in the first half-mile and 1,300 cars in the remaining area between downtown Kīlauea and the Kīlauea Point NWR Overlook. From these counts it is estimated that 25 percent of all traffic on Kīlauea Road is headed to the Refuge, either the Point or the Overlook.

There is little-to-no signage properly directing traffic from the main highway down the County roads to the Refuge. There is also no intelligent transportation system (ITS) that conveys real-time information about parking availability at the Refuge (a comment was made on this issue on one of the visitor surveys). At this time the Refuge is being considered to take part in a Service ITS demonstration project. This demonstration would most likely involve the use of vehicle detection counts at the Refuge to relay parking availability and operation status of the Refuge to visitors out on Kūhiō/State Route 56 Highway via electronic messages. Some further planning, design, public involvement, and compliance would still need to occur before this technology could be tested.

The entrance road from the Overlook to the parking area has a number of issues. At the Overlook, pedestrians do not have a designated path by which to navigate from where they parked to the actual Overlook. They sometimes must weave between cars entering and exiting the Refuge. Although signs indicate that pedestrian use of the access road beyond the entrance gate is not allowed, a number of individuals disregard or do not see the signage and walk down the access road. Traffic congestion also occurs at the Overlook due to its cul-de-sac configuration when there is a queue to enter the Refuge or people are waiting for parking spots at the Overlook.

There is limited advance directional or orientation/information signs to help visitors understand how to access the Point and see the Lighthouse, or what their options are. Visitors who arrive by car typically park to see the view at the Overlook but are confused about whether or not they are supposed to drive or walk past the gate down into the Refuge. There are signs, however, they are not readily noticed by the visitor. It is also unclear to bicyclists whether they are allowed to ride their bicycles past the entrance gate. Residents expressed concern about the impact of tourists on transportation infrastructure and they did not want to see overbuilding of the Refuge’s circle infrastructure to accommodate more visitors (Parsons Brinckerhoff 2006).

The winding, narrow, steep road leading into the Refuge makes for dangerous conditions. Larger vehicles, such as tour buses, have no access because of the road conditions and limited parking facilities. School groups that use school buses are accommodated outside of the hours for the general public. However, the groups often leave after the Refuge has opened, which requires a minimum of two staff to stop traffic to allow the bus to use the access road, as well as a staff member to work in the entrance booth. Bicycle use of the access road is also an issue for many of the same reasons cited for pedestrians.

Parking is often insufficient at the Refuge, especially during peak visitation periods (comments were made on this issue in the visitor surveys). At such times, Service staff must be stationed to direct traffic and promote safety when the parking lot is congested. When visitation exceeds parking capacity, including reasonable overflow limits, Service staff place a sign at the entrance gate to indicate that public entry into the Refuge is temporarily closed. During these times, a staff member is stationed at the entrance gate to facilitate a one-car-in, one-car-out operation. Such overflow conditions not only prevent Refuge staff from conducting other key duties such as providing talks

and interpretive opportunities, but also degrade the quality of wildlife habitat, negatively impact the visitor experience, and undermine the Service's ability to fulfill its goals for wildlife-dependent uses.

Traffic flow through the existing parking lot is also an issue as shown by visitor survey comments about the steep climb from the lot to the booth, limited parking, and the tightness of the parking area. There are two paved parking areas, the upper and lower lots, which include 32 designated stalls, oriented at 90 degrees to the parking access lanes. The upper lot has one designated ADA-accessible parking stall and access aisle located near the existing fee booth and Point Area Pedestrian Pathway entrance. The two lots are connected on the north side by a paved asphalt pedestrian access ramp which has steep slopes of up to 18 percent. Bollards block vehicular access to this ramp at the north end of each lot. The current parking lot traffic flow in these lots is U-shaped; vehicles must pull-in and pull-out the same direction they came from (no through traffic). Drivers are unable to determine the availability of parking until after entering each respective lot. If parking is unavailable, drivers must back up out of the parking lot in order to turn around and look for parking in other locations.

Vehicles must also avoid pedestrians walking to the entrance fee booth. Grass areas are used for parking during overflow conditions. However, wet grass or slippery conditions can be hazardous and have resulted in accidents. They are also endangered nēnē foraging, roosting, and brood-rearing areas. Traffic cones are used to direct traffic when possible. However, the effort involved for Refuge staff to install and move cones creates additional staffing issues. Through the use of Public Lands Highway Discretionary program funds, the Refuge is planning to undertake minor construction to improve the traffic flow situation in these lots. Included in this work would be improvements and stabilization to the administrative and graveled parking areas and stabilization of the retaining wall below the pedestrian walkway.

After the visitors exit their parked vehicles, there is a lack of information and signage to let them know where they can and cannot go, leading to confusion. There are several buildings adjacent to the parking areas; however, the Lighthouse, restrooms, and VC are not visible from the parking lot. Therefore, visitors are often confused about how to get to these facilities, as well as the existing buildings and where they should go. In the visitor surveys conducted, several comments about needing better signage were recorded.

The transportation, signage, and access issues also pose a danger to native wildlife. There is threatened 'a'o or 'ua'u kani habitat on the side of the narrow, curving road leading into the Refuge, which makes regrading or expanding this road problematic. Nēnē also nest and rear young along this road and have been killed or injured, despite the wildlife and slow down signs posted and speed bumps.

As a result of these issues and staff desire to provide quality visitor services experiences (versus increasing visitation numbers), several studies were conducted to provide solutions. Alternative transportation systems (ATS) were evaluated, including a traffic, visitor, and parking study; visitor and community survey; and Refuge visitor projection report. The 2006 ATS study provided five alternatives for consideration to deal with current transportation issues and anticipated rise in island visitor numbers:

- No improvements, which would keep current status;
- Minor improvements, transportation system management, and transportation demand management. These would include physical or operational changes to increase effective capacity through improved management of parking resources, or they would redistribute

demand to less busy times;

- Moderate improvements to increase capacity, which would include physical improvements such as additional parking and/or widening roads;
- Voluntary shuttle service with private vehicle access, which would institute a shuttle system from a new offsite hub facility while continuing to allow private vehicles onto the Refuge;
- Mandatory shuttle service, which would prohibit public parking beyond the entry gate at Kīlauea Point NWR and require all visitors to use a shuttle system from an offsite hub facility.

It should be noted that in the Kīlauea Town Plan planning process, the shuttle bus for visitors was heavily discussed in the public workshop discussions (County of Kaua‘i 2006). The Kīlauea community’s interest was to manage visitor demand at Kīlauea Point NWR by using entry fees and other measures and to make only modest changes to parking and transportation rather than take steps that may promote increased visitation to the Refuge.

The report also looked at cost feasibility as well as modeled several different case scenarios related to visitor numbers and anticipated use. Several of the recommendations and analyses were integrated into the actions described in Chapter 2 of the CCP, as well as the effects analysis in Chapter 6 of the draft CCP/EA. This study can be found at [http://www.cflhd.gov/lrtp/documents/projects/KPNWR\\_ATS\\_FINAL.pdf](http://www.cflhd.gov/lrtp/documents/projects/KPNWR_ATS_FINAL.pdf).

In addition to the 2006 ATS report, a Transportation Assistance Group (TAG) was convened in 2009 to assist the Service in further refining data and recommendations to pursue regarding transportation, especially as it relates to the CCP. In addition to the problems already identified, additional issues identified by TAG included:

- Transit viability concerns due to visitation patterns;
- Fee collection location creates circulation problems, does not capture visitors at the Overlook, and the flat rate does not encourage the use of alternative transportation;
- Constrained footprint in which to expand or support transportation infrastructure;
- Visitation is expected to grow and to remain diverse.

TAG provided a series of recommendations for the Refuge to consider. Most focused on incorporating transportation goals and planning into the CCP process. The recommendations were:

- Revisit previous approach of pursuing NEPA analysis funds for 2006 ATS Study; integrate transportation planning with CCP and town planning;
- Consider proposals for additional funding from other sources;
- Develop transportation goals and objectives, and an assessment of needs;
- Continue productive stakeholder partnerships; play a leadership role;
- Adopt an incremental approach; move away from planning and toward implementation; experiment with operational changes, such as:
  - Change operating hours—e.g., closing once per week, opening 1 hour later or earlier on particular days—to attempt to address anticipated traffic/parking problems, and/or to offer new services (such as sunrise hikes) that might smooth out demand over the course of the day, reducing the need to increase parking capacity;
  - Charge differential fees (subject to the Refuge’s fee authority), depending on the level of crowding by time of day;

- Work with cruise operators to coordinate transit from cruise ships docking at Kaua‘i;
- Install temporary traffic humps in town to determine how effective they could be at slowing traffic;
- Test a parking reservation system to enable advance planning for managing visitor traffic and parking;
- Test variations on the one-on, one-off protocol for managing visitor car access;
- Require staff to park offsite, providing transit or carpooling, in order to free up additional parking spaces for Refuge visitors;
- Arrange a transit demonstration service;
- Pursue small-scale infrastructure improvements;
- Identify data needs and collect data to fill gaps;
- Scope other planning efforts.

