

**Public Lands Transportation Scholar
Final Report**

**Private Vehicle Reduction Strategies and Access Improvements at
Kīlauea Point National Wildlife Refuge**

May 2017



*This document was prepared for the US Fish & Wildlife Service by the
Federal Lands Transportation Institute of the Western Transportation Institute.*

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ABSTRACT

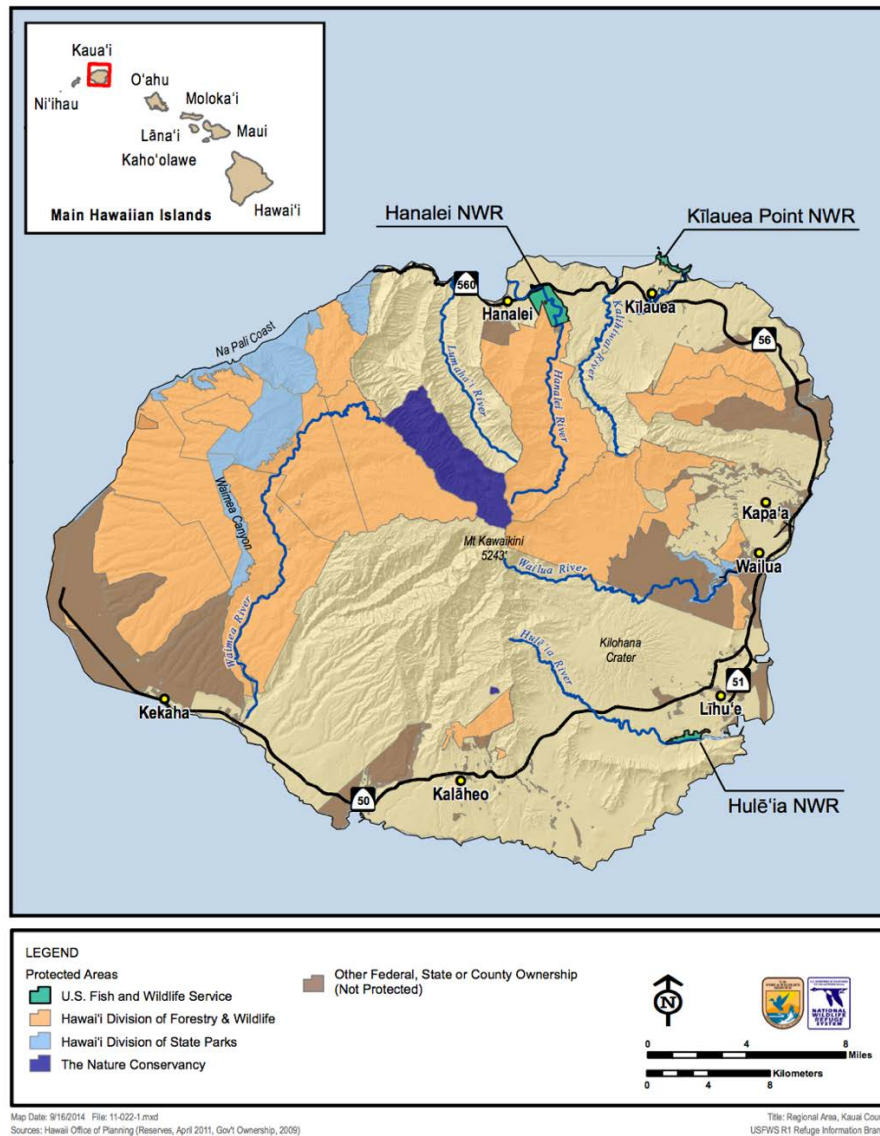
Between June 2016 and April 2017, Public Lands Transportation Scholar Alex Roy assessed transportation concerns leading to and at the Kīlauea Point National Wildlife Refuge (Kīlauea Point NWR or Refuge). Part of the Kaua‘i National Wildlife Refuge Complex, Kīlauea Point NWR is the only U.S. Fish and Wildlife Refuge on Kaua‘i open to the public and one of the most visited refuges in the United States. Established in 1985, the Refuge is home to the famous historic Daniel K. Inouye Kīlauea Point Lighthouse, as well as world class wildlife viewing opportunities.

With only one access point and peak daily visitation over 1,000 people per day, vehicle congestion and safety concerns are some of the most pressing issues facing Kīlauea Point NWR. This document describes efforts related to reducing the impacts of private vehicles and peak visitation at the Refuge. The Kīlauea Point NWR Comprehensive Transportation Planning Study (Transportation Study) was completed during the Scholar’s tenure. The Transportation Study was an extensive planning process extending over several years. The Scholar contributed to the Transportation Study and designed his work to complement the Transportation Study’s findings and recommendations. Transportation recommendations promoted by the Transportation Study included Kīlauea Point NWR shuttle service and a reservation system. This report details findings and recommendations developed by the Scholar, as well as presenting a first-hand account of Alex’s experience and understanding of transportation topics as they relate to federal land units.

INTRODUCTION

Kaua‘i is the oldest and furthest west of the main Hawaiian Islands. It is one of the most geographically and climactically diverse islands in the chain, and is home to the world-renowned Nā Pali coast, 5,000 foot peaks, record setting rainfall, tropical canyons, and scenic waterfalls. The 2016 census data estimates the population of Kaua‘i was 72,000¹. The largest population center is Kapa‘a and Līhu‘e is the primary business district and transportation hub. In addition to residents, Kaua‘i is a very popular tourist destination with over a million visitors a year.²

Figure 1: Kaua‘i Refuges³



¹ <https://www.census.gov/quickfacts/table/PST045216/15007>

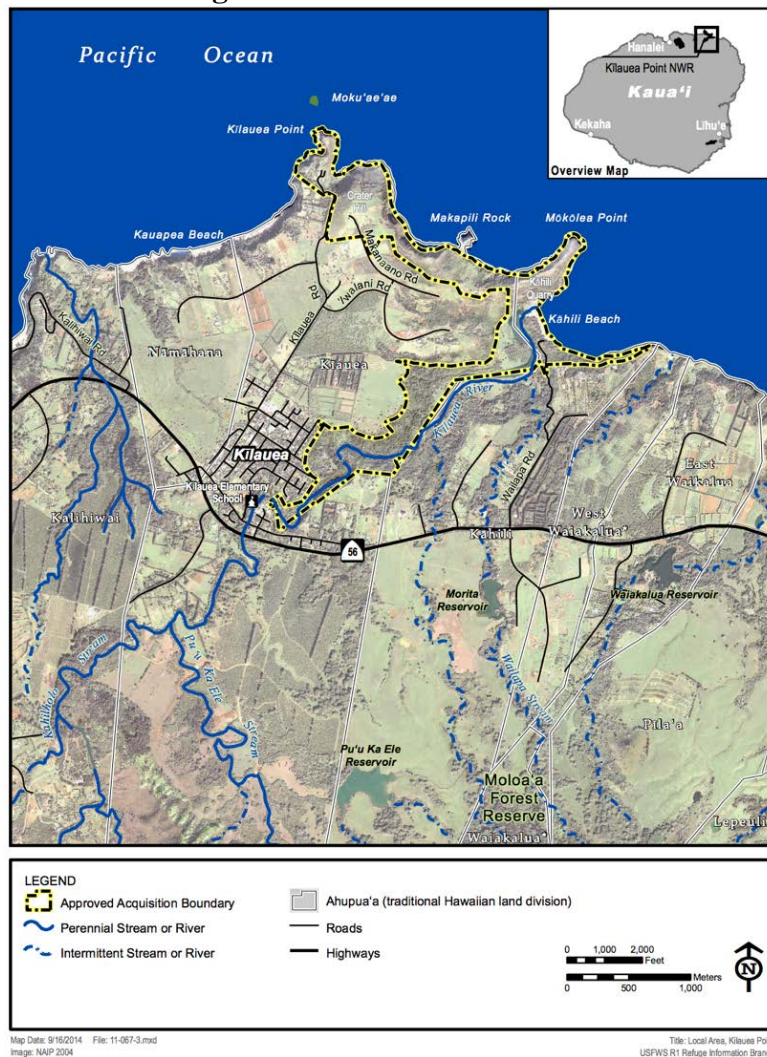
² <http://hawaiiourismauthority.org/research/research/visitor-highlights/>

³ Kīlauea Point National Wildlife Refuge Comprehensive Transportation Planning Study

The Kaua'i National Wildlife Refuge Complex consists of three Refuges: Hulē'ia, Hanalei, and Kīlauea Point. Hulē'ia National Wildlife Refuge is not open to the public. The visitor amenities at Hanalei National Wildlife Refuge are limited to information boards and a small viewpoint parking lot. Kīlauea Point National Wildlife Refuge (Kīlauea Point NWR or the Refuge) is the only refuge on Kaua'i open to the public and providing visitor services.

