



PROVINCE LANDS TRAILS

Project Proposal

Increasing safe and healthy walking trail use at Cape Cod National Seashore

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Current Context

Province Lands Visitor Center

Over four million people visit Cape Cod National Seashore (CCNS) each year, many in search of mental and physical restoration (NPS 2017). The park protects 40 miles of undeveloped sandy shoreline, and numerous forests, freshwater ponds, and wetlands. There are two visitor centers within the park, one in the south district, and one in the north district. The Province Lands Visitor Center (PLVC) is located in Provincetown, in the north district of the park, on the tip of Cape Cod. The visitor center provides direct access to a paved bike trail. The dune environment surrounding the visitor center is unique to this part of Cape Cod, and therefore draws a lot of attention. The Visitor Center provides views overlooking the Atlantic Ocean. The parking lot is free and open to the public year-round. The parking lot can also be accessed by the public buses. The visitor center has public restrooms, a water fountain, maps, and seasonal employees who can provide directions and information. About 50% of the contacts with the North District interpretation staff happen at the Province Lands Visitor Center. In the 2017 fiscal year, over 216,000 visitors in total visited PLVC (NPS 2017).

Provincetown and Barnstable County Health Context:

The National Park Service and Centers for Disease Control and Prevention suggest evaluating the health profile of the community where the park is located before developing new trails (2016). Use of parks and features varies across age (Baran et al. 2014). Therefore, park and trail design depends upon an evaluation of the local residents and visitors. Although the highest visitation to the park occurs during the summer months, the parking lot of the visitor center and the bike trail are open year-round. Therefore, PLVC serves as an important resource for the local community. Barnstable County (where Provincetown is located) has a growing older adult population. The population over the age of 65 increased from being 23% of the total population in 2000 to being 25% of the total population in 2010, much higher than the state and national averages of 13% (U.S. Census Bureau). In Provincetown specifically, the average age of residents is 57 years (U.S. Census Bureau). In 2016, Cape Cod Healthcare released a Community Health Needs Assessment for Barnstable County. The report covered the specific health needs of the local residents. The report identified areas of particular concern, including “chronic and infectious diseases”, “mental health issues”, and “senior health challenges” (Cape Cod Healthcare

2016). According to surveys conducted by the Barnstable County Department of Human Services, 60% of the residents reported a BMI above the “overweight” threshold category, indicating an increased risk of chronic diseases (Department of Human Services 2012). Cardiovascular disease and cancer were identified as the top two causes of death within Barnstable County, so future health programs are aimed to reduce these occurrences. To specifically address these areas, Cape Cod Healthcare proposes initiatives to support community-based programs and activities to improve the conditions of chronic disease and senior health (Cape Cod Healthcare 2016).

Visitor profile:

Many people come to Cape Cod for mental relaxation and to get away from their busy city lives. Natural environments, such as what can be found at the park, may be able to provide attention restoration to visitors (Kaplan 1995). While driving in traffic and computer-based work may require more directed forms of attention, natural environments may allow for a restoration of this more demanding attention level. Many visitors seek out the trails in the park to gain the sense of “being away.” This feeling has been shown to increase visitor satisfaction at park trails (Dowart, Moore and Leung 2009). Visitor use statistics show that those who visit CCNS go to the beaches and visitor centers more than other locations in the park (NPS 2017). Without a strong knowledge of places to hike, the visitor center often serves as a starting point for determining trip plans. One of the top five questions asked at PLVC is, “Where can we go for a hike in the dunes?” The visitors to CCNS are generally families and older adults (Anastasio 2018).

Healthy Parks, Healthy People

In 2015, CCNS partnered with Cape Cod Healthcare as part of a national initiative to reframe the role of parks as health resources. The “Healthy Parks, Healthy People” movement was adopted by the National Park Service in 2011, with each park having freedom to implement the program in a way that best fits to the specific park, varying with demographics, visitor profiles, and landscape. This program is based on evidence showing that parks serve an important role in communities for achieving public health recommendations (Cohen et al. 2007, Cape Cod Healthcare 2015). At CCNS, the program is geared towards addressing the specific health needs of the local community, visitors, and employees. Reducing obesity through increasing physical activity using park resources is one of the primary goals of the program. Natural environments can be important resources for attaining physical health (Wells et al 2007). Parks have been identified as significant areas for people to engage in physical activity (Cohen et

al. 2007, Evenson et al 2016). Within parks, people are more likely to be physically active on trails (Mowen 2010).

