# New York Adirondack High Peaks Region

## Shuttle Feasibility Study

Calamity Brook (Source: ADK 46ers)

April 2021

Prepared for:
**New York State, Department of Environmental Conservation**

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U.S. Department of Transportation Volpe Center

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The New York State Adirondack High Peaks Region Shuttle Feasibility Study establishes the current road, parking, congestion, and travel pattern trends within the region. Also documented is the stakeholder outreach process to gather feedback on visitation trends, issues, and a shuttle bus service in general. The report then identifies popular recreation destinations, those that are suitable as shuttle bus pick-up/drop-off locations (stops), and delves into potential future scenarios for a shuttle bus service. Initially the study aimed to present three concept scenarios together, representing different functional elements or levels of service. Due to circumstances that arose through the course of the project related to the ongoing COVID-19 pandemic; this report presents a potential pilot core service guided by what would be possible given present conditions, existing vehicles, and a specified amount of available funds ($800k). A subsequent deliverable will explore two potential future scenarios that provide different functional benefits that may serve the interests of recreational users exclusively, or may provide benefits to other stakeholders. The pilot service scenario detailed in this report includes cost estimates based on both hourly and mileage rates from similar services, discusses the benefits and considerations of servicing the route with a split- or continuous-service, and includes recommendations for complementary activities to support the piloting of a new shuttle service.

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# List of Abbreviations

| Abbreviation | Term |
|---|---|
| AADT | Average Annual Daily Traffic |
| ADK | Adirondack Mountain Club |
| AMR | Adirondack Mountain Reserve |
| APSLMP | Adirondack Park State Land Master Plan |
| BEB | Battery Electric Bus |
| COVID-19 | Coronavirus Disease 2019 |
| EV | Electric Vehicle |
| FT | Frontier Town Hub Site |
| GHG | Green House Gases |
| HPAG | High Peaks Advisory Group |
| MPH | Miles Per Hour |
| NPS | National Park Service |
| NYSDOT | New York State Department of Transportation |
| NYSDEC | New York State Department of Environmental Conservation |
| ORDA | Olympic Regional Development Authority |
| ROOST | Regional Office of Sustainable Tourism |
| SUNY ESF | State University of New York College of Environmental Science and Forestry |
| VMT | Vehicle Miles Traveled |
| UMP | Unit Management Plan |
| USDOT | United States Department of Transportation |

# Foreword

This feasibility study and analysis took place during a global pandemic. Typical data gathering activities including site visits were not possible due to state and local travel restrictions. The project team overcame these restrictions through virtual orientation, including sharing maps, images and videos, as well as using online map services including Google Maps to gather perspective on the unique features along potential service routes. Data sources including Waze and AllTrails data helped the team understand traffic and visitation levels. The U.S. Department of Transportation (USDOT), Volpe National Transportation Systems Center (Volpe Center) relied heavily on the New York State Department of Environmental Conservation (NYSDEC) to provide context, insights, clarification, and other firsthand input. Stakeholder input typically gathered during in-person events instead took place through email communications and virtual participation in the High Peaks Advisory Group (HPAG). A planned summer and fall 2020 County shuttle service did not begin out of an abundance of caution regarding COVID-19; thus, the project team was unable to benefit from real-word pilot data and the wealth of relevant experience gained during service pilots. As the project continued into the fall of 2020, other uncertainties arose that hindered the analysis from proceeding to a planned conclusion by the end of 2020. Both the Volpe Center and NYSDEC acknowledge an uncertain immediate future and that the pandemic hindered the project's initial data gathering and development of three service scenarios as initially planned. In order to respond to an immediate need to plan for the upcoming 2021 summer season, and a need to carry forth with future planning efforts (with wide uncertainties including and beyond those associated with the pandemic), NYSDEC and Volpe agreed to extend the project timeline until April 2021 and to proceed with the following approach:

1. Document current conditions, stakeholder outreach, and analysis of feedback. Given existing conditions (including available vehicles, funding, parking facilities, and general "lay of the land") determine the feasibility of providing a pilot shuttle service. Include considerations, recommendations, and best practices for pilot shuttle services.
2. Develop two conceptual scenarios to address different potential future conditions. The first scenario would primarily focus on recreation and visitor management through a 'hub-and-spoke' arrangement, featuring central parking, traveler information, and multiple routes to select destinations. The second scenario connects the Lake Placid area to a southern hub off the interstate that may develop into a destination attracting visitors traveling up from the south. This scenario could enable a transportation system that meets the needs of NYSDEC as well as those of local stakeholders, and could potentially support economic development in the region.

The information and data presented in this technical memorandum is based on materials collected outside those initially envisioned for the project and have been reviewed by NYSDEC staff to establish accuracy or provide context.

# Executive Summary

The New York Adirondack High Peaks Region Shuttle Feasibility Study builds on previous efforts to understand and explore the feasibility of implementing a shuttle service in the Adirondack High Peaks region. This report focuses on current conditions on Route 73, identified by the New York State Department of Environmental Conservation (NYSDEC) as the most problematic corridor for parking and congestion in the High Peaks region. It captures the feedback from relevant local stakeholders (identified by NYSDEC) and presents an initial shuttle route for an upcoming pilot service with existing vehicles (four 20-passenger shuttle buses) and financial resources. Based on this information, shuttle service options presented, if implemented successfully, have the potential to make the region safer, less congested, and more accessible for those wishing to recreate outdoors. The scope for this effort did not include a carrying capacity analysis. Any shuttle system would need to address carrying capacity in its operational design. Appendix E provides a brief overview on the state of the battery-electric bus (BEB) shuttle market, infrastructure considerations, and provides references to recommended practices for planning guidance.

## Key Findings

The project team from the Volpe National Transportation Systems Center (Volpe Center) analyzed various data (sourced from NYSDEC, New York State Department of Transportation (NYSDOT), and Waze, among others) to understand transportation trends, needs, and associated issues in the Adirondack High Peaks. The High Peaks region appears as shaded areas in **Figure 1** on the following page, congestion and parking issues tend to occur along Route 73 as it passes through the towns of Keene and North Elba. Note parking locations shown serve recreational areas, including established trails denoted by the dashed green lines.