An average of 400,000 people a year visit the Kīlauea Point NWR, making it the 19th most visited refuge in the United States. Around half of the total visitors pay to enter the Point and Lighthouse area. Kīlauea Point NWR was established in 1985 and has multiple purposes, including providing habitat and protection for migratory birds, conservation of threatened and endangered species, and the conservation and management of native coastal strand, riparian, and aquatic biological diversity. The Refuge includes the historic Kīlauea Point Lighthouse and world class wildlife viewing opportunities. The Refuge is 203 acres and is located 2 miles north of historic Kīlauea town on the northernmost tip of Kaua'i.

Figure 2: Kīlauea Point NWR⁴



⁴ Kīlauea Point National Wildlife Refuge Comprehensive Transportation Planning Study

The Kīlauea Point NWR has completed several transportation studies since 2000. In 2017 the Refuge, along with partners from the Volpe Center, Central Federal Lands Highway Division, and US Fish & Wildlife Region 1, completed the Kīlauea Point National Wildlife Refuge Comprehensive Transportation Planning Study (Transportation Study). The Transportation Study built upon and refined previous efforts to develop a comprehensive range of transportation concepts and recommendations for the Refuge.

As one of the most popular visitor destinations on Kaua‘i, Kīlauea Point NWR experiences very high visitation periods. During these peak visitation periods the Refuge frequently has more vehicles entering the Point than available parking. This leads to vehicle queuing on the entrance road, vehicle congestion, and visitors parking in unmarked spaces. These conditions are exacerbated by a single-entry point and limited transportation alternatives to the private vehicle; walking into the Refuge is not allowed and there are minimal private tour shuttles. Due to safety concerns, wildlife and habitat located along the entrance road, and impacts to the visitor experience, queues greater than 5-10 vehicles along the entrance road are prohibited. Frequently during these peak periods Refuge staff are forced to leave their ranger and maintenance duties and direct traffic, and during the worst periods the Refuge is closed until there are multiple available spaces.

Alternative modes, shifting visitation periods, and increased capacity are the transportation improvements for the vehicle conditions experienced at Kīlauea Point NWR. Due to limited land and wildlife concerns, increased capacity is not a valid alternative. During his tenure, the Public Lands Transportation Scholar (Scholar) focused on alternative modes and identifying methods of shifting visitation to less busy times. The Scholar advanced alternative transportation by contributing to the Transportation Study, working on the active transportation FLAP project, developing shuttle alternatives, and collaborating on the County of Kaua‘i’s FLAP grant application. To identify methods of shifting visitation the Scholar conducted data collection and developed reservation system alternatives.

Figure 3: Queuing Vehicles and Refuge Staff Directing Traffic



METHODOLOGY

The Transportation Study recommended and outlined a Kīlauea Point NWR shuttle service and an advance reservation system. To refine the shuttle service and reservation system recommendations, three different approaches were utilized by the Scholar to understand the specific transportation needs of the Kīlauea Point NWR:

- Data Review and Data Collection
- Literature and Background Review
- Field Observations

This methodology led to understanding of the visitation and vehicle data behind the transportation concerns and the conditions and “on-the-ground” impacts.

Data Review and Data Collection

A data collection plan was designed by the scholar to develop baseline conditions for existing vehicle and parking use, as well as to identify those periods that vehicle and parking issues are most severe. The existing conditions were then used to evaluate transportation alternatives and scenarios.

The data collection plan used data such as visitor services and fee collection data, as well as, a comprehensive data collection plan to gather brand new data. The visitor services and fee collection data was used to summarize daily, monthly, and yearly visitation trends. The comprehensive data collection concentrated on collecting data that was not readily available from the visitor services / fee data. Data that was collected during 2016/2017 includes parking occupancy, visitation length, and driveway counts. Key findings from the data review and data collection are discussed in the Kīlauea Point NWR Visitation Chapter. The Data Review and Data Collection report is included as Appendix I. Raw data was provided to the Kīlauea Point NWR and stored on the Refuge shared drive.

Literature and Background Review

Documents reviewed include the following: Kīlauea Point National Wildlife Refuge Comprehensive Conservation Plan (CCP) (2016), the Kaua‘i National Wildlife Refuge Complex Comprehensive Transportation Planning Study (2016), Kīlauea Point Alternative Transportation Systems Study (2006), Kīlauea Point TAG Study (2009), The U.S. Fish and Wildlife Service’s Plan 2035 the National Long Range Transportation Plan (LRTP) (2016), U.S. Fish and Wildlife Region 1 LRTP (2012), and the North Shore Path Alternative Report (2012). These documents supplemented discussions with U.S. Fish and Wildlife The Kaua‘i National Wildlife Refuge Complex leadership to gain an understanding of the transportation issues facing the Refuge.

A Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis of the transportation environment and conditions was conducted based on the U.S. Fish and Wildlife Service's Plan 2035 the National Long Range Transportation Plan strategic goals.

A SWOT analysis is an exercise that is frequently used when a business, municipality, or other government agency is looking at starting or expanding into a new market, or providing new services. It can be a helpful exercise in both identifying potential benefits and areas of concern. During SWOT exercises, strengths and weaknesses are factors or conditions internal to the organization, while opportunities and threats are factors or conditions external to the organization. Opportunities and strengths identified in the SWOT analysis include continued collaboration with the County and Town and an interest in alternative transportation on the Kaua'i. Threats and weaknesses included increased tourism, dispersed population and hotels, and limited funding opportunities. The SWOT analysis for Kīlauea Point NWR transportation environment is included as Appendix VII.

Field Observations

Field observations consisted of walking to the Refuge from Kīlauea Town, assisting with parking direction, watching vehicle parking lot maneuvers, observing conditions at the Overlook, and observing active transportation use on Kīlauea Road. While this information was not conducted in a manner to provide quantifiable data, it did prove to be beneficial in gaining a sense of existing conditions. The following conditions were especially relevant to the transportation environment at and accessing the Refuge.

- *Active Transportation on Kīlauea Road* - cyclists and pedestrians frequently travel to the Kīlauea Point NWR Overlook, located at the end of Kīlauea Road and open to the public 7-days a week. Past the Seacliff development, the multi-use path abruptly ends forcing cyclists and pedestrians onto the roadway. While vehicle speeds are relatively low (15 – 20 MPH), bends and blind curves make on-street active transportation use uninviting. Existing use indicates that with improved facilities active transportation use would rise.
- *Kīlauea Point NWR Overlook Parking* - One of the most scenic views of the Refuge and Lighthouse is from the Overlook. The popularity of the Overlook combined with open access leads to high usage. When parking at the Overlook is full, pedestrians are forced to walk in the roadway to access the scenic area.

Figure 4: Jogger with Stroller on Kīlauea Road



Figure 5: Pedestrians in the Roadway at Refuge Overlook



CONSTITUENCIES

Kīlauea Point NWR transportation projects require strong partnerships with government and non-government organizations. The most immediate of these partnerships is with the County of Kaua‘i, which owns and maintains Kīlauea Road and a portion of the Overlook parking lot. Other partnerships include potential shuttle stop locations and neighborhood groups. Below are the jurisdictions, agencies, partners, and stakeholders that have or could play a critical role in the transportation environment at Kīlauea Point NWR.