In March 2011, another workshop, the CCP Visitor Services and Alternative Transportation Workshop, was conducted to assist in incorporating TAG and other transportation-related study recommendations into the CCP. Refuge and Service regional staff, along with technical advisors from Federal Highway Administration-Central Federal Lands Division, U.S. Department Of Transportation, Volpe Center, U.S. Geological Survey, Hawai‘i Department of Transportation, Kaua‘i Bus, and Kaua‘i County participated in this workshop. The group examined CCP goals and identified how transportation related to achieving these goals. These transportation objectives and goals were broadly folded into the alternatives discussed in Chapter 2 in the CCP (e.g., adopting an incremental approach at first to include demonstration projects and small, incremental changes for infrastructure and operations).

More specific transportation planning and implementation will take place via SDMPs that take their direction from the CCP. The Refuge has received funding from the Federal Transit Administration’s Paul S. Sarbanes Transit in Parks Program to assist in planning for the implementation of the transportation components that emerge from the CCP. The study will provide recommendations on how to implement components, such as data collection; coordination with other entities; and additional planning required to implement elements.

## **5.4 Wildlife-Dependent Public Uses**

The Improvement Act identified hunting, fishing, wildlife observation and photography, and environmental education and interpretation as wildlife-dependent, priority public uses for the Refuge System.

### **5.4.1 Hunting**

The Refuge is not open for hunting. However, there are other lands (e.g., state forest reserves) on the island where public hunting is offered.

### **5.4.2 Fishing**

The Refuge is open for recreational fishing. From 2010 to 2013, the number of participants per year ranged from 18 to 104 (USFWS 2014). Fishing occurs at Kāhili Quarry (sea) and the Kīlauea River (estuary). In addition, cultural Native Hawaiian fishing access is granted to the East Cove of Kīlauea

Point. Participants must sign a waiver as well as receive an orientation on sensitive areas. For additional information please refer to Appendix B.

### **5.4.3 Wildlife Observation and Photography**

Most of the wildlife viewing and photography occurs on the Point or at the Overlook. The Refuge offers exceptional opportunities for wildlife observation and photography and is one of the best accessible locations in the main Hawaiian Islands for viewing wildlife as it has a high diversity of breeding birds at one location. Six to eight species of seabirds, as well as Hawai‘i’s State bird, the endangered nēnē, can readily be seen by the majority of visitors. The sheer number of birds, as well as their proximity, makes for a high-quality viewing and photography experience.

The National Oceanic Atmospheric Administration (NOAA) also administers the Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) in the waters surrounding the Refuge, and endangered koholā (humpback whales) are readily seen offshore and photographed from December to April. Groups of nai‘a (spinner dolphins), ‘Īlio-holo-i-ka-uaua (Hawaiian monk seal), and honu (green sea turtle) can also be seen from the Point. In addition, due to climate change and associated sea level rise, protected areas like the Refuge will become increasingly important for the persistence of seabird populations in the main Hawaiian Islands.

General information about the wildlife is provided on the Refuge’s website; however, it does not include information such as current highlights, sightings, or wildlife counts. A wildlife checklist is offered onsite, but is directed at avid wildlife watchers. Viewing scopes are set up in multiple locations around the Point and binoculars are provided for loan in order to enhance wildlife viewing. Volunteers help visitors use the scopes and binoculars, identify species, point out and provide information about wildlife behavior, and provide interpretation about the Refuge and its resources. In the past, the Refuge utilized a remote camera focused on a nesting mōlī or ‘ā (red-footed booby), which then sent a live video feed to the visitor Contact Station. Staff and volunteers regularly receive requests to re-institute these cameras. Currently, wildlife observation and photography programs, workshops, and activities are not provided on a consistent basis and could be expanded or enhanced.

While the best viewing opportunities are on the Kīlauea Point Peninsula, additional opportunities are provided at the overlook at the entrance to the Refuge, as well as on Crater Hill (offered in the past but discontinued in 2003). They also provide a different perspective than is provided from the peninsula.

Between 2010 and 2013, total wildlife observation visits annually ranged from 366,890 to 376,937 and photography ranged from 290,000 to 300,100 (USFWS 2014). Many of the 2010–2011 visitor survey comments reflected visitor enjoyment of seeing the wildlife and habitats and identified these resources as making the Refuge unique.

### **5.4.4 Environmental Education**

Environmental education occurs mostly on the Point. School groups participating in EE programs generally arrive at the Refuge at around 8:30 a.m., before the Refuge opens. This way, school buses can easily maneuver the roadway and have adequate room to park without the complication of regular visitor traffic. The children also have the Point to themselves and are not distracted by the large number of visitors. Although most school groups try to leave before 10:00 a.m., they often leave after the Refuge has opened, which then requires a minimum of two staff to assist in safely

getting the children through the busy parking lot to their bus, as well as to stop traffic to allow the bus to exit the Refuge. By departing at 10:00 a.m., this leaves only one hour for the EE program given loading, unloading, restroom breaks, etc., which does not lend itself to a high-quality EE program. The small window during which EE is offered (8:30 to 10:00 a.m.) means many schools on the west, south, and east sides of the island are unable to participate because of the travel. Only seven percent of Kaua‘i’s public and charter school students (K–12) are within a 20-minute drive of the Refuge. For 68 percent of the students, it is at least a 40-minute drive to get to the Refuge, and for nearly 30 percent it takes more than an hour.

In 1987, Congressional funding provided for the design and construction of an EE Center. Today, the main floor of this facility serves as the VC and houses the bookstore operated by KPNHA (the bookstore was originally located in the Contact Station adjacent to the Lighthouse). The bottom floor of the VC has a multi-purpose room. The size of the multi-purpose room is often insufficient for EE programs. As such, the Contact Station adjacent to the Lighthouse is frequently used for EE, but staff often find they are racing to pack up their EE supplies and reorganize the room as visitors begin arriving at the Refuge. From 1997 to 2007, a portion of the bottom floor also provided office space for the Refuge’s EE Specialist. It currently provides office space for three KPNHA staff members, and storage for KPNHA supplies and merchandise.

Beginning in 1985, when the Refuge was established, a dedicated cadre of volunteers and KPNHA developed EE materials. During the summers of 1986 and 1987, an intern developed additional EE materials for teachers, and a teacher’s manual was later completed as part of an intern-led effort. In 1988, over 3,000 students participated in EE programs at the Refuge. In 1997, the Refuge hired a full-time EE specialist and more materials such as field trip leader packets and a traveling trunk about Refuge seabirds were created. In 1999, through a partnership with a university, a website was established to allow classes to follow the flights of foraging mōlī. In 2001, the Jason Project brought the Refuge’s wildlife to schoolchildren via satellite. From 2000 to 2001 the EE specialist position was vacant and the position was later replaced with a Volunteer/EE coordinator position, with 40 percent of the time devoted to EE. In 2004, the additional responsibilities of overseeing the daily operations of the Refuge’s VS program and the fee program, as well as supervising the Refuge ranger staff, were added to the position, leaving even less time for management of the EE program. In 2009, a junior ranger program was instituted.

During the summer months, the Refuge can receive over 100 visitors under the age of 16 per day. Due to Lighthouse restoration during the 2010–2011 school year, the Refuge was able to accommodate only a limited number of school visits onsite. In turn, staff developed a program whereby 12 North Shore second grade classes followed the life history of the mōlī throughout the school year. The program included five visits by a Refuge AmeriCorps member or ranger to each class, along with a culminating field trip to the Refuge.

Since budget sequestration in 2013 and the resulting loss of staff, with the exception of the Albatross Life Cycle program managed by one volunteer, the Refuge has not been able to conduct onsite EE programs. Instead, the EE program has been adapted to allow elementary classes access to the Refuge via a “short” bus (which carries 25 passengers—and is paid for by KPNHA) during public hours. They are offered a program that they can lead, or they can choose to utilize onsite interpretive signs. A ranger-led program is no longer available, as was traditionally done. Although offered in the past, the Refuge does not currently conduct teacher trainings.

The Refuge conducts EE programs throughout the year with the greatest number of students visiting from January through May.

Between 2010 and 2013, education participants involved in on- and offsite EE programs ranged from 7,200 to 12,032 per year (USFWS 2014). In 1988, 3,000 students participated in EE (USFWS 1989). KPNHA provides funding for bus transportation for schools that visit the Refuge, which is a significant contribution to the EE program.

### **5.4.5 Interpretation/Outreach**

Interpretation and outreach occur mostly at the Point and Overlook. Visitors are first welcomed to the Refuge at the fee collection booth. The staff on duty assists in orienting visitors, answering their questions, informing them about wildlife activity that day and advising them of Refuge services offered at the VC and Contact Station (Radio Beacon Building), such as free binoculars for loan and docent interpretive services. Volunteers help visitors use the viewing scopes and binoculars, identify species, point out and provide information about wildlife behavior, and provide interpretation about the Lighthouse, the Refuge, and its resources. Volunteers are the primary means of personal interpretation on the Refuge. The majority of volunteer hours were dedicated to the VS program.

Under optimum conditions, there are at least two volunteers on duty, with one volunteer operating an on-call golf cart to help visitors who may need assistance getting from the parking lot to the VC or Lighthouse. The Contact Station, as well as the area surrounding the Lighthouse, is almost entirely staffed by volunteers. The Refuge is extremely fortunate to have volunteers to provide this person-to-person service as opposed to resorting to self-guided interpretation.

The Refuge has a number of interpretive panels around the Point highlighting native and nonnative plants and wildlife. Some of the panels were done at different times, using different styles, approaches, and materials. These panels are appealing, of a good size, and are well-placed to be visible but not obtrusive. The most recent panels were completed in 1999. The panels are permanent and are in place year-round. Wildlife at the Refuge is seasonal. For example, whales and albatrosses are found in the winter months. Thus, this can cause some confusion for the visitor.