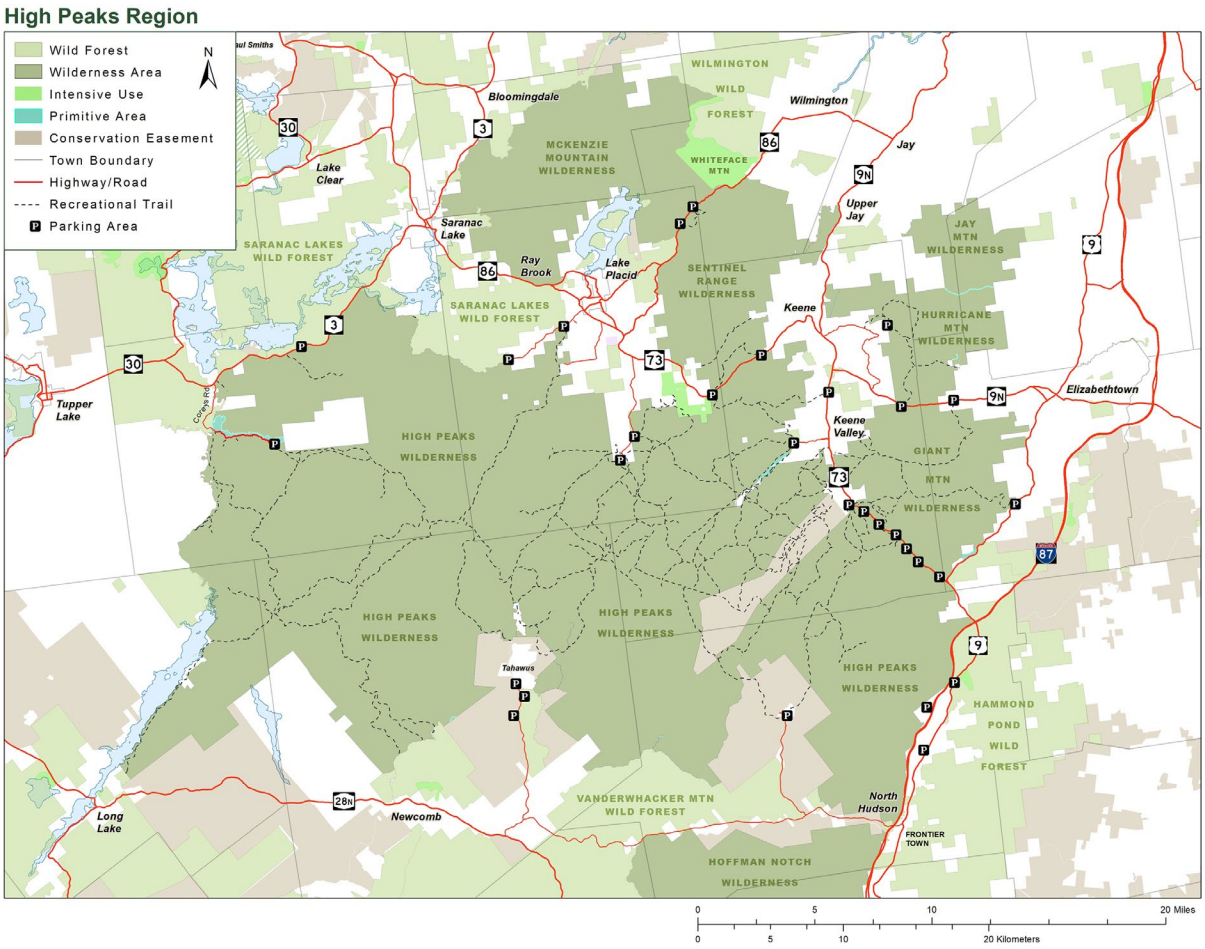


**Figure 1: High Peaks Region of New York State**
Source: NYSDEC

The analysis captures elements including visitation, parking, congestion, and safety. Prominent findings from research, stakeholder feedback, and input from NYSDEC include:

- Hikers represent over 85 percent of visitors to the region (extending beyond the focus of the study area), with hiking being the most popular summer and fall activity. Other popular activities of potential relevance for a shuttle service to consider include cycling, swimming, and rock climbing.
- The high season is from June to October, with a peak during the month of August. Instead of consistently busy holiday weekends, peak visitation tends to be more associated with weather patterns, with a surge in hiking visitation during especially sunny and temperate weekends that follow periods of rain.
- Most trailheads have small parking lot areas, generally with less than 20 spots, although some parking areas do not feature striping to delineate spaces.
- Route 73 road segments have annual average daily traffic counts between 1,000 and 5,000.
- Between 2015 and 2018, there was a yearly average of 54 crashes on Route 73. The most common contributing factors were animal actions, slippery pavement, unsafe speeds, and vehicles following too closely.

# Shuttle Service Options

NYSDEC and the project team began with a visioning exercise to understand the goals and evaluation factors for a shuttle service. That exercise yielded the following goal statement:

**The primary goals of the shuttle service are to ensure safe access to destinations (trailheads) for recreating within the Adirondack High Peaks and to mitigate congestion, inadequate parking space, and safety-related issues associated with increasing demand for recreational access.** Given these goals, the project team determined three operational scenarios: (1) a pilot core service, and potential growth scenarios; (2) a "hub-and-spoke" system featuring three routes; and (3) a "complete" route that provides a direct connection between I-87 and Lake Placid.