For one component of the Healthy Parks, Healthy People partnership at CCNS, health professionals attend trailheads in the park during summer months to encourage all park visitors to go for a walk. Walking is the most common physical activity behavior observed in parks among adults. Therefore, providing spaces which allow equitable access for all visitors to engage in walking behavior may have public health implications (Cape Cod Healthcare 2015). The presence of features such as trails in particular have been identified as important for encouraging park use among adults, which matches to the demographic profile of the local area (Kaczynski et al 2008). Having multiple park options has also been correlated with increased park use (Kaczynski et al 2014). Because CCNS has a variety of landscape and trail options, then maximizing the availability of these areas could improve the public health of the residents and visitors alike. The following are the guidelines set forth by the formation of the partnership between Cape Cod Healthcare and CCNS (Cape Cod Healthcare 2015):

- We promote health and well-being as an interrelated system linking human health to natural landscapes and all species.
- We seek expertise and resources from a wide range of partners in the public and private sectors.
- Our aim includes activities that contribute to physical, mental, and spiritual health, and social well-being.
- Our work takes place both within and beyond park boundaries.
We encourage uses that promote the health of all species while avoiding those that impair resources.
- We seek to provide equitable access to open spaces and natural places.
- Our commitment to improving public health will be mirrored in internal programs for our workforces.

Hiking options in the park:

Within Cape Cod National Seashore, there are accessible beaches with sand wheelchairs available to visitors during life-guarded hours. There is an ADA accessible trail at Doane Picnic Area in Eastham, in the South District of the park, which features a paved trail in a forested area. Parking lots at beaches and the Visitor Centers are all ADA accessible. Provincetown has multiple walking trail options. However, no accessible self-guided trails exist within the North District of the Park. There are also currently no self-guided walking trails featuring a dune landscape within the park. Visitor statistics show that the use of the park trails in Provincetown are more frequent during the winter months than the visitor center, indicating the particular significance of trails for the local community (NPS 2017). Visitors

are also welcomed to hike on the two National Park Service managed beaches. However, this option requires paying the day use fee, which is not a viable option for all visitors. The following free hiking options are currently presented to hikers who inquire at PLVC about walking options:

1. Walk along a paved bike trail accessed from the parking lot, which becomes busy with fast-moving bikers during the spring-fall. The paved bike trail can be congested and intimidating with fast-moving bikers, and experiences frequent accidents due to collisions and operator error. It does not allow the visitor to experience the feeling of walking with their feet in the sand in an open dune landscape. The distance of the trail (5.45 miles) acts as a barrier for most hikers.
2. One mile from PLVC is the Beech Forest trail, which is a 1-mile loop around a freshwater pond in a forested area. This area is often full of mosquitoes during summer months. This area does not allow the visitor to walk in the type of open-dune landscape they see from the visitor center, unless they choose to venture off-trail. Visitors have been venturing off-trail into dune areas, creating excessive erosion on steep slopes. Fencing has been installed to mitigate this activity.
3. Although not an official trail, Snail Road is a popular area for hiking. The Snail Road route is strenuous, with steep slopes, and contains many off-shoots of social trails. See Figure 1 for a map of the unofficial and unmarked trail routes in this area. People use this route to explore the Peaked Hill Bars Historic District, and often disturb dune shack dwellers. In addition to fragmenting the dune habitat, people cross the foredune and descend to the beach in steep, eroding areas. People park along the State Highway to access this unsigned trail, often resulting in unsafe conditions. Parking along route 6 at Snail Road is illegal but not enforced. The trail has no water or bathroom facilities. According to law enforcement rangers, there are approximately 5-7 responses to this area each year. Some of these incidents are for medical issues. The vast majority of the responses are for lost persons (C. Anderson, personal communication, April 6, 2018). There are likely many more incidents in this area each year that go unreported due to lack of cell phone service in the area.
4. The dunes can be accessed from anywhere along the bike trail. There are several social trails visible from the bike trail and parking lot area of the visitor center, and a portion of visitors elect to explore these on their own. The issue is that the heavy use of social trails creates widespread erosion and trampling of vegetation. Similar to the Snail Road area, visitors get lost and have medical emergencies in areas where finding them is difficult and cell phone service is spotty.