County of Kaua‘i

The County of Kaua‘i is a frequent partner with the Kīlauea NWR. A county road, Kīlauea Road is the only access to the publicly open area of the Refuge. The County and the Refuge have partnered on a Federal Lands Access Program (FLAP) project along with Central Federal Lands Highway Division (CFL) and an engineering consultant. The FLAP project is identifying ways to improve active transportation to the Refuge. Preliminary designs include a separated path on the section of road closest to the Refuge and sharrows/signage in Kīlauea Town. The FLAP project is also examining redesigning the Overlook parking area. In Spring 2017 the County, with support from the Refuge, applied to have this project receive further funding and complete designs to 100% and develop “shovel-ready” plans.

Kīlauea Point Natural History Association (Friends Group)

The Kīlauea Point Natural History Association (KPNHA) is a non-profit organization, or “friends group,” that works to advance the mission and goals of the Kīlauea Point NWR. They operate the Refuge bookstore daily when the Refuge is open. They also offer support in many other fashions including, managing and administering private donations for Lighthouse rehabilitation and other large projects, work with the Refuge on educational programs, and organize public art shows and events.

Kīlauea Community Agriculture Center

The nonprofit organization ‘Āina Ho'okupu o Kīlauea has established the Kīlauea Community Agriculture Center in partnership with the County of Kaua‘i. The mission of the Agriculture Center is to strengthen the community and teach responsible farming practices. Once completed, the Agriculture Center will host community events, including a farmer’s market. Given its proximity to the Refuge and available parking, the Agriculture Center has been identified as the preferred pick-up/drop-off location for a Refuge Shuttle. Initial conversations have indicated that the Agriculture Center is open to hosting shuttle parking. As of Spring 2017 construction was in progress and no formal conversations had been held or agreements reached.

Kīlauea Neighborhood Association

The Kīlauea Neighborhood Association (KNA) is the oldest community association on Kaua‘i. KNA is led by a Board of Directors and is very active in planning, working with developers and governments, and organizing community events. Their mission is “to promote the general welfare of the Kīlauea District encouraging a thriving community based on a strong foundation of community values, preservation of its culture and traditions of its people and to promote participation, responsibility and accountability to each other”⁵. The Refuge works closely with KNA regarding Kīlauea Point projects that could impact the community. The Refuge also gives monthly updates at KNA meetings.

Hawaii Department of Transportation (HDOT)

Kīlauea Town is accessed via the Kuhio Highway (SR-56). The Kuhio Highway is owned and maintained by the Hawaii Department of Transportation (HDOT) and is the one of the principal highways on Kaua‘i, running from Hanalei to Lihue.

John A. Volpe National Transportation Systems Center (Volpe Center)

The Volpe Center was the lead of the Transportation Study, completed in 2017.

U.S. Department of Transportation, Central Federal Lands Highway Division (CFL)

Along with the Volpe Center, the U.S. Department of Transportation, Central Federal Lands Highway Division (CFL) prepared the Transportation Study. They also are a partner and the funding agency on the County of Kaua‘i led FLAP project.

⁵ [http://kna-Kaua‘i .org/about/](http://kna-Kaua'i.org/about/)

the weekend. Kaua'i Bus operated a pilot North Shore Shuttle from Hanalei to Hā'ena State Park in 2016. As of Spring 2017, it was undecided if future service funding would be approved.

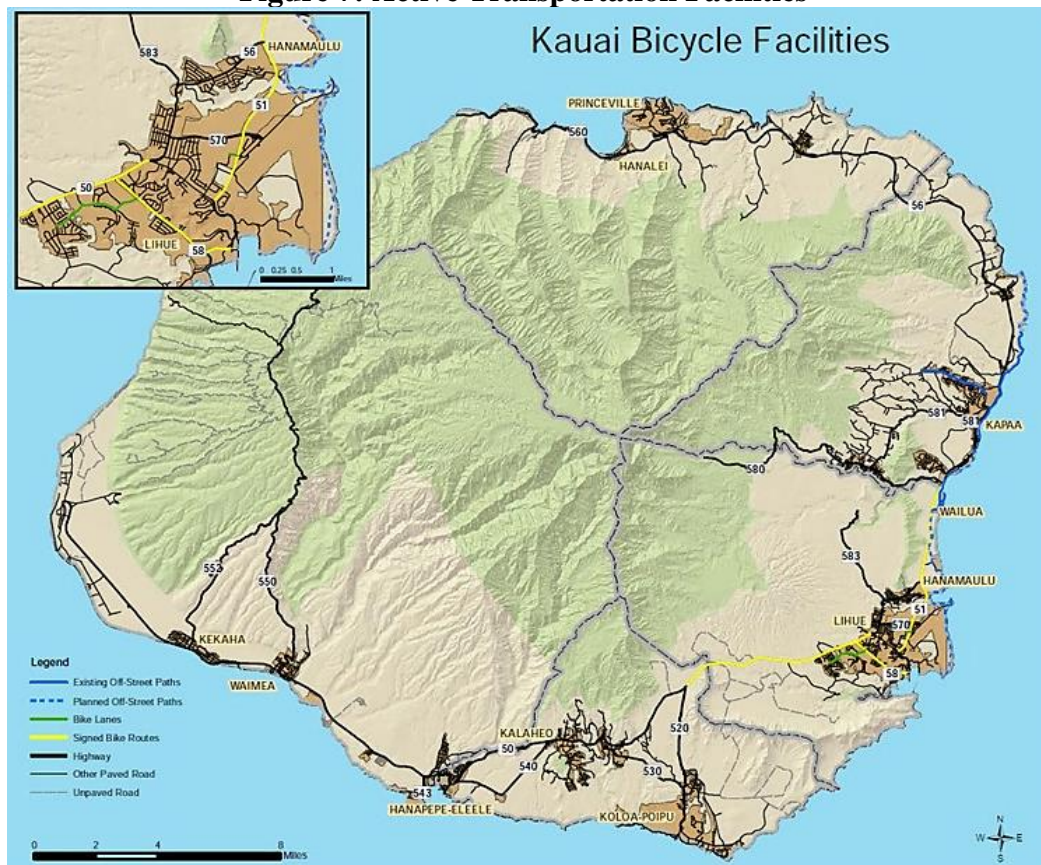
Cruise Ships

Cruise visitation averages nearly 4,800 people per week.⁷ Typically, large cruise ships dock in Lihue on Thursday and sail to the Nā Pali coast on Friday.

Active Transportation

Active transportation is limited by potentially hazardous conditions on many of the State highways. The Kuhio Highway (SR-56) accessing Kīlauea Town has minimal shoulders, vegetation overgrowth, and high speeds. Much of cycling and walking is done on multi-use paths or local streets. These usually do not connect between cities. The most used multi-use path is the Ke Ala Hele Makalae, in Kapaa. An initial planning process for a north shore multi-use path was completed in 2012.

Figure 7: Active Transportation Facilities⁸



⁷ Hawai'i Department of Business, Economic Development, and Tourism, Visitor Statistics 2014.

⁸ Kīlauea Point National Wildlife Refuge Comprehensive Transportation Planning Study

Transportation Culture

There is a transportation culture that exists on Kaua'i that is different from transportation on the mainland. On Kaua'i transportation facilities are often designed to seek a balance between natural preservation and operations; roadways are kept smaller than their mainland counterparts, sidewalks are sporadic, and traffic lights are few and far between. Speeds are typically slower and local culture encourages slowing down. An example of balance between preservation and operations is the Hanalei Bridge. When a larger two-way bridge was proposed, residents of the area fought to keep the existing bridge and maintain the 5-7 vehicle one-way bridge crossing pattern, informing motorists that they are entering a slow speed area.

Figure 8: Hanalei Bridge



KĪLAUEA POINT NWR TRANSPORTATION FACILITIES

Entrance Road

Kīlauea Point NWR is accessed via a narrow entrance road between the Overlook and the Point (primary visitation area). The entrance road ranges from 15-18 feet wide for 1,500 feet. Due to the narrow travel lanes and steep grade, pedestrians and large busses are prohibited. Pedestrians occasionally walk into the Point, past two walking prohibited signs (Figure 9). The speed limit on the entrance road is 10 MPH. Smaller shuttle busses are allowed and cyclists are not encouraged, but usually not forbidden. There is no sidewalk or pedestrian path access on to the Refuge due to steep slopes with endangered and threatened birds that nest along the road.