Scenario 1 represents a feasible pilot shuttle service that meets the basic needs and limitations as communicated by NYSDEC. The proposed route operates primarily along Route 73, with a southern terminus at Frontier Town and a northern terminus at Mt. Van Hoevenberg. Stops include Mt. Van Hoevenberg, the Town of Keene, the Saint Huberts Area, Chapel Pond/Giant Mountain Trailhead, and Frontier Town. The route serves to connect major parking areas (Mt. Van Hoevenberg, Frontier Town Campground) to major trailheads (the Saint Huberts area, Chapel Pond & Giant Mountain). This leverages existing parking locations and aims to intercept visitors before they drive into more congested areas along the Route 73 corridor. If visitors take advantage of the shuttle service, it has the potential to decrease congestion and hazardous parking, especially near trailheads. This scenario could also create a connection with the Garden Shuttle, presumed to remain in independent operation throughout each scenario.

Scenarios 2 and 3 are representations of possible future scenarios with the potential to address different needs or to be responsive to local development and stakeholder partnerships. Routes, hub locations, and bus stops presented are for conceptual understanding and planning purposes only. Future operations along the lines of these concepts may require substantial capital investments for 'start-up' infrastructure (including land acquisition, design/permitting, construction, etc.), purchase of additional vehicles, and build-out of permanent bus stops and other accommodations.

A central visitor "hub," where ample parking and a visitor information center (with NYSDEC or volunteer staff to answer questions) is located and where transit routes converge ("hub-and-spoke"), anchors the first of these (Scenario 2). Developing a transit hub will require adequate land, site design, environmental reviews, permitting and construction and should be planned with confidence in the future demand for such a service. With those investments and effort, this scenario provides a publicly accessible, secure, and safe parking area and enables administrative control over visitation. Route scheduling, information material, and staff can provide direction or serve as levers to increase flexibility in managing recreational use and enhancing the visitor experience.

The final scenario (Scenario 3) aims to connect visitors approaching from the south (traveling north on I-87) to multiple recreation destinations along the Route 73 corridor and on to Lake Placid. This scenario could complement potential development of the Frontier Town area as a recreation hub with other tourism-based opportunities in Lake Placid and has the potential to provide more than parking-to-trailhead service. The "complete" route connects visitors from the highway to trailheads and ultimately to Lake Placid. This route could help foster car-less trips within the region, serve local stakeholders' interests, and support economic development.

Between a pilot service and a long-term, smoothly operated shuttle service lie potential pitfalls. To avoid these, continuous planning and development can monitor progress and inform upcoming plans. Experience with prior parking shuttles at in-demand locations indicates that visitors tend to appreciate knowing they can find parking and get to their desired trailhead with minimal hassle. If marketed properly, initial pilot services can become very popular after rollout and can reach capacity on busy days. Alternatively, pilots without thorough marketing or those lacking adequate vehicle capacity (either too few vehicles or comprised of vehicles that are too small) to meet immediate demands and expectations for service frequency can struggle to gain traction and frustrate visitors who attempt to use the service. NYSDEC and its partners are encouraged to plan for these potential factors. The pilot service must be well known (marketed) and complimented by parking enforcement and direction of traffic to authorized parking areas. Securing additional vehicles and staff ridership grows can ensure there is enough capacity to satisfy demand.

The pilot service along the core route outlined below is not sufficient to serve all visitors during high visitation times; it represents a starting point that is feasible given current resources and constraints, from which to begin service, gain experience, and build towards a more robust system in the future.

# 1. Introduction

Increasing visitor use and changing use patterns have exacerbated unsafe parking and crowding adjacent to popular recreation sites in the High Peaks region of Adirondack Park. New York State Department of Environmental Conservation (NYSDEC) is exploring options for managing this use in a way that protects public safety and natural resources without infringing upon public enjoyment of State lands.