Natural resources in Provincetown:

The dune environment is a significant natural resource within Cape Cod National Seashore. All new development can impede the growth of vegetation and further fragment plant and animal habitats (Adams, 2018). Wetlands are protected in this area, ranging from seasonal bogs to saltwater marshes. See Figure 2 for a map of wetlands around PLVC along with the proposed locations for the new trails. The dunes also provide habitat for Spadefoot Toads, a threatened species which relies upon wetland habitats for reproduction. The dune environment is in a process of reforestation, so lichen crusts are a significant step towards revegetation. Human impacts have created fragmented habitats within the dunes, thus limiting vegetation growth. The National Park Service is responsible for preserving land for sustainable use for all people. Therefore, all planning decisions must not significantly impact the quality of the natural resources. Because development projects are permanent, then significant justification must be provided for any new construction that would alter the natural environment (Adams, 2018).

Future Recommendations

In order to provide visitors with a positive experience that addresses a definite need in the park, CCNS will provide an opportunity to engage in self-guided walks in the dunes surrounding the Province Lands Visitor Center. Recommendations for making healthier communities involve designing a built environment that encourages active living at all ages, accommodates for the uniqueness of the specific locale, and makes the healthy choices easy (Eitler, McMahon, and Thoenig 2013). Two trails will be designed to increase healthy behaviors among visitors and local residents. These trails are in partial fulfillment of the guidelines set forth by the Healthy Parks, Healthy People partnership to increase the use of park resources for health outcomes. One trail will be an accessible boardwalk going up to a view of the dune landscape at an overlook. The other trail will consist of directional signage along an existing unmarked route to the beach through the dunes. Both trails will be well-marked and feature educational stops. The proposed project is consistent with park sustainability priorities to allow for positive visitor interaction with the resource while also minimizing negative environmental impacts.

Visitors who walk the trail will access scenic views and experience a sense of wilderness unavailable in other parts of the park. Studies of preference for walking trails have shown that visitors prefer to have scenic views along trails (Dowart, Moore, and Leung 2009, Lieber & Fesenmeier 1985). Additionally, the opportunity to engage in physical activity through walking supports the goals of the Healthy Parks, Healthy People partnership. A trail leaving the visitor center will provide adequate parking, restroom facilities, drinking water, and safety information. A review of studies about parks identified aesthetic qualities, maintenance, and available amenities as important for increased use of parks (McCormack et al. 2010). The combination of water and bathrooms at the trailhead along with scenic views aligns with these research findings. Staff at PLVC will be able to provide one clear answer when visitors ask about walking in the dunes. Law enforcement rangers who need to assist visitors will have an easier time responding along marked trails.

Phase 1: Province Lands Dune Hike

The first step in the project will involve the installment of directional signage along the unofficial route currently used to access the beach from PLVC. As this is an inexpensive intervention, then it can be implemented within the next budget year. This trail will be designed to fulfill the need for a more remote trail that provides an alternative to the popular Snail Road hike. Although this may not alleviate

pressure on the Snail Road Trail, it may provide a safe alternative for those wishing to hike to see the water, but would prefer to have parking and restroom facilities. The route will access the beach through the existing cut along the foredune as to minimize the impact on erosion. No dogs will be allowed on this trail. This trail does pass through wetland environments. However, it is anticipated that fewer unofficial trails will be used by visitors, thus allowing the habitats as a whole to be healthier. Simple wooden signs will guide visitors along the trail, crossing the bike path. This recommendation is based on research showing the importance of providing directional information for positive visitor experiences (Dumitras et al 2017). See Figure 3 for more details.