When entering the VC, people often expect to see exhibits relating to the Kīlauea Point Light Station or the wildlife at the Refuge. However, some of the exhibits are only tangentially related or are fully irrelevant to the site. This may prove disorienting to the visitor who may have expectations of finding information regarding the Refuge. In addition, due to the 1.5 million plus visitors who have passed through the VC since it reopened after Hurricane 'Iniki in 1994, as well as the open air conditions of the building, the exhibits are badly worn. They are out of date and interpretive messaging for children is lacking (some comments from the 2010–2011 visitor surveys indicated the desire for more updated displays). In the past, visitors viewed a video presentation based on refuges in their home state. However, due to maintenance issues having to do with electronics in the salty, open-air environment, they were removed.

In 1989, the Contact Station was remodeled and new interpretive displays were added. The building contains an interpretive display on the history of Kīlauea Lighthouse, a desk staffed by volunteer docents, binoculars for loan, as well as an area to sit and watch a video about the Refuge.

One of the most popular and notable features of the Refuge is the historic Kīlauea Lighthouse. Since restoration, visits into the Lighthouse are only possible on a guided tour. Since Lighthouse Day (the

first Saturday in May) in 2014, the Refuge started offering guided tours weekly, dependent upon staff and volunteer availability. Guided tours require temporary modifications of the interior and an intensive staff and volunteer effort. Free tour tickets are issued 60 minutes prior to the start of the tour and each tour can accommodate 15 people, every hour on the half hour beginning at 10:30 a.m. with the last tour at 2:30 p.m. (except on Lighthouse Day, when the Lighthouse is open until 7 p.m.).

The tours take 30 minutes given the time it takes to get everyone up the narrow staircase to the top of the Lighthouse, provide opportunities for visitors to look around and take photographs in the small area, and then make their way back down. Both the community and visitors regularly express a strong desire to have greater access to the interior of the Lighthouse and to see it lit. Overall, the frequency of opportunities for the public to experience the interior of the Lighthouse on guided tours is variable; tours may in the future occur more or less frequently than once per week depending upon the availability of staff and volunteers.

Most of the Refuge's current outreach efforts have been conducted on an ad hoc basis to meet the needs of an individual event or program. While this has resulted in favorable results in some individual instances, its overall effect has been a scattershot approach to communications. Existing resources dedicated to outreach are limited. Refuge staff often note that the public confuses the Service with State wildlife agencies and the National Park Service. Anecdotal evidence suggests that most are not aware of who the Service is, while an even greater number are not aware of what the Service does or why it does this work. Messages describing how the Service is different from other government agencies, how national wildlife refuges are different from other public lands, and why the Service's work is important to people are currently absent.

Between 2010 and 2013, participants engaged in on an offsite talks and programs ranged from 160,600 to 210,528 per year (USFWS 2014).

#### **5.4.6 Cultural Resources Interpretation**

Interpretation of historic structures such as the lighthouse occurs daily. Additional cultural resources interpretation is available during National Wildlife Refuge Week with a special tour highlighting the Native Hawaiian and plantation cultural resources on the Refuge.

### **5.5 Other Refuge Uses**

Between 2010 and 2013, participants in other recreational activities ranged from 21,840–22,000 per year (USFWS 2014). The majority includes secondary public uses involving access through the Refuge at Kāhili Quarry or near the mouth of Kīlauea River (aka Kāhili Stream) for boating, including launching and loading of canoes, kayaks, paddle boards, and surfboards; and for stream, beach, and ocean uses (such as snorkeling, sun bathing, surfing, swimming, and walking). Horseback riding is allowed along an approved easement.

### **5.6 Illegal Uses**

According to annual law enforcement Refuge System reports between 2008 and 2010, illegal uses included trespass, violation of liquor laws, drug possession, illegal hunting, off-roading, vandalism, drunkenness, theft, weapons possession, disorderly conduct, and presence of suspicious persons. Incidences reported ranged from 19–29 per year. Most illegal uses occur during evening hours at the

overlook (e.g., late night drinking) or unintentional trespass by fishermen along the Refuge’s coastline or at Kāhili (or Rock Quarry) Beach.

The Service law enforcement issues on lands and waters of the Refuge are under the jurisdiction of the Service Zone Officer based in Honolulu and the KNWRC law enforcement officer on Kaua‘i. The role of both is to enforce laws and document law enforcement incidents. They also coordinate and meet with Refuge staff and law enforcement partners. Primary laws and regulations enforced include the:

- Administration Act;
- Lacey Act;
- ARPA;
- ESA;
- MBTA;
- Marine Mammal Protection Act;
- Code of Federal Regulations.

Zone and Refuge officers are also empowered to enforce all criminal laws. Activities could include issuing traffic citations and warrants for arrest as they relate to drugs, trespass, hunting, fishing, and the taking of wildlife on Federal lands and, in some instances, boating safety related to refuges. The KNWRC officer will also be responsible for enforcing SUPs. Service officers often partner with other law enforcement agencies, such as the Division of Conservation and Resources Enforcement-DLNR and other Federal law enforcement agencies.

## **5.7 Area Outdoor Recreational Opportunities and Trends**

This section provides an overview of outdoor recreational opportunities and trends on Kaua‘i.

### **5.7.1 Nearby Recreational Opportunities**

The island of Kaua‘i provides myriad recreation opportunities on a variety of public and private lands and waters. Kaua‘i is home to 3 national wildlife refuges (including Kīlauea Point NWR); 23 State parks and boating facilities; 68 County parks; and 13 private parks, camps, and gardens (Hawai‘i DLNR 2009). The Hawai‘i State Parks Survey (OmniTrak Group Inc. 2007) conducted in 2003 and 2007 found that millions of people visit State parks annually. Four of the top ten most visited State parks are on Kaua‘i: Wailua River State Park, Hā‘ena State Park, Waimea Canyon State Park, and Nā Pali Coast State Wilderness Park.

Preliminary results from the 2011 Kaua‘i Parks and Recreation Master Plan Public Input Survey indicate that Kaua‘i residents visiting County parks most commonly engaged in walking/jogging/running, swimming/surfing/paddling, and picnicking (County of Kaua‘i 2013). Hunting is not allowed in County parks, but more than a third of the residents surveyed indicated they had fished in county parks (Miller pers. comm 2011)

Table 5-1 provides an overview of recreation activities and the number of areas providing these activities on Kaua‘i. Though not listed, wildlife viewing is a component of many of the activities and also is an activity in its own right. Kaua‘i is home to many indigenous, migratory, and introduced

bird species, including a number of endangered or threatened species. Additionally, the island provides opportunities to see marine life such as whales, dolphins, sea turtles, and saltwater fish through activities such as boat tours, swimming, snorkeling, SCUBA diving, and scenic lookouts.

**Table 5-1. Number of areas providing specific recreation activities on Kaua‘i<sup>1</sup>.**

<b>Recreation Activity</b>	<b>Number of Areas Providing Activity</b>
Fishing (shore or boat)	39
Picnicking	23
Beach activities (including snorkeling, SCUBA diving, swimming, and surfing)	22
Boating (motorized, sailing, kayaking, and canoeing)	19
Camping (established sites and wilderness)	18
Education/interpretative display <sup>2</sup>	13
Hiking <sup>2</sup>	10
Scenic lookouts <sup>2</sup>	7
Historic/cultural sites <sup>2</sup>	7
Botanic gardens/nature parks	6
Hunting	3
Bicycling	1

<sup>1</sup>Data from Hawai‘i Department of Land and Natural Resources, 2009.

<sup>2</sup>Activities which Kīlauea Point NWR offers.

Near the Refuge is Kāhili Beach where surfing, fishing, picnicking, diving, camping, and other recreation occurs; about 10–200 persons use the area daily (USFWS 1989). Access to Kīlauea Falls is no longer available and access to Slippery Slide has been closed for at least a decade. Both are at the upper (mauka) part of the Kīlauea River.

## 5.7.2 Outdoor Recreation Rates and Trends

### *Wildlife-Related Recreation Rates and Trends*

According to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (USFWS and U.S. Census Bureau 1993, 1998, 2003, 2008), thousands of people participate in wildlife-related recreation each year in Hawai‘i (Table 5-2). A large decline in numbers for away-from-home wildlife watching and fishing occurred from 1996 to 2001 and was driven primarily by declines in the numbers of nonresidents participating in these activities. These declines mirror the drop in overall visitation to Hawai‘i in 2001 as a result of the events of September 11, 2001 (HDBEDT 2001). For example, in 1996, 130,000 anglers were nonresidents; in 2001, that number had dropped to 41,000. In contrast, the number of Hawai‘i residents participating in wildlife watching actually increased from 1996 to 2001. Numbers increased from 2001 to 2006 for all types of wildlife-related recreation overall, though not all groups increased. For instance, the number of nonresident anglers increased to 65,000 from 41,000 while the number of resident anglers decreased to 92,000 from 109,000.

**Table 5-2. Number of people participating in wildlife-related recreation in Hawai‘i over time.<sup>1</sup>**

Activity	1991	1996	2001	2006
Wildlife watching	N/A	325,000	220,000	262,000
Away-from-home	321,000	255,000	141,000	154,000
Around-the-home	217,000	111,000	120,000	145,000
Fishing	202,000	260,000	150,000	157,000
Hunting	18,000	23,000	17,000	18,000

<sup>1</sup>Data from USFWS and U.S. Census Bureau, 1991, 1996, 2001, and 2006.