Providing for public safety, natural resource protection and enjoyment of State lands can be challenging. These values exist as part of an integrated system that requires holistic management. NYSDEC staff, in partnership with local stakeholders, have identified traffic and transit management as potential tools to both improve public safety and assist in protecting the natural resource. Traffic and transit management may also be able to enhance the user or visitor's experience.

## 1.1 Focus

This report assesses the feasibility of implementing a pilot shuttle system in the Adirondack High Peaks region in New York State and provides two future scenarios to assist with planning for, and developing, a more robust shuttle system responsive to potentially different future dynamics.

The Adirondack High Peaks region (the region) has experienced consistently growing visitation over the past decade, and in particular, has seen growth in demand for access to lands containing the 46 major peaks of the Adirondack Mountains. The region suffers from significant parking issues and traffic congestion, typical side effects of high demand for limited access destinations. The Town of Keene operates a parking shuttle service to the Garden trailhead and limited shuttle services have piloted in the past; however, none adequately addressed the congestion, over-parking, and unsafe conditions at popular trailheads.

User demand exceeds existing parking capacity; this causes congestion from visitors looking or waiting for parking and results in unsafe road conditions, including pedestrians in areas without pedestrian accommodations. These conditions negatively influence the visitor experience, exacerbate safety concerns, and damage natural resources.

A shuttle service is ***one of many tools*** available to address traffic congestion and parking concerns, and offers a means of engaging with visitors to ensure a positive experience. A shuttle service can provide more access to a broader demographic of visitors, and facilitate car-less travel within, or to the region. Shuttle services can also mitigate air-quality issues and reduce emissions through eliminated car-trips.

Governor Andrew Cuomo's New York State Action Plan for Climate Change established ambitious goals to reduce greenhouse gas (GHG) emissions in the state, and encourages expanded public transit options that use very low- and/or zero-carbon fuels and reduce vehicle miles traveled (VMT) by personal cars.[1] This feasibility study supports the climate action plan by exploring the viability of reducing carbon

[1] New York State Climate Action Council. *Interim Report 11-9-10*. "Chapter 7: Transportation and Land Use Mitigation." Last retrieved 9/1/20. https://www.dec.ny.gov/docs/administration_pdf/irchap7.pdf

emissions from individual vehicles by implementing a shuttle service. This draft presumes utilization of shuttle buses already purchased and provides resources on available battery electric shuttle buses and considerations for future fleet electrification in Appendix E: Electrification Planning. However, detailed analyses of emissions benefits from a future shuttle service or of the energy constraints associated with electrification are beyond the scope of this study. While those analyses are vital to a future electrified fleet, a new shuttle service's first priority should be to establish an efficient service that achieves desired goals within available constraints. Planning for large electric vehicles is a process that can take years and begins with establishing a dialogue with the local utility service provider. The utility provider can communicate critical information including rate structures and locations of power distribution lines / grids, and can work cooperatively to identify whether charging the fleet would require upgrades to the utility power infrastructure. Planning for electrification should consider the full, future fleet so that future needs do not require duplicative site work or construction costs. NYSDEC and its partners are encouraged to engage with their utility early and discuss their desire to electrify future bus services should the pilot system be successful and to begin plans for infrastructure and vehicle investments critical for long-term growth and sustainability.

Detailed below are challenges, limitations, and potential benefits of implementing a shuttle service; along with a conceptual route for a pilot "core service" informed by visitation, projected demand, public trail use, existing services, and in consultation with the sponsor and stakeholders. Also identified are various alternative congestion management tools that may complement a shuttle service and references to seek additional information; however, a comprehensive congestion management analysis is beyond the scope of this particular study. In addition, the scope for this effort did not include a carrying capacity analysis. Any shuttle system implementation relies on addressing carrying capacity in its operational design.