Figure 9: Pedestrians Walking down the Entrance Road



Refuge Parking Areas

The Refuge parking area consists of 55 marked parking spaces and 5 unmarked dirt spaces. During peak visitation 2-3 overflow spots are used. Thirteen paved spaces with two handicapped spaces are in the upper parking lot, twenty paved spaces are in the lower lot, and twenty-three marked gravel spaces are in the south lot. Two-way traffic flow, small parking spaces, and narrow aisle width make parking lot circulation between the lots difficult. The parking lot difficulties are exacerbated during peak periods, but functions adequately during slower seasons. In 2012, Kīlauea Point NWR contracted a parking redesign project, uncompleted as of 2017. This redesign would have improved the traffic flow and would not require a staff member to direct traffic to available spaces, but would reduce the number of spaces from 60 to 45.

Figure 10: Kīlauea Point NWR Parking Lots



Overlook Parking Area

Parking for the Kīlauea Point NWR Overlook is located at the end of Kīlauea Road, before the Refuge gate. Five marked parking spaces are located on Refuge property and an unmarked dirt parking area is located on the west side of Kīlauea Road. Depending on parking configuration, between 18-40 vehicles can park in the dirt parking area. The FLAP project is examining redesigns of the parking lot, removing the dirt parking area, and providing approximately 15 marked spaces and a pedestrian path.

Figure 11: Overlook Parking Area

KĪLAUEA POINT NWR VISITATION DATA

A data review and data collection plan was designed by the Scholar for the Kilauea Point NWR. The purpose of this plan was to develop baseline conditions for existing vehicle and parking use, as well as to identify those periods which vehicle and parking issues are most severe. Baseline conditions can be used to evaluate future transportation alternatives and scenarios. An example of this would be identifying a shuttle scenario where a single shuttle could meet the transportation demand most of the time, but a supplemental shuttle may be required during peak days, weeks, or months. The baseline data also provides the opportunity to evaluate conditions post pilot implementation and to determine effectiveness. The Visitation Review and Data Collection report is included as Appendix I and raw data was provided to Refuge Staff and saved on the Refuge server.

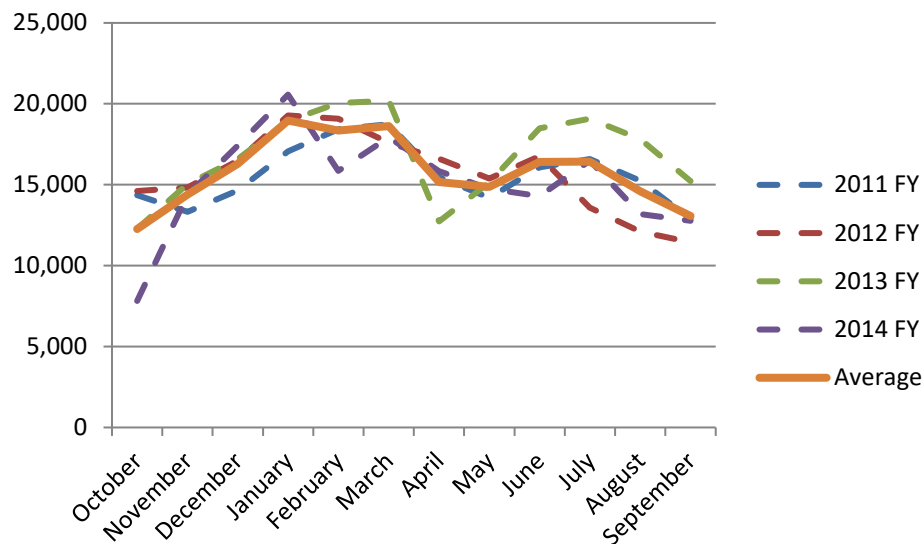
Data Review

Visitor services and fee collection data provided by Refuge staff was used to determine daily, monthly, and yearly trends.

Monthly Visitation

Figure 12 shows the monthly visitation for KPNWR from 2011 to 2014. January, February, and March were the months with peak visitation. Each of the peak months averaged over 18,000 visitors. January was the busiest month with an average of 18,969 visitors. October was the calmest month with an average of 12,262 visitors. The overall peak month was January 2014 with 20,571 visitors.

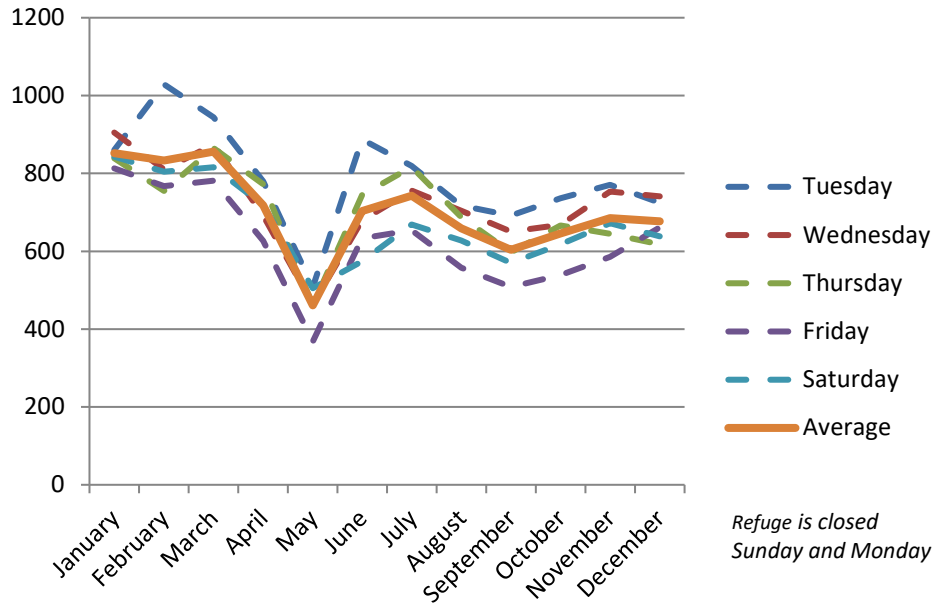
Figure 12: Monthly Visitation 2011-2014 (FY)



Daily Visitation

Figure 13 displays the monthly visitation by day for Kilauea Point NWR. Tuesday was consistently the day with the highest visitation, and Tuesdays in February had the highest overall visitation with an average of 1,029 visitors. This condition is likely due to demand build-up, as the Refuge is closed Monday and Sunday. Friday was consistently the slowest day, and Fridays in May averaged 368 visitors. *Note: The Refuge implemented the 5-day week during January 2014, so data from January 2015 was utilized*

Figure 13: Visitation by Day (2014)



2011 and 2014 Comparison

Figures 14 and 15 display comparisons between the monthly visitation of 2011 and 2014. These months were reviewed to identify the impact of reducing the days that the Refuge was open from a 7-day per week schedule to a 5-day per week schedule. 2011 had a yearly visitation total of 186,995 and 2014 had a yearly visitation total of 177,200. Outside of a drop during May 2014, the monthly visitation was consistent.