Phase 2: Sunset Hill Boardwalk

The second step in the project will involve the construction of a new ADA accessible boardwalk trail leading to an observation deck overlooking the dunes. The name of the trail is based on a name used in the area before the park's development to be sensitive to the area's history. From the vantage point of this trail, visitors will be able to look for whales, hognose snakes, foxes, and become immersed in the pitch pine and sand landscape. These opportunities are not currently available to visitors with physical disabilities who cannot hike through sand or those who cannot walk more than 1 mile. The trail will provide increased opportunities for visitors who currently are not able to use the existing walking trails. The design of the trail will allow for older adults and disabled individuals to participate in walking at CCNS. This trail will be a boardwalk built on piers, sitting above the ground. The path does not interfere with wetland environments. See Figure 4 for more details. The switchbacks of the trail will be designed in a way that is sensitive to the existing topography and vegetation.

Design Recommendations:

Based on the health context and the specific area of interest, we are proposing the following guidelines to facilitate planning and construction. Phase 1 of the project will involve clear directional signage along the existing sand trail to the beach. Additional temporary signage will be placed during shorebird nesting season. This trail will not be advertised in the official map, but will be encouraged to those who are looking to explore the dunes and have a sense of "being away."

Phase 2 of the project will be built to comply with ADA standards. It will be a boardwalk to allow for the movement of sand and to provide railings or raised edges along the path. Table 1 describes the qualifications that must be met to achieve ADA standards. Phase 2 of the project will also involve the installment of interpretive signage along the trail to provide visitors with educational information about

the surrounding environment. The boardwalk will be built to reduce maintenance costs with PermaTrak surfaces on concrete pilings. The design drawings provided by PermaTrak are shown in Figure 5. The design of the boardwalk will mimic the design of the existing permanent boardwalk trails in the South District of the park, such as can be found at the Red Maple Swamp trail.

Table 1. ADA standards for a newly built trail (ADA 2010)

<i>Width of Trail</i>	<i>60"</i>
<i>Tread Obstacles:</i>	<i>2" maximum</i>
<i>Cross Slope</i>	<i>5% maximum</i>
<i>Running Slope (any distance)</i>	<i>5% maximum</i>
<i>Running Slope (200 ft)</i>	<i>8.33% maximum</i>
<i>Running Slope (30 ft)</i>	<i>10% maximum</i>
<i>Running Slope (10 ft)</i>	<i>12.5% maximum</i>
<i>Signs</i>	<i>Indicating accessible trail length</i>

Health Outcomes

The new trails will be designed to address human and environmental health issues in the local community. Residents are more likely to use parks that are close in proximity to their homes, so local trails provide an accessible option (Cohen et al. 2007). The impacts are anticipated to affect ecological health of the natural environment as well as the physical and social health of visitors. These impacts are based on anecdotal information from interviews with park staff and empirical evidence showing how park trails can benefit the park itself.

Physical:

Given the demographics of Provincetown, with an older adult population, a boardwalk trail will better service these individuals overall. Having multiple options will provide visitors with a choice between a longer or shorter trail. The presence of features such as trails is important for encouraging park use among adults, thus matching the community profile of Provincetown (Kaczynski et al 2008). Having multiple trails available has been linked to increased park use (Dumitras et al. 2017). Walking in

particular is shown to decrease blood pressure, improve heart health, and reduce weight (Cape Cod Healthcare 2015). A review of the relationship between natural environments highlighted how access to greenspace and actual use of these spaces may improve physical health (Wells et al. 2007). People who use greenspaces are more likely to achieve physical activity recommendations and have a healthy weight (Ellaway, Macintyre, & Bonnefoy, 2005). Walking for physical activity is associated with a reduced BMI and risk for chronic disease. Therefore, visitors can match their preferences to the trail that they use. Families with young children, who may also be limited by trail length of the existing options, may also find the boardwalk to service their needs. The boardwalk can be used for wheelchairs and strollers. Research has shown that people prefer to have nice scenery along their walks (Dowart, Moore, and Leung 2009). The new trails will provide scenery in a way that is not currently provided by existing walking options. Studies have also shown the significance of having facilities such as water fountains and bathrooms in trail selection.