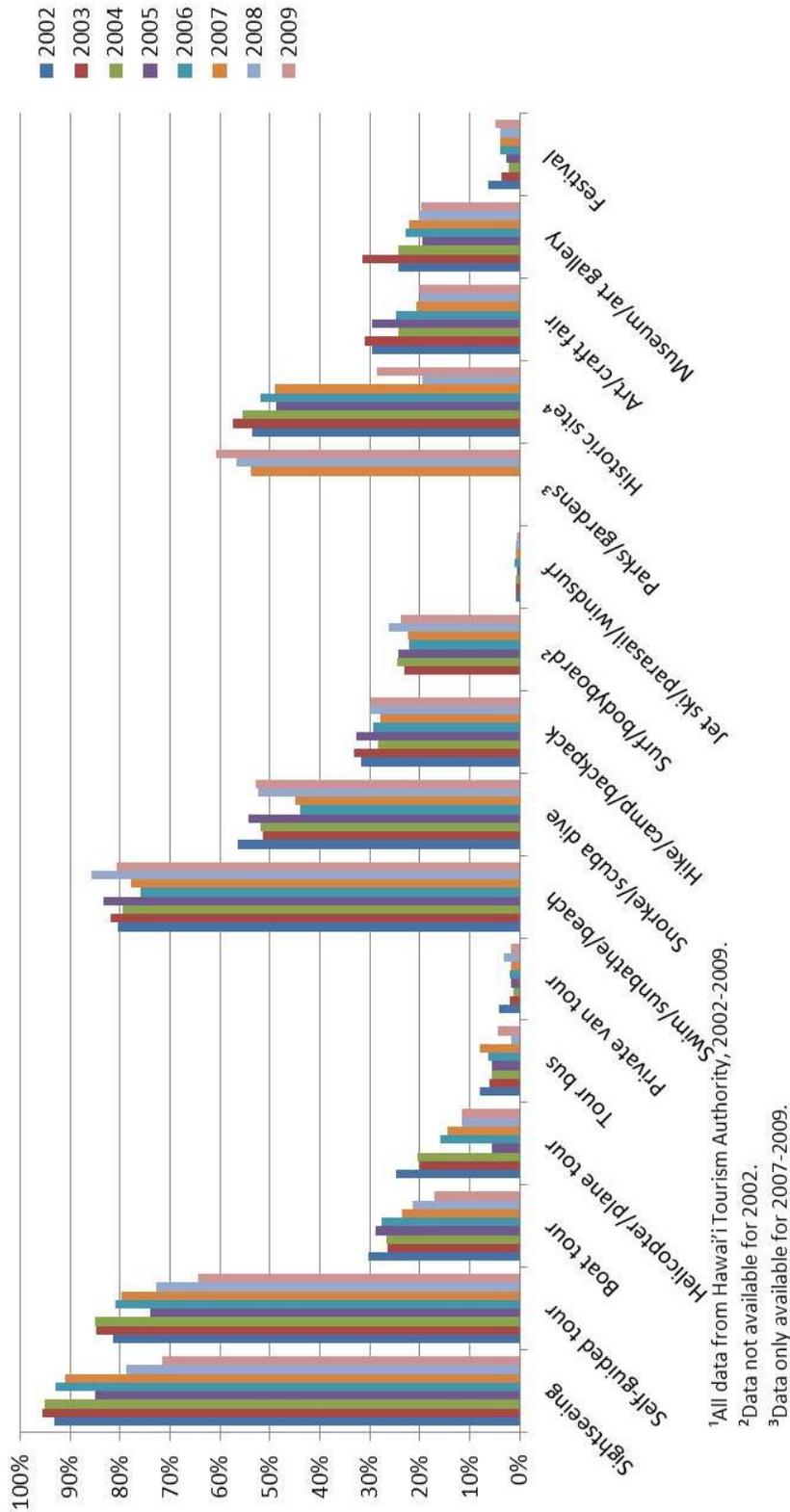
***Non-Wildlife-Related Recreation Rates and Trends***

Visitors to Kaua‘i tend to participate in the same recreation activities consistently over time, according to the Visitor Satisfaction and Activity Report produced by the Hawai‘i Tourism Authority (2002–2009). Figures 5-4 through 5-6 show the activities over time of visitors from the western U.S., eastern U.S., and Japan. The majority of visitors from the U.S participated in self-guided sightseeing and beach activities such as swimming and sunbathing. Among U.S. visitors, there appears to be a decreasing trend in participation in sightseeing in general including sightseeing by self-guided tour, boat, aircraft, and tour bus over this time period. Participation in activities such as swimming, snorkeling, hiking, surfing, and jet skiing remained relatively constant. Cultural activities such as visiting historic sites, arts and crafts fairs, and museums and art galleries also seemed to be declining, while visiting parks and gardens was increasing.

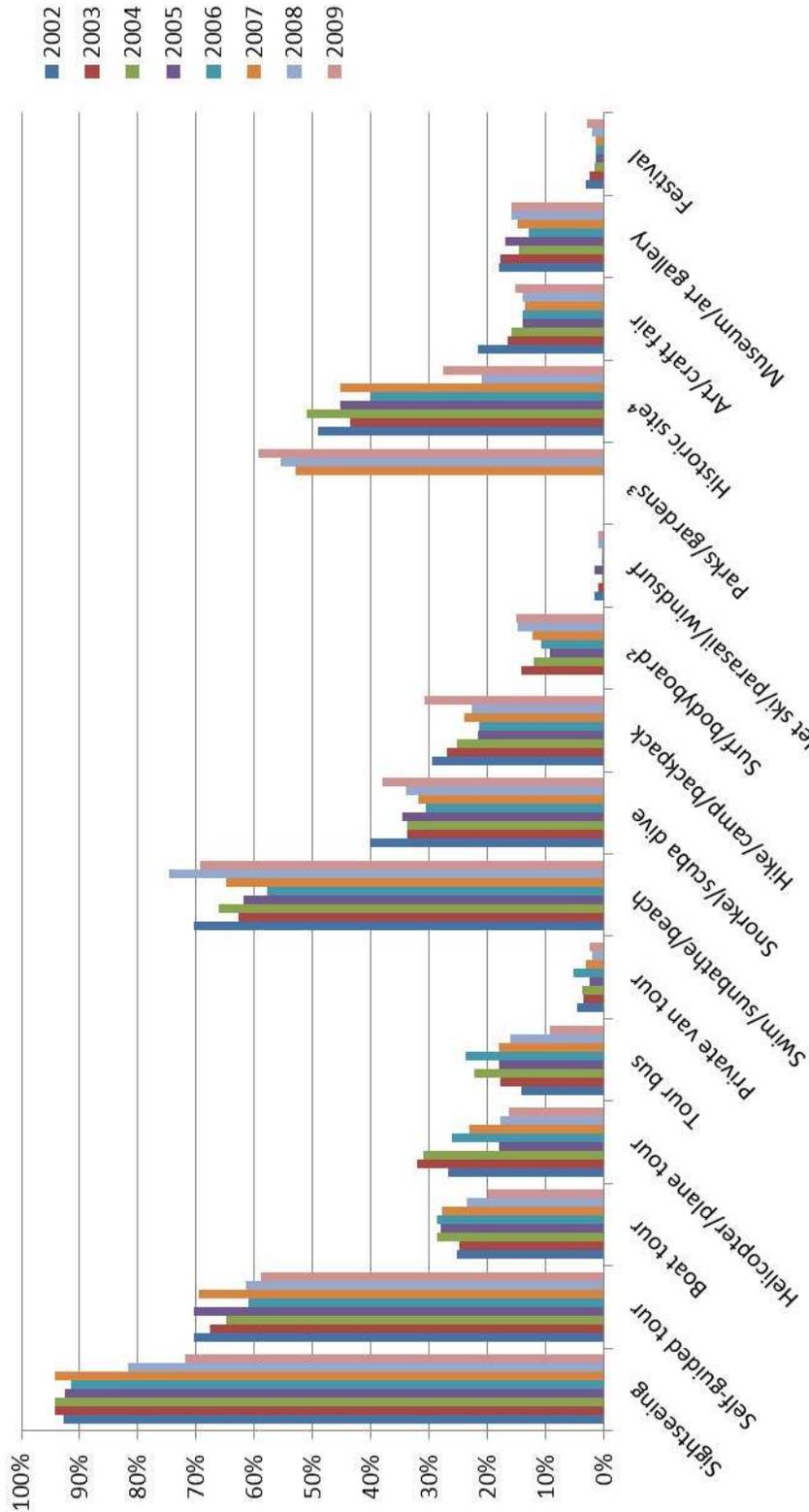
The majority of visitors from Japan participated in sightseeing via tour bus and they were less likely to participate in outdoor recreation and cultural activities than U.S. visitors. Participation in most activities seems to have remained constant among Japanese visitors over this time period. It does appear that tour bus sightseeing decreased in 2008 and 2009 while self-guided sightseeing increased.