Figure 14: Monthly Visitation (2011FY and 2014)

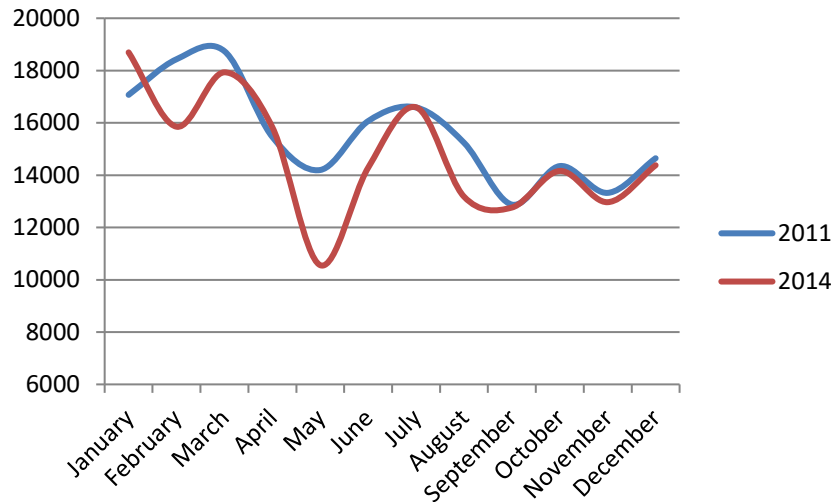
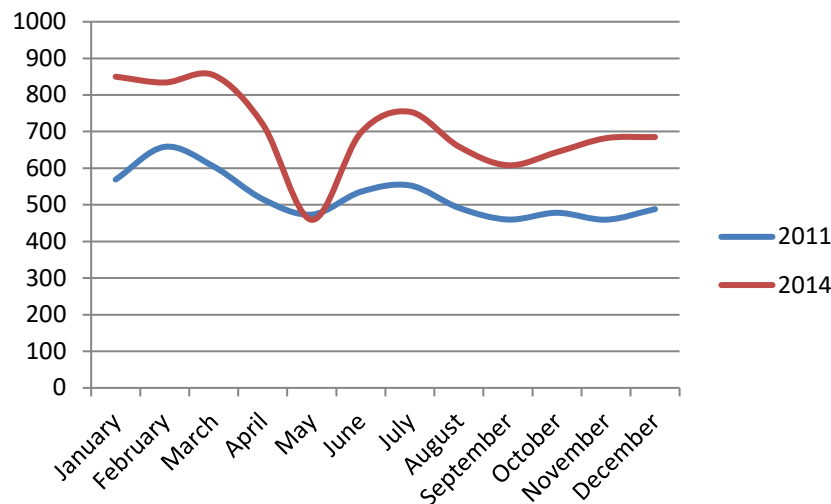


Figure 15 displays that there was a significant increase in the daily visitation after the Refuge schedule was reduced. The visitation daily average in 2011 was 524 and the visitation daily average in 2014 was 704. This growth represents a 34% increase in daily visitors between 2011 and 2014, even though there were less total visitors in 2014.

Figure 15: Monthly Visitation by Daily Average (2011FY and 2014)



Data Collection

A comprehensive data collection was conducted in addition to the data collection review. This data collection was concentrated on obtaining data that was not readily available from the visitor services / fee data. Data that was collected during 2016/2017 includes parking occupancy, visitation length, and entrance road vehicle data.

Parking Occupancy

For the parking occupancy evaluation vehicles were counted every ½ hour once a month on a Tuesday (Figure 16) and a Thursday (Figure 17). These days were chosen to represent a peak day (Tuesday) and an average day (Thursday). Monthly parking occupancy counts were conducted to identify hourly visitation trends and to see if visitor patterns varied based on the time of year. The Refuge parking lots fill early in the morning and occupancy decreases in the afternoon for both Tuesday and Thursday throughout the year. During conversations with Refuge staff, the consensus was that many visitors stop first at Kilauea Point NWR when visiting the North Shore for the day. One possible mitigation strategy for this condition would be to offer additional tours or events during the afternoon to help encourage afternoon visits.

Figure 16: Tuesday Parking Lot Occupancy (August 2016 – March 2017)

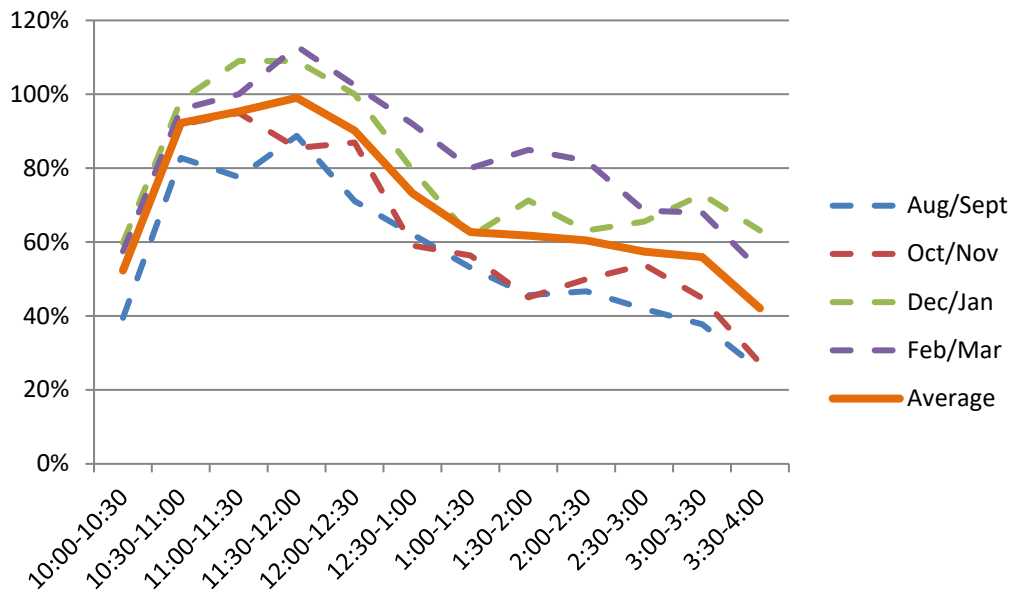
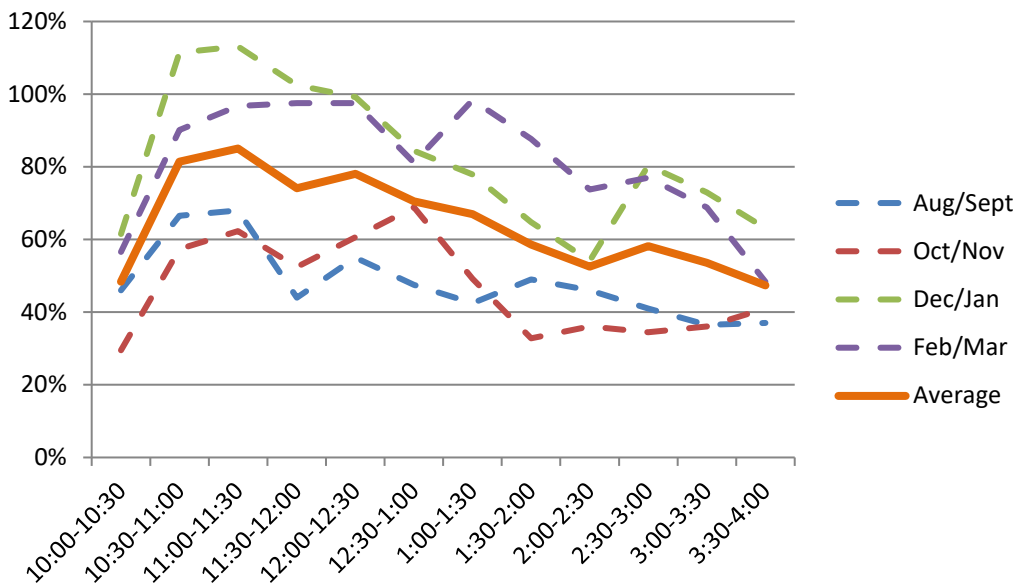


Figure 17: Thursday Parking Lot Occupancy (August 2016 – March 2017)



Visitation Length

The Kīlauea Point National Wildlife Refuge Traffic, Visitor, and Parking Counts Study (TVP Study), conducted in March and August 2003, found that the average duration of stay at the Point was approximately 40 minutes. Lighthouse tours began on a regular basis in 2013, therefore the TVP Study did not distinguish between Lighthouse tour and non-Lighthouse tour days. An updated visitation length (stay duration) data collection was conducted by the Scholar to provide additional detail to visitation length and to determine if length of visitation trends had changed significantly in past decade.

The visitation length remained close to the TVP Study findings with a 5-minute increase for all visits. There was an 8-minute difference between the average visitation during Lighthouse tour and non-tour days. There was a significant difference in the longest visitation and the percentage of visits greater than an hour between Lighthouse tour and non-tour days.