Physical safety is another anticipated effect of the newly built trails. Issues of lost persons and heat-related incidents could be reduced by properly informing visitors about the different trail options and having sufficient clear signage along trails. Theoretical underpinnings of environmental psychology show that people who feel in control of their environment (such as having clear signage versus confusion about which trail to take) are more cooperative and competent (Kaplan and Kaplan 2008). Having sufficient parking facilities is another increase in safety for visitors. Water and bathroom facilities improve the ability for people to be prepared for a hike.

Social:

Social capital may be increased through the presence of places where people can informally gather, such as along walking trails. Social capital may in turn influence sustainability in these areas (Rogers, Gardner, and Carlson 2013). Social cohesion in community has been connected to overall community health (National Park Service & Centers for Disease Control and Prevention 2015). Because the current park context does not match the demographic profile of the park, then this trail will be a more inclusive space for informal social interaction.

Current formal education at the Visitor Center goes along an unmarked trail from the PLVC. The new trails could provide an official way for park staff to educate visitors about the history of the area (J. Anastasio, personal communication, March 2018). There would be an anticipated increase in participation in interpretive program due to the ADA accessibility and the increased visibility of the groups along the trail. Organized programs at parks may play a role in increasing the use of those parks

(Mowen 2010). The Healthy Parks, Healthy People Partnership, which includes healthcare professionals being at trailheads within the park, would benefit from the new trail system as well. Visitors can have their blood pressure and weights measurements taken throughout the summer season. Participation in the program would also allow for visitors to connect informally with healthcare professionals. Additional positive interactions with law enforcement rangers may also result from the new trail. If visitors are clear about directions along the dune trail, then fewer lost person reports may occur (Anderson 2018).

Environment:

The boardwalk trail option avoids wetland environments. The design of the boardwalk itself also allows for vegetation around the trail area, permitting for regrowth of dune grass. Interpretive signage along the trail will inform visitors about the importance of staying on the trail in the dune environment to lessen the impact on the local ecology. The interpretive signs can also communicate information to visitors about the unique plants and animals found within the area, fostering a respect for these species. The use of the existing trail does not create the need to build additional trails through the dunes. Because no new trail is being built, then additional habitats are preserved in their current state. The sand trail will go through wetland environments. However, this trail can be closed following high rain events to allow for Spadefoot Toad reproduction. Additionally, the marked trail will be signed in hopes of reducing the number of unofficial trails in the area. This will lessen the habitat fragmentation in the dunes. The trails will be designed to match the natural landscape, curving around existing features rather than altering them (M. Adams, personal communication, April 2018).

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Figure 1. Unofficial trail routes (red line) through the Snail Road area. Dune Shacks are shown in blue.