The Hawai‘i State Parks Survey (OmniTrak Group Inc. 2007) found that most of the visitors to State parks on Kaua‘i in 2007 were nonresidents (86 percent), which was not the case on Maui (69 percent), Hawai‘i Island (57 percent), and O‘ahu (53 percent). The most common activities participated in while visiting the parks on Kaua‘i in 2007 were observing scenic views or taking photographs (83 percent), hiking or walking (35 percent), recreating in the ocean or other water bodies (29 percent), seeing park flora and/or fauna (28 percent), picnicking or having an outing (23 percent), and visiting historical or cultural sites (16 percent). Nonresidents were more likely to observe scenic views or take photographs, hike or walk, and see park flora and fauna than nonresidents, while residents were more likely to fish or hunt and camp than non-residents.

**Figure 5-4. Percentage of visitors from the western U.S. participating in certain recreation activities on Kaua‘i over time.<sup>1</sup>**



**Figure 5-5. Percentage of visitors from the eastern United States participating in certain recreation activities on Kaua‘i over time.<sup>1</sup>**

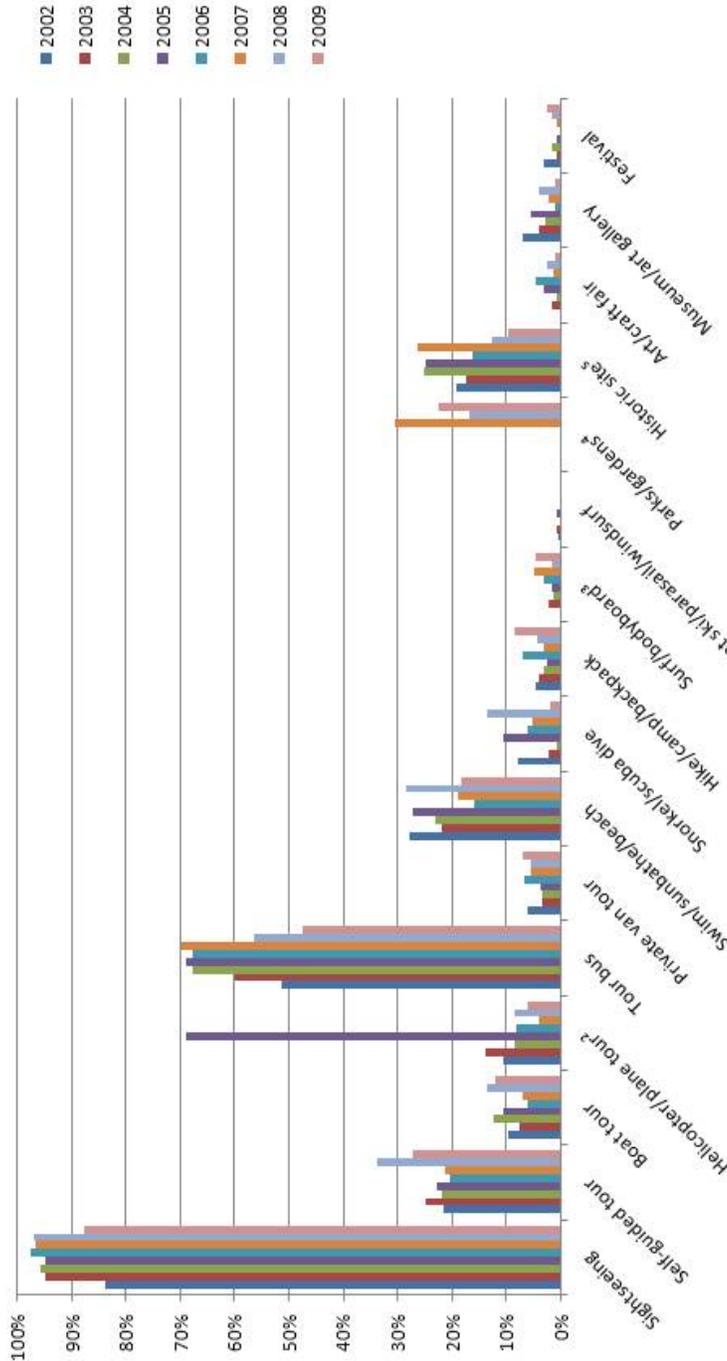


<sup>1</sup>All data from Hawai'i Tourism Authority, 2002-2009.

<sup>2</sup>Data not available for 2002.

<sup>3</sup>Data only available for 2007-2009.

**Figure 5-6. Percentage of visitors from Japan participating in certain recreation activities on Kaua‘i over time.<sup>1</sup>**



<sup>1</sup>All data from Hawaii Tourism Authority, 2002-2009.  
<sup>2</sup>The reason for the large increase in helicopter/plane tours in 2005 is unknown.  
<sup>3</sup>Data not available for 2002.  
<sup>4</sup>Data only available for 2007-2009.  
<sup>5</sup>2002-2007 data is for all historic sites; 2008 and 2009 data is for non-military historic sites only.

## 5.8 Social/Economic Environment

A regional economic analysis provides a means of estimating how current management and proposed management activities affect the local economy. This type of analysis provides two critical pieces of information: it illustrates the Refuge's contribution to the local community and it can help determine whether economic effects are a real concern in choosing among management alternatives.

In order to assess the economic contributions and impacts to the local economy of visitation and management at Kīlauea Point NWR, an appropriate local region must be defined. For the purposes of an economic impact analysis, a region (and its economy) is typically defined as all counties within a 30–60 mile radius of the impact area. Only spending that takes place within this regional area is included as stimulating changes in economic activity. The size of the region influences both the amount of spending captured in the local region and the economic multiplier effects that capture the circulation of money within the local economy. Kīlauea Point NWR is located in the County of Kauaʻi. As an island economy, most of the economic activity related to the Refuge occurs within the island. Therefore, the economic impact region for the Refuge is defined as the County of Kauaʻi.

The management activities of economic concern for this analysis are:

- Refuge purchases of goods and services within the local community;
- Refuge personnel salary spending;
- Revenues generated from Refuge Revenue Sharing;
- Spending in the local community by Refuge visitors.

The next sections describe the socioeconomic characteristics and trends in Kauaʻi, and highlight key Refuge activities that affect the local economy.

### *Communities near Kīlauea Point National Wildlife Refuge*

Kīlauea Town is the gateway to Kīlauea Point NWR. The town covers about 1.5 square miles, and had a population of 3,072 residents in 2010 (U.S. Census Bureau 2011b). As a former sugar plantation town, Kīlauea has a rural quality, and residents feel a strong connection to the agricultural heritage of the area (County of Kauaʻi 2006). Visitors travel to Kīlauea mainly to visit the Refuge; however, some also enjoy hiking in the area (Go Hawaiʻi 2011). The town offers several restaurants, specialty gift stores, and one of only two gas stations on Kauaʻi's North Shore. In 2005, 13.7 percent of visitors surveyed at Kīlauea Point NWR reported Kīlauea as the primary town in which their local purchases were made (Sexton et al. 2005).

In addition to the visitor survey conducted in 2003–2004, a survey of residents of Kīlauea Town was also conducted (Sexton et al. 2005) in support of the Alternative Transportation Study conducted for the Refuge (Parsons Brinckerhoff 2006). The objectives of this resident survey were to better understand residents' use and experience of the Refuge, community/Refuge relations, community quality of life, and community preferences for alternative transportation options as they might affect Kīlauea Town and its residents.

The survey found that community visitation to the Refuge is somewhat limited. Most had been five or fewer times in the past 5 years. About one-third had attended special events held at the Refuge. Overall, residents who visit the Refuge participate in activities similarly to other visitors (though they

tended to rank viewing native wildlife and being in a natural area higher than visitors) and are satisfied with activities and services provided by the Refuge. Residents are supportive of increased environmental education, guided hikes, and increased access (though in the 2003–2004 survey they did not want the Refuge to become too crowded and another “all-American amusement park”).

In terms of quality of life, residents of Kīlauea Town were satisfied with community living and felt things were going well for them at the time of the survey. They felt community issues most needing to be addressed were slowing growth and development and improving local land use planning. Community attributes that residents felt needed concentrated efforts (they were rated as high importance and low satisfaction) included parks and open space, walkways/bike paths, number of stores and shops, affordable housing, and reliable and convenient public transit. These findings also reflect what is in the Kīlauea Town Plan.

Having the Refuge nearby is important to residents (now and for future generations), even though many do not regularly spend time there. The biggest benefits to being a neighbor of the Refuge are preservation of the land and available access to the area. The majority of residents indicated they trust and have confidence in Kīlauea Point NWR staff and decisions made by the Service.

Residents cited reliable public transit, walkways, and bike paths as important features when selecting a community in which to live. Residents indicated there were some impacts to the community from visitors to the Refuge. Traffic congestion in town, traffic safety, and traffic noise were perceived as at least a small problem (especially if visitor numbers increased). However, residents generally did not feel their personal privacy or disruption of daily activities were a problem.

Most residents considered pedestrian and/or bike access to the Refuge and the completion of the Kīlauea Road walking path to be desirable Refuge access/transportation options. Residents were more evenly split in the desirability of a North Shore shuttle that would link to Kīlauea and the Refuge as a Refuge transit option. When asked what factors may be important in encouraging residents to support a shuttle system, community respondents ranked the reduction of traffic congestion on Kīlauea Road, the preservation of homeowner privacy, offsite parking for a shuttle near the highway, and a shuttle system that benefits the local economy as the top factors. Community members were less willing to pay a Refuge fee that included a shuttle and guide compared to just an entrance fee (as opposed to visitors). Residents indicated a desire for self-guided hikes to scenic views, guided hikes to Crater Hill, and environmental programs for school and community groups.