Table 1: Visitation Length

Period (Date)	Vehicles Observed	Average Visitation	Longest Visitation	Shortest Visitation	Percentage of Visits Greater than an Hour
Lighthouse Tour (2/25/2017)	97	48 minutes	2 hrs. & 2 minutes	14 minutes	20%
No Lighthouse Tours (3/17/2017)	85	40 minutes	1 hr. & 23 minutes	10 minutes	8%
Combined	182	45 minutes	2 hrs. & 2 minutes	10 minutes	14%

ALTERNATIVES ANALYSIS

Alternatives developed for this report center on a Kīlauea Point NWR shuttle system and reservation system. The Transportation Study identified the shuttle as the preferred transportation alternative and presented initial cost estimates, route locations, shuttle time tables, vehicle types, and other information for a Refuge shuttle system. A reservation system was presented as an alternative if the shuttle system proved unfeasible.

The Scholar used field observations, Transportation Study information, and visitation and vehicle data to develop pilot shuttle recommendations and reservation system details and operations. The pros and cons, operations, reservation system alternatives, maps, and decision matrix presented below were developed by the Scholar to help Refuge leadership contextualize and analyze the transportation alternatives. The Kīlauea Point NWR shuttle service and reservation system reports are included as Appendix II and III.

Kīlauea Point NWR Shuttle System

A mandatory shuttle and an optional shuttle are the two primary operational alternatives for shuttle service accessing the Refuge. The mandatory shuttle would require anyone entering the Point to access it by the shuttle. An optional shuttle would allow some parking at the current Point parking lots, while also connecting the Refuge with the off-site parking. During overflow periods the shuttle would become mandatory. In addition to providing transportation from off-site parking, the shuttle system could serve as a visitor service amenity and allow staff or volunteers to inform the riders about the Refuge and surrounding area, including Crater Hill and the Mokolea Point.

The following list of pros and cons was created by the Scholar to help Refuge leadership decide which operational model should be developed for a pilot shuttle system at Kīlauea Point NWR.

Mandatory Shuttle Pros

- Removes all parking and parking concerns from the Point parking lots
- Potentially allows for bicycle and pedestrian access to the Point
- Refuge staff or volunteers can engage with all visitors and shuttle riders improving the visitor experience
- Reduction of vehicle mile traveled (VMT) and emissions
- Potentially redevelop existing parking lots into biological areas
- Reduction of vehicles traveling along Kīlauea Road, lessening the impact on wildlife

Mandatory Shuttle Cons

- May reduce the number of visitors, negatively impacting the budget of the Refuge
- Prevents traditional/ most used visitation method (private vehicle)
- Highest Cost
- Shuttles accessing the Point via narrow driveway
- Highest off-site parking requirements

- Concerns with visitors parking at the Overlook and walking to the Refuge Point

Optional Shuttle Pros

- Lessens parking needs and parking concerns for the Refuge Point's parking lots
- Allows some traditional/ most used visitation method (private vehicle)
- Gives visitors the option of having an extra tour experience
- Redevelop parking for maximum circulation, reducing staff needed to manage parking
- Lower impact to off-site parking than mandatory shuttle
- Potentially lower cost than mandatory shuttle

Optional Shuttle Cons

- May reduce the number of visitors, negatively impacting the budget of the Refuge
- Visitor confusion about the shuttle operations
- Vehicle congestion at the Point driveway may still be an issue
- Refuge staff will be required to direct parking during peak periods
- Cost, though potentially lower than mandatory shuttle

Mandatory Pilot Shuttle Operations

Under the mandatory pilot shuttle all visitors to the Refuge who wish to travel to the Point will be required to board a shuttle at the Agriculture Center. Kīlauea Point NWR staff should enter into an MOU agreement with the County and Agriculture Center to allow 2 cutaway shuttles to enter and pick-up/drop-off Refuge visitors. The Memorandum of Understanding (MOU) should allow for 63-85 visitors vehicles to park at the Agriculture Center. If the parking lot becomes over capacity, a secondary or on-call pick-up location may be necessary.

The shuttle system will operate from 10:00 AM until 3:58 PM, 5-days a week (Tuesday – Saturday). It is recommended that the Refuge enter into a USFWS-administered contract or agreement with a private company providing 100% of the shuttle service and maintenance. The pilot shuttle is estimated to cost the Refuge between \$137,380 and \$206,693 depending on the length of service. These estimates may be reduced once the contract has gone out to bid. It is recommended that the pilot shuttle be operated by a private company to limit the impact on Refuge staff. Volunteers should be approached about providing shuttle narration during the pilot shuttle operating period. The Scholar developed scope of work for the mandatory shuttle contracting companies, included as Appendix III.

Optional Pilot Shuttle Operations

Under the optional pilot shuttle, visitors to the Refuge are given the option of taking a private vehicle or shuttle to the Point. Once capacity has been reached, all visitors who wish to travel to the Point will be required to board a shuttle at the Agriculture Center. Visitor services staff will likely be required to monitor and close the entrance gate, similar to current operations. Once the capacity has been reached vehicles will be directed to the Agriculture Center.

Kīlauea Point NWR staff should enter into an MOU agreement with the County and Agriculture Center to allow 1 cutaway shuttle to enter and pick-up/drop-off Refuge visitors. The MOU should allow for 32-43 visitors vehicles to park at the Agriculture Center. The shuttle system will operate from 10:00 AM until 3:58 PM, 5-days a week (Tuesday – Saturday). It is recommended that the Refuge enter into a USFWS-administered contract or agreement with a private company providing 100% of the shuttle service and maintenance. The pilot shuttle is estimated to cost the Refuge between \$117,340 and \$149,680 depending on the length of service. These estimates may be reduced once the contract has gone out to bid. It is recommended that the pilot shuttle be operated by a private company to limit the impact of Refuge staff. Volunteers should be approached about providing shuttle narration during the pilot shuttle operating period. The Scholar developed a scope of work for optional shuttle contracting companies, included as Appendix IV.

Reservation System

Reservation systems require or allow visitors to reserve the day that they will enter a site or take a tour. Timed entry systems are a type of reservation that identifies the exact time of entrance or tour. Reservation systems typically operate as a per visitor reservation or a per vehicle reservation. Per visitor reservations require each person to have a reservation prior to entry. Per visitor reservation systems are frequently used in coordination with a tour that has limited spaces. These systems are often located at sites that have excess parking or are near large cities that have multiple transportation options. Per vehicle reservation systems reserve a parking space and allow all visitors in the vehicle to enter on one reservation. These systems are frequently used in areas that have limited parking and are dependent on private vehicles to access the site. Both per visitor and per vehicle reservation systems can charge an entrance fee on top on the minimal reservation fee.

Pros of reservation systems are that they can be used to manage visitation (visitors and time), encourage visitation when there is excess capacity, and provide the Refuge with advance notice of upcoming visitation. Knowing visitor demand ahead of time can inform the amount of staffing, programming, and transportation needs.

The primary con of reservation systems is that they limit visitor freedom and prohibit pass by trips. They can also discourage certain populations who are uncomfortable with or do not have internet or phone access. Reservation systems can also create confusion and potentially visitor anger if they are not well informed about the system. Some of these concerns can be minimized by visitor and community outreach. Special conditions can also be arranged for significant cultural or other important visitors.

Based on the conditions of visitation at the Refuge it was recommended that any reservation system include a timed entry component. As space at the Refuge entry is limited, walk-up reservations should be prohibited. This would prevent visitor vehicles without a reservation from blocking the Refuge driveway entrance. If the reservation system became permanent, walk-up reservations could be accommodated by having a ticket booth in town or at the Community Agriculture Center. The Transportation Study considered a parking reservation system a medium-term recommendation implementable in 3+ years.

Pilot Reservation System

The Pilot Reservation System described below is designed to alleviate impacts on Refuge staff, who are frequently forced to direct traffic. In addition to reducing the need for visitor services staff to manage parking, the pilot reservation system is designed to require minimal significant investments in equipment or considerable alterations to the current fee structure and operation schedule. A critical component of the pilot reservation system will be distributing updated plans to hotels and on-line via USFWS website and the Refuge and Friends Group social media accounts. The Refuge should consider entering into a contract with recreation.gov for setting up and implementing a reservation system. They have extensive experience managing similar services at federal land units and are funded by charging a low (approximately \$1.50) service fee.