DEP Wetlands Areas



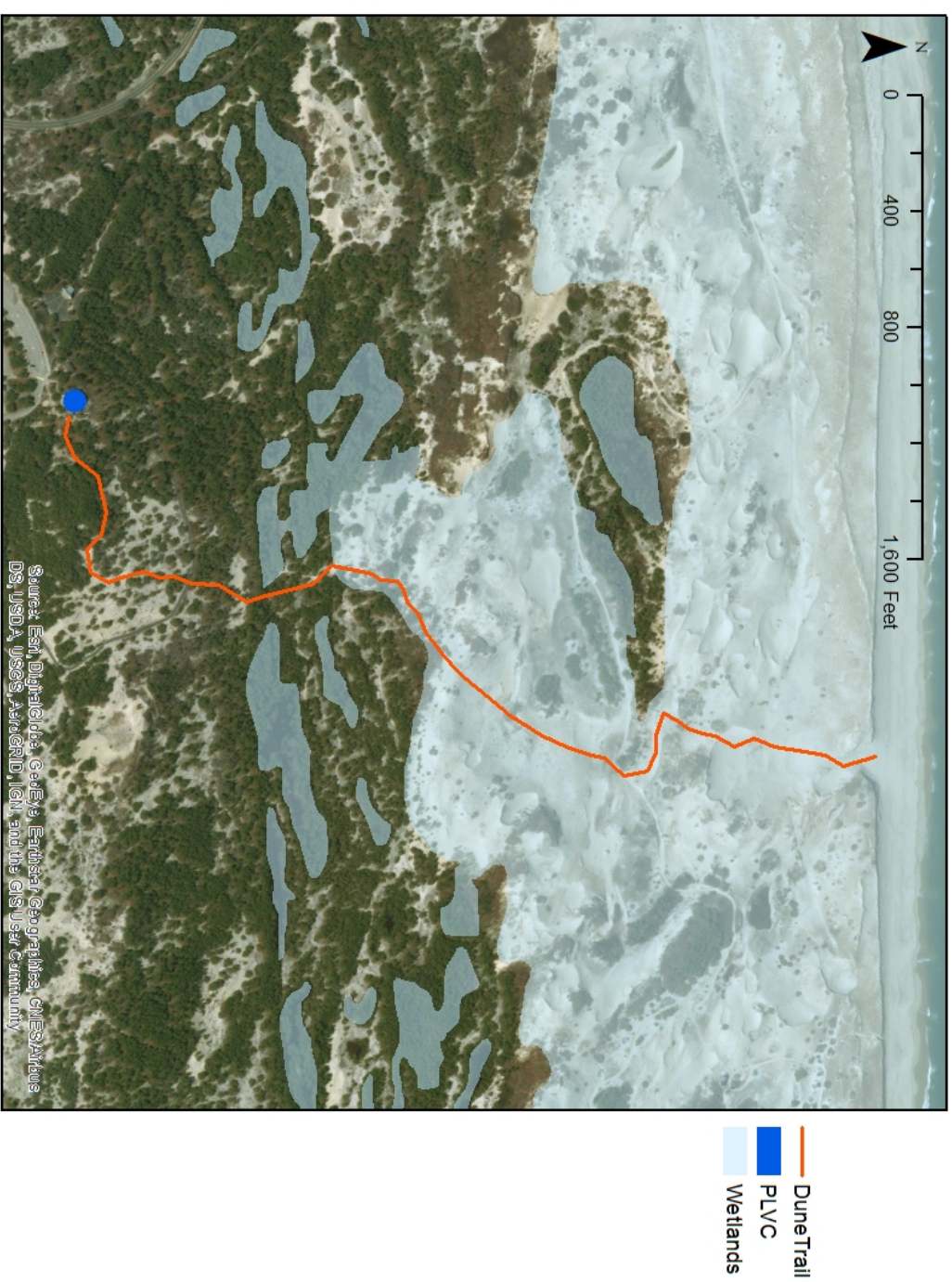
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Anna Gannett
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Source: MassGIS, Massachusetts DEP
Projection: NAD 1983 State Plane Massachusetts Mainland

- Wetland Classification**
- Coastal Dune
 - Shrub Swamp
 - Wooded Swamp Coniferous
 - Wooded Swamp Mixed Trees
 - Boardwalk
 - Dune Trail
 - PLVC

Figure 1. Department of Environmental Protection wetlands classifications around Province Lands Visitor Center

Province Lands Dune Hike



Anna Gannett
 March 25, 2018
 Source : MassGIS, Massachusetts DEP
 Projection : NAD 1983 State Plane Massachusetts Mainland

Figure 3. Proposed path for the signage along exiting route through the dunes from PLVC

Sunset Hill Boardwalk



Anna Gannett
 March 25, 2018
 Source : MassGIS, Massachusetts DEP
 Projection : NAD 1983 State Plane Massachusetts Mainland

Figure 4. Proposed path for the new boardwalk route leading to an observation deck from PLVC