Other issues tied into the Kīlauea community are recent discussions about development of a supermarket and other stores where the post office is located. This has prompted renewed interest by the Kīlauea Town residents about a bypass road (identified in the Kīlauea Town plan) that would link Kūhiō Highway to this development area, thereby directing traffic from the highway away from the main part of town. Given that an estimated 25 percent of the traffic on Kīlauea Road is attributable to visitors to the Refuge (Parsons Brinckerhoff 2006), the Refuge is engaged with the Kīlauea Neighborhood Association and other groups in these discussions and how it may impact Refuge visitation and community concerns about traffic.

In 1992, prior to Hurricane Iniki, there was less local traffic and more visitor traffic through Kīlauea than in 1998. Although current visitor traffic on Kīlauea Road is lower than in 1992, local traffic has increased due to land use changes, such as the construction of a new subdivision in Kīlauea and the relocation of the post office (Parsons Brinckerhoff 2006). The Kīlauea Town Plan also calls for looking at transit centers (either on Kūhiō highway or Kīlauea Town) to manage traffic.

Other communities near the Refuge include Princeville, Kapa‘a, and Līhu‘e. Princeville is located on the North Shore of Kaua‘i in proximity to Kīlauea Point NWR and Hanalei NWR. A scenic overlook that provides visitors with views of the Hanalei Valley is located just past the Princeville turnoff on Kūhiō Highway. The overlook provides panoramic views of the lo‘i kalo on Hanalei NWR and the Wai‘oli Hui‘ia Mountains. Princeville was home to 2,066 residents in 2010 (U.S. Census Bureau 2011b). Visitors are drawn to Princeville by its remarkable resort features, with golf courses overlooking the Pacific Ocean, as well as outdoor recreation opportunities on public lands and waters (Princeville at Hanalei 2011).

Kapa‘a is one of the larger towns on the island of Kaua‘i with 10,060 residents in 2010, or 16 percent of the island’s population (U.S. Census Bureau 2011b). Covering almost 10 square miles, Kapa‘a has a local population density of 971 persons per square mile. The town is located about 17 miles southeast of Kīlauea Point NWR. Kapa‘a’s economy is centered around tourism and features a large number of hotels, shopping centers, gift shops, and restaurants. In 2005, 20.8 percent of visitors surveyed at Kīlauea Point NWR reported that Kapa‘a was the primary town in which their local purchases were made (Sexton et al. 2005).

Līhu‘e is also one of the larger towns on Kaua‘i with 7,387 residents in 2010, or 10 percent of the island’s population (U.S. Census Bureau 2011b). The town is home to Kaua‘i County’s government and is the commercial center of the island. Līhu‘e houses the island’s main airport and serves as its major shipping center and cruise ship port (Go Hawai‘i 2011). Located about 25 miles south of Kīlauea Point NWR, 19.5 percent of visitors surveyed at Kīlauea Point NWR in 2005 reported that Līhu‘e was the primary town in which their local purchases were made (Sexton et al. 2005).

### **5.8.1 Population, Housing, and Income**

Table 5-3 summarizes the population characteristics of Hawai‘i and the County of Kaua‘i. As of 2010, the total population of Kaua‘i was 67,091 residents, or 5 percent of Hawai‘i’s total population. Kaua‘i’s population grew by 14.8 percent from 2000 to 2010, outpacing the 12.3 percent growth rate for the state as a whole. Over the same period, the island’s population density increased from 104 persons per square mile to 119 persons per square mile; meanwhile, Hawai‘i’s population density increased from 189 to 212 persons per square mile (U.S. Census Bureau 2000, U.S. Census Bureau, 2010). The Hawai‘i Department of Business, Economic Development, and Tourism predicts that the population of Kaua‘i will continue to grow at an annual rate close to 1 percent through 2040, resulting in an estimated 2040 population of 93,000 (DBEDT 2012). Kaua‘i is proud of its rural feel, and residents of the island value its lush vegetation, agricultural lands with wide open vistas, and communities where people know each other (County of Kaua‘i 1999).

**Table 5-3. County and state population estimates.**

	Population in 2010		Percent Population Change
	Residents	Persons per Square Mile	2000–2010
Hawai‘i	1,360,301	212	12.3%
Kaua‘i	67,091	119	14.8%

Sources: U.S. Census Bureau 2000, U.S. Census Bureau 2010

As of 2011, white persons (33.5 percent) and persons of Asian descent (31.8 percent) together comprised nearly two-thirds of the population of Kaua‘i. Persons of Hispanic or Latino origin represented the next largest group (9.7 percent), followed by Native Hawaiians and other Pacific Islander persons (9.2 percent) (U.S. Census Bureau 2011a). Kīlauea Town consists of 21.3 percent Asians, 54.9 percent Caucasians, 4.9 percent Native Hawaiian or other Pacific Islander, 1.5 percent persons of some other race, 0.3 percent American Indian or Alaska Natives, and 0.5 percent black or African Americans (U.S. Census Bureau 2011b). In Kaua‘i County, approximately 28 percent of residents age 25 or older have earned a bachelor’s degree or higher, compared with 29.1 percent for the state of Hawai‘i (U.S. Census Bureau 2011b).

At the beginning of the 2010–2011 school year, there were 1,610 elementary-aged students enrolled in kindergarten through 5<sup>th</sup> grade in the region (Hawai‘i Department of Education 2011). For Kīlauea Town, 578 students were enrolled from kindergarten through high school (U.S. Census Bureau 2011b).

Table 5-4 summarizes median household income, unemployment, and percentage of persons below the poverty level. As of 2011, median household income for Kaua‘i County was higher than that for Hawai‘i (\$67,116 compared to \$64,422) (U.S. Census Bureau 2011c). In 2011, the percent of the Kaua‘i County population living below the poverty line was on par with the state average and below the national average (10.0 percent compared to 10.2 percent and 15.9 percent). Similarly, the unemployment rate for residents aged 16 and older for Kaua‘i was slightly below that of Hawai‘i and well below the national average (7.2 percent compared to 7.7 percent and 10.3 percent) (U.S. Census Bureau 2011c). Kīlauea Town’s median household income is \$69,688, with unemployment at 5.1 percent (or 123 individuals), with only 7.1 percent of individuals below the poverty line (U.S. Census Bureau 2011b).

Although the median income in Kaua‘i is above the national median, the cost of living on the island is very high. As of the year 2011, Kaua‘i’s median gross rent (MGR) recorded was much higher than the national average (\$1,335 compared to \$871). Median gross rent as a percentage of household income, however, was lower than both the Hawaiian and national averages (31.2 percent compared to 34.4 percent and 31.9 percent) (U.S. Census Bureau 2011c). Food prices also tend to be higher than prices on the mainland. The transportation cost of food to Hawai‘i is 66 percent higher than that for the mainland (Alternative Hawai‘i 2007). With the influx of warehouse clubs like Sam’s Club and

Costco, food prices are beginning to fall in line with those of the mainland (Alternative Hawai‘i 2007).

**Table 5-4. State and county income, unemployment, and poverty statistics, 2011.**

	<b>Median Household Income (2011)</b>	<b>Percentage of Individuals below Poverty (2011)</b>	<b>Percentage Unemployed (2011)</b>
Hawaii	\$64,422	10.2	7.7
Kaua‘i	\$67,116	10.0	7.2

Source: U.S. Census Bureau 2011c

### 5.8.2 Employment and Business

Kaua‘i’s modern economy was founded on its agricultural industry, which produced crops such as sugarcane and wetland kalo. Although agriculture is still an important industry on the island, tourism has far surpassed agriculture as the County’s leading industry. The tourism industry in Kaua‘i has grown tremendously over the past 50 years and has become a key foundation of the island’s economy (Go Hawai‘i 2011, HDBEDT- Research and Economic Analysis Division 2009).

Kaua‘i’s economy is sensitive to visitor arrivals. In 2010, there were 963,520 visitor arrivals on Kaua‘i Island. Since 2000, visitor arrivals have closely followed world events such as the 2001 terrorist attacks, as well as the recent recession. Kaua‘i was hit particularly hard by the 2008 recession as tourism and recreation are an integral piece of its economy. In 2007, Kaua‘i saw almost 1.3 million visitors arrive, followed by a 20.6 percent reduction the following year (UHERO- Kaua‘i Interactive Database 2015). As tourism declined from 2007 to 2008, unemployment for the State rose from 2.7 percent to 4 percent (U.S. Department of Labor, Bureau of Labor Statistics 2011). Tourism continued to decline by almost 10 percent from 2008 to 2009, while unemployment rose from 4 percent to 6.8 percent (U.S. Department of Labor, Bureau of Labor Statistics 2011, UHERO- Kaua‘i Interactive Database 2015). From 2009 to 2010, visitor arrivals increased by 3.8 percent and unemployment fell from 6.8 percent to 6.6 percent (U.S. Department of Labor, Bureau of Statistics 2011, UHERO- Kaua‘i Interactive Database 2015). Visitor spending in Kaua‘i has followed the same trend. From 2007 to 2008, visitor spending fell by 13.3 percent, and fell another 12.6 percent from 2008 to 2009 before growing by 12.4 percent from 2009 to 2010 (UHERO- Kaua‘i Interactive Database 2015).