The Refuge should initiate the initial pilot reservation system for a 3 or 4 month period between December 1 to February 28 or March 31, depending on available funding and Refuge leadership direction. During this period access to the Point and parking areas will require a reservation. Reservations should be an hour in length. Based on current parking capacity 56 spots would be allowed every hour. It is recommended that the dirt and overflow parking areas be utilized for Lighthouse tour and other visitors that have prior approval to spend more than one hour. Lighthouse tours tickets should be combined with the parking reservations to streamline both ticketing processes. During the pilot reservation period, it is recommended that ½ of the parking reservations be distributed every ½ hour; 28 parking reservations released for 10:00 – 11:00 AM and then 28 parking reservations released for 10:30- 11:30 AM. This minimizes vehicle congestion from all reservation holders arriving at once. If congestion is an issue under this approach, reservations could be further distributed as 14 reservations every 15 minutes.

The pilot reservation system would require a staff member or volunteer to be positioned at the top of the driveway checking reservations. The pilot reservation system should not allow drive-up reservations. If a visitor vehicle comes to the reservation inspector and it does not have a reservation they will be directed to turn around in the existing loop. Staff or volunteers can suggest that they consider a reservation for later that day or later during their trip. It may be the case that there is parking availability when they arrive but they do not have a reservation. In this scenario, the vehicle will need to leave the queue, travel to a safe location, park their car and make the reservation from a smart phone or other web enabled device. After they have a reservation they can re-enter the reservation inspection line. Vehicles will not be allowed to place reservations while in line. This should be prohibited due to both time concerns and limited WIFI availability. Reservations can be printed out or displayed on a web enabled device. The holder of the reservation will be required to be in the vehicle that is using the reservation.

Figure 18: Pilot Reservation System Map

Permanent Reservation System

The Permanent Reservation System described below is designed to eliminate impacts on Refuge staff, who are frequently forced to direct traffic. As a Permanent Reservation System could reduce the need for future staff, it is justified in requiring significant investments in equipment and allowing alterations to the current fee structure or operation schedule. A critical component of the permanent reservation system will be working with the County, KNA, hotels, tourism agencies and other groups to ensure that the reservation system information is well distributed. In addition to information being on-line via US FWS website and the Refuge and Friends Group social media accounts. The Refuge should contact guide books regarding the reservation system.

There are two options for inspecting a reservation in a permanent reservation system: relocating the booth to the driveway gate area or having a scanner or keypad entry. Providing entry via a scanner or keypad entry would be a significant departure from standard practices at federal public

land units, though pre-paid smart cards have started to be used for visitor entry at Rocky Mountain National Park. The Kilauea Point NWR should work closely with Regional Staff and a parking contractor if a permanent parking reservation system is preferred transportation option. Moving the fee booth and having it staffed to check reservations would more closely resemble current federal public land unit practices. Due to internet limitations, it is recommended that all reservations be made offsite. To reduce time at the reservation booth, it is recommended that the reservation fee be combined with a per vehicle entrance fee of \$25. In this scenario, an offsite reservation ticket machine could be placed at the Community Agriculture Center or in Kilauea Town. Advanced signs advising of the reservation requirement and location of ticket machines should be installed to reduce confusion at the booth and direct traffic flow. As reservation fees are combined with entrance fees, no payments will need to be accepted at the booth. Additional visitor service programs, such as the Jr. Rangers, will remain at the Point.

Figure 19: Permanent Reservation System Map



Decision Matrix

The Scholar developed a decision matrix as a tool to help Refuge leadership determine a transportation alternative. The decision matrix scored five transportation alternatives, Mandatory Shuttle, Optional Shuttle, Peak Period Shuttle (December-March), Reservation System, and Peak Period Reservation System according to nine criteria. The decision matrix was designed to be a living document, allowing Refuge leadership to update scoring, add new criteria, and make changes to importance throughout the process. Table 2 presents a draft decision matrix completed by the Scholar. The Peak Period Shuttle (December-March), Reservation System, and Peak Period Reservation System alternatives were the highest scoring alternatives. Year-round shuttle alternatives scored low in the initial draft scoring due to the need to raise fees and ongoing costs. If the Refuge received funding from the Region or was successful in future grant applications, the shuttle alternatives scoring would improve.

Table 2: Draft Decision Matrix

		Mandatory Shuttle	Optional Shuttle	Peak Period Shuttle	Reservation System	Peak Period Reservation System
Criteria	Importance					
Bike/Ped Access	1	4		1	2	1
Impact to Commerical Tours/Programs	1	2	2	2	3	3
Impact to Visitor Freedom	2	1		2	2	3
Improved User Experience	2	4		3	2	1
Physical Infrastructure Needs	2	2		2	2	2
Similar Programs	2	2		3	3	2
Staffing Impact	2	2		2	2	3
Need to Raise Fees	3	1		1	2	3
Ongoing Costs	3	1		2	3	3
Total		34	36	42	42	42
Notes:						
Importance Ranked 1 (low) - 3 (high)						
Scoring 1 (negative impact/difficult) - 4 (positive impact/beneficial)						

NEXT STEPS/IMPLEMENTATION

The next decision that Kīlauea Point NWR leadership will have to make is a difficult one. Both the Refuge shuttle service and reservation system have benefits and drawbacks, while taking no action may exacerbate the parking situation as visitation rises.

Under both the shuttle service and reservation system alternatives, the initial first step will be to increase the Kīlauea Point NWR entrance fee. In 2017, initial efforts began to raise the fee from \$5 to \$10 per visitor. Pass holders and visitors under 16 will continue to enter free of charge. This fee increase will help fund ranger staffing and other visitor service amenities. The initial fee increase will also help fund a pilot shuttle or reservation transportation system, as well as other transportation related expenses (signage, parking etc.).

Kīlauea Point NWR Pilot Shuttle Service Next Steps

As noted in the Alternatives Analysis chapter, it is recommended that the Refuge enter into USFWS-administered contract or agreement with a private shuttle company for the pilot shuttle service. The Refuge should also work with the Agriculture Center or other partner to develop a MOU for allowing shuttle pick-up / drop-off and visitor parking.

If a Refuge shuttle service is desired to be implemented permanently, Kīlauea Point NWR should enter into a service contract, concessionaire contract, or memorandum of understanding with a private, non-profit, or public partner to run a shuttle, that would be available for all visitors. The feasibility of these options depends on availability of partners or private companies. The Refuge should begin discussions with the Hawaii office of the GSA to lease three cutaway vehicles to provide contracted service.

Payment for the pilot shuttle system should be funded by the initial fee increase. For a permanent shuttle system, the Refuge should work with the regional office or other partner to determine if funding options exist. If no funding options are available, Kīlauea Point NWR will need to raise entrance fees to \$15 per person based upon findings in the Transportation Study. The Refuge should also request funding from the Region to design and reconstruct parking lots to better accommodate transit.

Kīlauea Point NWR Reservation System Next Steps

As noted in the Alternatives Analysis chapter, it is recommended that the Refuge work with recreation.gov to develop reservation system. The Transportation Study recommended requesting Regional funding to hire a contractor to further refine the cost estimates for reservation and timed entry systems as well as the cost of conducting public meetings.

Other Recommendations

Beyond significant transportation operations and infrastructure developments, there are several smaller scale transportation improvements that the Refuge should complete:

- Update the Kīlauea Point NWR website and social media accounts to inform visitors of busy periods
- Develop afternoon programs to encourage visitation after peak hours
- Work with local hotels and tour groups to encourage afternoon visitations
- Partner with the Kīlauea Neighborhood Association to improve in-town signage
- Install advanced warning signs for periods where the Refuge is closed due to full parking lots

Figure 20: Refuge Closed Sign



CONNECTION TO WIDER TRANSPORTATION COMMUNITY

Across the U.S., refuges, state and national parks, and other public lands are experiencing a surge in popularity. While increased visitation expands the visibility and brand of natural areas, increased visitation can also negatively impact the natural setting and beauty. Many of these places hold special meaning in their solitude. On the transportation side, increased visitation leads to congestion, parking lots over capacity, and concerns with safety and wildlife impacts.