The goal, in fulfillment of the project agreement and bound by a limited scope, is to provide NYSDEC with an objective evaluation of the feasibility of implementing transit service in the Adirondack High Peaks. The project team acknowledges the unique challenges facing the region by exploring a path forward for a potential service in the area and, as appropriate, providing recommendations for next steps and implementation. Alternative parking and traffic management strategies to implement in place of, or in addition to, a shuttle system are also suggested.

Ultimately, an initial pilot service is feasible within the bounds and available resources noted herein. A sustainable service often takes many years to achieve and requires sufficient funding, sound management, and enough drivers and vehicles to provide service levels that meet demand. The potential demand for a shuttle service in the region is unknown at this time, meaning NYSDEC and its service partners must monitor progress, react to on-the-ground circumstances, listen to visitor feedback, and work cooperatively to develop plans for iterative growth. Each iteration provides an opportunity to make adjustments and tailor the vehicles, route(s) and operations of the service to meet current needs.

## 1.2 Methodology

The project team collected and analyzed relevant data (e.g., traffic volumes, parking areas, trailheads, no parking areas, etc.) from NYSDEC and partner agencies, such as the New York State Department of Transportation (NYSDOT). That data provided initial orientation of parking, average annual daily traffic (AADT), crashes, existing shuttle routes, and general orientation of the various surrounding roads

including Route 73, Route 86, Route 9, Route 9N, and Interstate-87 (I-87). Crowdsourced data from Waze helped inform roadway event patterns, such as traffic jams, vehicles hazardously parked on the shoulder of a road, and crashes. These disparate private and public data sources informed development of maps, which, along with NYSDEC feedback and insights, created a baseline context to understand the existing congestion and parking conditions.

Tourism and trailhead registration data helped determine trail usage, and data from AllTrails along with input from NYSDEC helped gauge which trails were most popular. Waze roadway event data helped explore the relationship between congestion, accidents, and trail popularity. This information along with stakeholder responses informed baseline scenarios and potential routes that would support trail visitation without damaging the natural environment on the trail and in the parking area while creating safer, less congested roads.

NYSDEC identified stakeholders in the region including state governments, local governments, quasi-government organizations, private landowners, economic development groups, non-profit/advocacy groups, and recreational organizations. These groups received targeted questions and provided feedback regarding a potential shuttle service. The correspondence helped gauge the perception of the feasibility or efficacy of a potential shuttle system, capture concerns, identify potential support or opposition, and propose alternatives according to local stakeholders. The stakeholder outreach also sought to gain a clearer understanding of issues that would hinder implementation of a shuttle system, how a shuttle may impact tourism and recreational activities, how such a system may impact visitor demographics, and other general concerns.

The project team was unable to conduct a site visit due to the COVID-19 pandemic and relied upon Google Maps for distances and travel times between the proposed shuttle stops. These data aided in the creation of an Excel model that incorporated dwell time, service hours, and mileage. The study team used the model to evaluate whether different combinations of routes and service frequencies met the established goals of service.

# 2. Current Conditions

Local stakeholders and NYSDEC staff echoed a sense of growing concern over the surge in visitation the region has experienced over recent memory. Each year, major demand-events like holiday weekends or perfect weather conditions set records for visitation and, unfortunately, lead to more frequent safety incidents along roads and near parking areas. Many trailheads and parking lots along NY Route 73 are often located where this road carries a 55 miles-per-hour (MPH) speed limit and there are no pedestrian accommodations alongside the road, or for crossing the road (see Figure 1). Rangers and staff indicate trailhead-parking areas are usually full on busy days, and some lots fill up as early as 7:00 AM. As lots fill up, congestion in and around them spills into the roadway as cars idle or circle while waiting or begin to park illegally on the shoulder of the road, exacerbating safety concerns and congestion throughout the corridor (see Figure 2).