Table 5-5 summarizes full-time employment by industry for Kaua‘i County in 2011. The travel and tourism sector is particularly important to the Kaua‘i economy, with 23.1 percent of the County’s jobs in arts, entertainment, recreation, accommodation, and food, compared to 16.1 percent for Hawai‘i and 9.0 percent nationally (U.S. Census Bureau 2012). Employment in all travel and tourism sectors—including retail trade, passenger transportation, arts, entertainment and recreation, and accommodation and food—constitutes 40.3 percent of total private employment in Kaua‘i County, compared to 27.8 percent statewide and 15.2 percent nationally. Average annual wages among Kaua‘i residents employed in the travel and tourism industry are higher than Hawai‘i and U.S.

averages (\$33,676 compared to \$28,372 and \$21,495) (\$2012) (Bureau of Economic Analysis 2012). Other industries that employ a large percentage of Kaua'i residents include education, health care, and social assistance (16.1 percent), and retail trade (12.6 percent) (U.S. Census Bureau 2012). Government jobs at the Federal, State, and local levels comprise 12.4 percent of all County part-time and full-time employment (Bureau of Economic Analysis 2012).

**Table 5-5. Full-time employment by sector, 2011, Kaua‘i County.**

<b>Industry</b>	<b>Number</b>	<b>Percent of Total</b>
Total civilian employed population > 16 years	32,372	
Agriculture, forestry, fishing & hunting, mining	995	3.1%
Construction	2,976	9.2%
Manufacturing	681	2.1%
Wholesale trade	558	1.7%
Retail trade	4,074	12.6%
Transportation, warehousing, and utilities	1,679	5.2%
Information	574	1.8%
Finance and insurance, and real estate	1,777	5.5%
Prof., scientific, mgmt., admin., & waste mgmt.	3,048	9.4%
Education, health care, & social assistance	5,215	16.1%
Arts, entertain., rec., accommodation, & food	7,490	23.1%
Other services, except public administration	1,311	4.0%
Public administration	1,994	6.2%

Source: U.S. Census Bureau 2012

For Kīlauea Town, about 71.6 percent of the town’s population is in the labor force. The bulk of this workforce is involved in arts, entertainment, and recreation, accommodation, and food services (23.6 percent); retail trade (13.1 percent); construction (11.9 percent); and professional, scientific, management, administrative, and waste management services (11.7 percent) (U.S. Census Bureau 2011b).

### 5.8.3 Refuge Impact on Local Economies

Recreational spending near national wildlife refuges generates economic activity for local economies. These expenditures can include food, lodging, transportation, and other purchases from local businesses while engaging in refuge uses. More than 34.8 million visits were made to national wildlife refuges nationwide in fiscal year 2006, with visitor expenditures equating to an estimated \$1.7 billion (\$2006) in sales in regional economies. Accounting for both the direct and secondary effects, spending by national wildlife refuge visitors generated nearly 27 thousand jobs, and over \$542.8 million (\$2006) in employment income (Carver and Caudill 2007).

Refuges also contribute money to the local economy through the Refuge Revenue Sharing Act of 1978 (16 U.S.C. 715s). Under this act, the Service makes payments to counties where refuge lands are located. Payments are in lieu of taxes and the revenue is used by the counties for any government purpose. In 2012, \$11,490 for Kīlauea Point NWR, \$9,691 for Hanalei NWR, and \$2,343 for Hulē‘ia NWR was paid to Kaua‘i County through Refuge Revenue Sharing.

#### *Tourism and Recreation*

Visitors travel from all over the world to see Hawai‘i. With opportunities from relaxing beach getaways to hiking mountains and surfing the waves, there is no shortage of activities to stimulate the economy. From 2003 to 2010, the average annual expenditure by visitors arriving by air totaled over \$11.1 billion, or 18.5 percent of the State’s gross domestic product (U.S. Department of Commerce, Bureau of Economic Analysis 2011). In 2007, Kaua‘i accounted for 9.8 percent of Statewide visitor expenditures and is projected to maintain that ratio through 2035 (HDBEDT 2009).

#### *Wildlife Viewing*

Wildlife viewing opportunities are abundant throughout the State of Hawai‘i. Wildlife viewing can include the activities of observing, identifying, or photographing wildlife. In 2011, the number of people that reported participating in wildlife viewing as a primary form of recreation totaled 358,000 in Hawai‘i. Spending associated with wildlife viewing in Hawai‘i totaled \$669 million, of which 94 percent (\$628 million) was trip-related expenditures and \$41 million was spent on other expenses such as equipment (USFWS 2012).

### 5.8.4 Additional Economic Contributions

It is important to note that the economic value of the Refuge encompasses more than just the impacts on the regional economy. The Refuge also provides substantial nonmarket values (values for items not exchanged in established markets) such as maintaining endangered species, preserving wetlands, educating future generations, and adding stability to the ecosystem (Carver and Caudill 2007).

According to a recent report, the total value of ecosystem services provided by natural habitats in the Refuge System in the contiguous states totaled \$32.3 billion/year, or \$2,900 thousand/acre/year (Southwick Associates 2011). Wetlands were found to provide the most services at \$27.5 billion/year, or \$10,600/acre/year. If these figures had been extrapolated to include Alaska and Hawai‘i NWRs, the total amount would exceed \$2 trillion per year (likely more since the study only looked at terrestrial systems). The same report also identified that the loss of 9.9 million acres of wetlands in the U.S. over the last 50 years has resulted in more than \$81 billion of economic loss linked to the ecosystems services wetlands provide.

## 5.9 References

Aiken, R.R. 1988. Kīlauea Point Lighthouse: the Landfall Beacon on the Orient Run. Kīlauea Point Natural History Association.

Alternative Hawai‘i. 2007. The Cost of Living in Paradise is High! <http://www.alternative-hawaii.com/overpop.htm>.

Burgett, B., L. McGerty, and R. L. Spear. 2000. An Archaeological Inventory Survey of an approximately 27.56 acre parcel, Kāhili Ahupua‘a, Ko‘olau District, Island of Kaua‘i, HI [TMK 5-2-21-:6].

Carver, E. and J. Caudill. 2007. Banking on nature 2006: The economic benefits to local communities of National Wildlife Refuge visitation. Division of Economics, U.S. Fish and Wildlife Service. Washington, DC.

County of Kaua‘i, 1999. Kaua‘i General Plan. Page 5–1.  
<http://www.kauai.gov/Government/Departments/PlanningDepartment/TheKauaiGeneralPlan/tabid/130/Default.aspx>.

County of Kaua‘i. 2006. Kīlauea Town Plan. <http://www.kilauealighthousevillage.com/wp-content/uploads/2010/12/KilaueaTownPlan.pdf>.

Department of the Army, U.S. Army Engineer District, Pacific Ocean Division. 1991. “Kīlauea National Wildlife Refuge, Kīlauea Radar Station, Crater Hill, Kīlauea, Island of Kaua‘i, Hawai‘i.” Defense Environmental Restoration Program for Formerly Used Sites, Inventory Project Report. Site No. H09HI018000. Contract No. DACA83-89-D-0020.

Department of Business, Economic Development, and Tourism; Research and Economic Analysis Division. 2009. Population and Economic Projections for the State of Hawai‘i to 2035.

Department of Education. 2011. Reports, Enrollments 2010-2011.  
<http://doe.k12.hi.us/reports/enrollment.htm>.

Fredericksen, D. and W. Fredericksen. 1989. An Archaeological Inventory Survey of Crater Hill and Mokolea Point of Kīlauea Point National Wildlife Refuge, Kīlauea, Kaua‘i, Hawai‘i. Xamanek Researches, Pukalani, Maui, HI.

Garovoy, Jocelyn B. 2005. “Ua Koe ke Kuleana o na Kānaka (Reserving the Rights of Native Tenants): Integrating Kuleana Rights and Land Trust Priorities in Hawai‘i. Harvard Environmental Law Review. Volume 29, No. 2.

Go Hawai‘i. 2011. Kaua‘i: Hawai‘i’s Island of Discovery. <http://www.gohawaii.com/kauai/regions-neighborhoods/>.

Hammatt, H.H. and D.W. Shideler. 2013. Archaeological Assessment for the Kīlauea Point National Wildlife Refuge Fencing Project, Kīlauea Ahupua‘a, Hanalei District, Island of Kaua‘i TMK: (4) 5-2-004:103 por. Cultural Surveys Hawai‘i, Kailua, HI.