In the past or in a more suburban setting, the answer to transportation concerns may have been to increase capacity; whether more parking lots, wider roads, or intersection signalization. Limitations of space, environmental concerns, and the desire to keep public lands as natural as possible have discouraged using capacity increases to improve transportation issues. Due to existing buildings and infrastructure, many cities are no longer prioritizing increased capacity and are looking to alternative transportation and improved utilization to improve transportation concerns. Similarly, natural land units are implementing alternative transportation options to accommodate the next generation of outdoor lovers.

Natural lands are starting to develop bus systems, Zion's mandatory shuttle maybe the largest and most well-known, but it is far from a solitary example. Cycling and walking have long had a recreational purpose on public lands, but now there is an increased sense that they can be transportation initiatives as well. Kīlauea Point NWR is looking toward alternative transportation and optimizing efficiency to improve transportation issues and increase safety. A Kīlauea Point NWR shuttle service or reservation system would serve to reduce transportation concerns without having to build additional parking or negatively impact wildlife and natural systems. The Refuge is working with the County to improve cycling and walking and have also considered possibilities to allow pedestrians to access the Point.

Refuges and other natural lands face unique obstacles when planning for private vehicle alternatives. Many areas are far away from population centers and dependent on private vehicles to reach them, which limits home based trips. Natural land users are predominantly visitors who are unfamiliar with the transportation options. To offset these limitations, it is critical to make the visitors transportation experience as straightforward and comfortable as possible. Alternative transportation options should be reliable, but also clean, efficient, and educational. Making alternative transportation easier and more pleasant than a congested parking lot can leave visitors wondering why they would want to drive.

THE PUBLIC LANDS TRANSPORTATION LANDSCAPE

Working on transportation projects in a public lands setting brings a unique set of opportunities and challenges. Kīlauea Point NWR is tasked with a wide range of responsibilities. Providing habitat and safe nesting for native and endangered sea birds is at the forefront of management efforts by the Refuge. However, as one of the most visited sites on Kaua‘i providing a safe, educational, and enjoyable visitor experience is also one of the Refuges primary objectives. As Kīlauea Point NWR becomes more popular, the visitor experience and wildlife protection can seem at odds with each other. Identifying transportation alternatives, having a solid understanding of the transportation pros and cons, and recognizing transportation data and trends are ways that the transportation planning process can help improve the transportation setting while ensuring that sensitive species remain protected.

As part of the federal government, additional layers of approval are required for projects, employment, and entrance fee changes. Communication between agencies and regions can be challenging especially with Kaua‘i’s remote location. These factors can make projects move a little more slowly. One of the concerns with a Refuge owned and operated shuttle service for the Kīlauea Point NWR, was hiring the needed drivers and support staff. During my scholar term, there were several employment needs that were not filled due to difficulties in the federal hiring process and Kaua‘i’s high cost of living and remote location.

While it may seem like public land units should have an unlimited budget, the truth is that Refuge staff does an excellent job of running visitor services and protecting wildlife with limited funds. Employees take on multiple roles to make sure critical jobs are completed, and interns and volunteers play an important role in day to day operations. From the regions to the refuges, US Fish and Wildlife has dedicated and compassionate employees who do everything in their power to protect and maintain invaluable natural resources.

Figure 21: Visitor Services Park Ranger – Fee Booth



CASE STUDY FOR FUTURE PUBLIC LANDS TRANSPORTATION SCHOLARS

The Public Lands Transportation Scholar (PLTS) program offers the opportunity to spend several months working on transportation related issues at public land unit, in my case a U.S. Fish and Wildlife refuge. Like the public land units and refuges themselves, the Scholars can have a wide range of experiences. My experiences were based on relatively conventional congestion issues related to high visitation at a very well know tourist destination. Past scholars and the other 2016/2017 scholar often dealt with developing a relationship with the community and increasing awareness of the refuge on a regional scale. Before becoming a PLT scholar, I was a private transportation consultant for 2 1/2 years. I believe this background was unique as many Scholars come straight from graduate programs. My professional background was helpful in both developing the project and understanding the processes that would be helpful in meeting the scope of work (SOW). I would recommend that all future scholars have a realistic expectation of their tenure and use the SOW as a template if they are puzzled on how to move forward.

Before my tenure as a scholar, I had a very limited knowledge of the mission and operations of the U.S. Fish and Wildlife service. I believed that the primary purpose of the refuge system was to protect land solely for wildlife preservation. The orientation at Chincoteague National Wildlife Refuge in Virginia, showed me that there is a great deal of public recreation and visitation amenities in addition to wildlife preservation aspects. This trip also served as an introduction to the visitor service and natural preservation programs that I would see at Kilauea Point NWR.

The orientation also provided an excellent exposure to the different agencies that are involved in planning transportation on public lands. There were employees of US Fish and Wildlife headquarters, US DOT Central Federal Lands, Chincoteague NWR, and the Western Transportation Institute (WTI) at Montana State University Bozeman. Visiting the Refuge and touring Chincoteague NWR with a diverse and experienced group provided a greater understanding of what my role would be for the next 10 months. The orientation attendees were very approachable and encouraging of questions regarding the PLTS program. I would recommend asking as many questions as you can, the orientation will be the best time to interact with all the groups involved with the program in person.

One of the most changeling aspects of being a transportation scholar is combining the needs of the Refuge, timeline of existing projects or developments, and the internal scholar timeline. When I first got to the Refuge, the staff were very inviting and helpful detailing the operations and concerns of the Refuge. Almost everybody asked what I was there to do. Based on the orientation and scope of work I could answer these questions in general terms, but providing specifics was more difficult and it was not until several weeks after being at the Kilauea Point NWR that I began to feel comfortable with what I hoped to accomplish.

One method I used to feel more involved with Refuge operations was to volunteer for almost everything that I could. In my tenure, I helped with bird surveys, directed traffic, worked on

memorandums of understanding, and helped with public events. While these did not always directly impact my project, they did connect me with different branches of the Refuge and helped my understanding of where I could add value.

A difficulty that I encountered was physical distance from mentors and other members of the PLTS program. Kaua'i is the furthest west point in the U.S. and many of the other PLTS associates were on the east coast. The distance and time difference made it difficult to always feel connected to the other PLTS team members. Fortunately, I worked closely and had weekly meetings with the Supervisory Park Ranger, Jen Waipa. and regular meetings with the Refuge Complex Manager, Heather Tonneson. These interactions allowed me to feel connected to the project.

My final piece of advice to future transportation scholars would be to really listen to the concerns of the public lands staff and work to develop recommendations and projects that will benefit them. They will be at these areas long after the scholar term ends. The PLTS program provides a great opportunity to anyone who is interested in transportation planning and natural lands. One of the very best things about the job was working every day in such a beautiful place, no future job will have as good of a view!

PROFESSIONAL DEVELOPMENT

PLT Scholars are given a high degree of independence and responsibility when working on their public land unit. It is primarily up to the Scholar to work with Public Lands staff to ensure that the project is moving smoothly. There were multiple opportunities for professional development in multiple arenas of transportation planning. Being a PLT Scholar requires you to be well versed in many different transportation aspects and improves your understanding of how transportation planning concepts are incorporated in many “real-world” situations.

When I first arrived at the Refuge, I realized that a comprehensive data collection process would help inform my project and the transportation concepts that had been developed by the Transportation Study. Working with PLTS mentors and Refuge staff I designed and conducted data collection during my period on the Refuge. Designing and conducting the data collection effort helped me develop both qualitative and quantitative transportation approaches.

As the Transportation Scholar, you are encouraged to develop communications skills when dealing with the public and partner agencies. During my scholar tenure, I presented to the Kīlauea Neighborhood Association, during the FLAP open house, and at the monthly Refuge volunteers meeting. One of the most interesting parts of the PLTS program was attending and presenting at the TRB conference in Washington DC. With over 12,000 attendees, every transportation discipline and topic was presented. During my poster session, I interacted with professionals in the transportation field and discuss the transportation planning at Kīlauea Point NWR and the PLTS program.

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