- Hawai‘i Department of Business, Economic Development, and Tourism. 2001. Annual visitor research report. 110 p. <http://www.hawaiiitourismauthority.org/default/assets/File/reports/visitor-statistics/2001-annual-visitor.pdf>.
- Hawai‘i Department of Land and Natural Resources. 2009. Statewide comprehensive outdoor recreation plan (SCORP) 2008 update. 207 p. <http://state.hi.us/dlnr/reports/scorp/SCORP08-1.pdf>.
- Hawai‘i Tourism Authority. 2002. Visitor satisfaction and activity report. Hawai‘i Department of Business, Economic Development, and Tourism. 104 p. <http://www.hawaiiitourismauthority.org/research-reports/reports/visitor-satisfaction/>.
- Hawai‘i Tourism Authority. 2003. Visitor satisfaction and activity report. Hawai‘i Department of Business, Economic Development, and Tourism. 114 p. <http://www.hawaiiitourismauthority.org/research-reports/reports/visitor-satisfaction/>.
- Hawai‘i Tourism Authority. 2004. Visitor satisfaction and activity report. Hawai‘i Department of Business, Economic Development, and Tourism. 114 p. <http://www.hawaiiitourismauthority.org/research-reports/reports/visitor-satisfaction/>.
- Hawai‘i Tourism Authority. 2005. Visitor satisfaction and activity report. Hawai‘i Department of Business, Economic Development, and Tourism. 124 p. <http://www.hawaiiitourismauthority.org/research-reports/reports/visitor-satisfaction/>.
- Hawai‘i Tourism Authority. 2006. Visitor satisfaction and activity report. Hawai‘i Department of Business, Economic Development, and Tourism. 169 p. <http://www.hawaiiitourismauthority.org/research-reports/reports/visitor-satisfaction/>.
- Hawai‘i Tourism Authority. 2007. Visitor satisfaction and activity report. Hawai‘i Department of Business, Economic Development, and Tourism. 185 p. <http://www.hawaiiitourismauthority.org/research-reports/reports/visitor-satisfaction/>.
- Hawai‘i Tourism Authority. 2008. Visitor satisfaction and activity report. Hawai‘i Department of Business, Economic Development, and Tourism. 199 p. <http://www.hawaiiitourismauthority.org/research-reports/reports/visitor-satisfaction/>.
- Hawai‘i Tourism Authority. 2009. Visitor satisfaction and activity report, Hawai‘i Department of Business, Economic Development, and Tourism. 184 p. <http://www.hawaiiitourismauthority.org/research-reports/reports/visitor-satisfaction/>.
- Juvik, S.P. and J.O. Juvik. 1998. Atlas of Hawai‘i, Third edition. University of Hawai‘i Press: Honolulu. 333pp.
- Kikuchi, W.K. 1987. Proposed Visitor Center Archaeological Survey, Kīlauea Point, National Wildlife Refuge Kalae O Kīlauea, Kaua‘i.
- Miller, H. 2011. U.S. Geological Survey Policy Analysis and Science Assistance personal communications with D. Caylor of the Kaua‘i Department of Parks and Recreation. 2011 Kaua‘i Parks and Recreation Master Plan Public Input Survey.
- Northwest Heritage Consultants. 2006 Kīlauea Point Light Station Historic Structures Report.

OmniTrak Group Inc., 2007. Hawai‘i State Parks survey.

<http://www.hawaiitourismauthority.org/default/assets/File/research/natural-resources/HTAPRO-Report-12-01-2007.pdf>.

Parsons Brinckerhoff Quade and Douglas, Inc. 2004. Traffic, Visitor, and Parking Study.

Parsons Brinckerhoff Quade and Douglas, Inc. 2006. Kīlauea Point National Wildlife Refuge Alternative Transportation Systems Study Final Report. U.S. Department of Transportation Federal Highway Administration Central Federal Lands Highway Division. Contract No. DTFH68-02-D-00001, Task Order No. DTFH68-05-T-00044.

Princeville at Hanalei. 2011. Princeville at Hanalei: Magnificent by Nature.

<http://www.princeville.com/home.html>.

Shideler, D., T. Tulchin, and H.H. Hammatt. 2007. Archaeological Literature Review and Field Inspection for the approximately 163-Acre Kilauea Falls Ranch Property, Kīlauea Ahupua‘a, Ko‘olau District, Kaua‘i Island (TMK: [4] 5-2-012:035). Cultural Surveys Hawai‘i, Kailua, HI.

Shideler, D., T. Yucha, and H.H. Hammatt. 2008. Archaeological Inventory Survey of an Approximately 74-Acre Portion of the Kīlauea Falls Ranch Property, Kīlauea Ahupua‘a, Hanalei District, Kaua‘i Island (TMK: [4] 5-2-012:035 por.). Cultural Surveys Hawai‘i, Kailua, HI.

Sexton, N.R., S. C. Gillette, L. Koontz, S.C. Stewart, J. Loomis, and K.D. Wundrock. 2005. Visitor and community survey results for Kīlauea Point National Wildlife Refuge and Lighthouse: Completion report: U.S. Geological Survey, Biological Resources Discipline, Open-File Report 2005-1420, 221p.

Sexton, N.R., A.M. Dietsch, A.W. Don Carlos, L. Koontz, and A.N. Solomon. 2011. National Wildlife Refuge Visitor Survey 2010/2011: Individual refuge results: U.S. Geological Survey Data Series 643.

Smith, Gary. 2008. Volunteer orientation video.

Southwick Associates. 2011. The Economics Associated with Outdoor Recreation, Natural Resources Conservation, and Historic Preservation in the United States.

<http://www.nfwf.org/Content/ContentFolders/NationalFishandWildlifeFoundation/HomePage/ConservationSpotlights/TheEconomicValueofOutdoorRecreation.pdf>.

Transportation Assistance Group. 2009. Transportation Observations, Considerations, and Recommendations for Kīlauea Point National Wildlife Refuge. 44 pp.

UHERO – Kaua‘i Interactive Database. 2015. Kaua‘i Economic Dashboard.

<http://uhero.hawaii.edu/static/dashboard/kauai/index.html>.

U.S. Census Bureau. 2000. American Fact Finder: Profile of General Demographic Characteristics: 2000. <http://factfinder2.census.gov/>.

U.S. Census Bureau. 2010. American Fact Finder: Selected Economic Characteristics: 2010. <http://factfinder2.census.gov/>.

U.S. Census Bureau. 2011a. American FactFinder. American FactFinder:  
[http://factfinder.census.gov/home/saff/main.html?\\_lang=en](http://factfinder.census.gov/home/saff/main.html?_lang=en).

U.S. Census Bureau. 2011b. American FactFinder 2. American FactFinder 2:  
<http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>.

U.S. Census Bureau. 2011c. Census of Housing.  
<http://www.census.gov/hhes/www/housing/census/historic/grossrents.html>.

U.S. Census Bureau. 2012. American Community Survey: Selected Economic Characteristics: 2007–2011. <http://www.census.gov/acs/www/>.

U.S. Department of Commerce. 2007. Bureau of Economic Analysis, Regional Economic Information System. <http://www.bea.gov>.

U.S. Department of Commerce, U.S. Census Bureau. 2003. Census 2000 Brief: Housing Costs of Renters: 2000.  
[http://usgovinfo.about.com/gi/o.htm?zi=1/XJ&zTi=1&sdn=usgovinfo&cdn=newsissues&tm=16&gps=536\\_397\\_1276\\_863&f=00&su=p284.9.336.ip\\_&tt=2&bt=1&bts=1&zu=http%3A//www.census.gov/prod/2003pubs/c2kbr-21.pdf](http://usgovinfo.about.com/gi/o.htm?zi=1/XJ&zTi=1&sdn=usgovinfo&cdn=newsissues&tm=16&gps=536_397_1276_863&f=00&su=p284.9.336.ip_&tt=2&bt=1&bts=1&zu=http%3A//www.census.gov/prod/2003pubs/c2kbr-21.pdf).

U.S. Department of Commerce. 2011. Bureau of Economic Analysis, Regional Economic Information. <http://www.bea.gov>.

U.S. Department of the Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2008a. 2006 National survey of fishing, hunting, and wildlife-associate recreation: Maine.

U.S. Department of the Interior, Fish and Wildlife Service, 2008b. National and state economic impacts of wildlife watching—Addendum to the 2006 National survey of fishing, hunting and wildlife-associated recreation. Report 2006–1.

U.S. Department of Labor, Bureau of Labor Statistics. 2011. Labor Force Statistics from the Current Population Survey. [http://www.bls.gov/cps/prev\\_yrs.htm](http://www.bls.gov/cps/prev_yrs.htm).

U.S. Fish and Wildlife Service and U.S. Census Bureau. 1993. 1991 National survey of fishing, hunting, and wildlife-associated recreation—Hawai‘i. 84 p.  
<http://www.census.gov/prod/1/gen/interior/fhw91-hi.pdf>.

U.S. Fish and Wildlife Service and U.S. Census Bureau. 1998. 1996 National survey of fishing, hunting, and wildlife-associated recreation—Hawai‘i. 87 p.  
<http://www.census.gov/prod/3/98pubs/hifhw698.pdf>.

U.S. Fish and Wildlife Service and U.S. Census Bureau. 2003. 2001 National survey of fishing, hunting, and wildlife-associated recreation—Hawai‘i. 86 p.  
[http://www.hawaiiassessment.info/library/2001\\_survey\\_fishing\\_hunting\\_rec\\_usfws\\_hifhw698.pdf](http://www.hawaiiassessment.info/library/2001_survey_fishing_hunting_rec_usfws_hifhw698.pdf).

U.S. Fish and Wildlife Service and U.S. Census Bureau. 2008. 2006 National survey of fishing, hunting, and wildlife-associated recreation–Hawai‘i. 91 p.  
<http://www.census.gov/prod/2008pubs/fhw06-hi.pdf>.

USFWS. 1989. Draft Kīlauea Point NWR Public Use Management Plan.

USFWS. 2007. Land Conservation Plan and Environmental Assessment. Kīlauea Point National Wildlife Refuge, Kaua‘i County, HI.

USFWS. 2014. Refuge Annual Performance Planning (RAPP), Multi-year measures, 2010–2013.

Wichman, F.B. 1998. Ancient place-names and their stories. Honolulu, HI: University of Hawaii Press.

Wilcox, Carol. 1981. The Kaua‘i Album. Kaua‘i Historical Society: Kaua‘i.

Wilson Okamoto & Associates Inc for County of Kaua‘i Planning Department. 1980. North Shore Development Plan Update Includes Kīlauea.