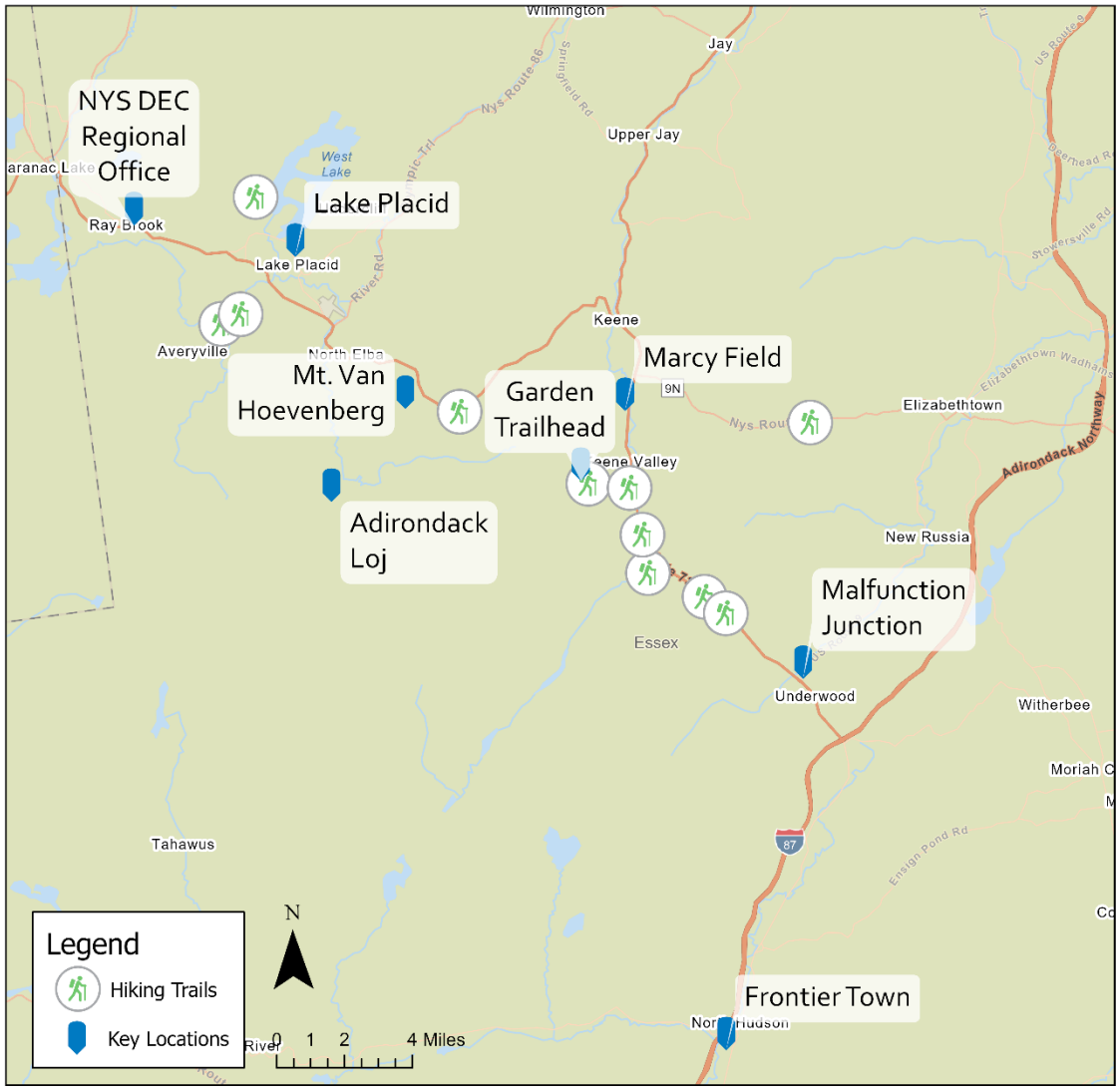


**Figure 2: Adirondack Regional Context Map**
Source: Volpe Center

As fewer hikers are able to park near their desired destinations, more hikers find themselves hiking in terrain for which they are unprepared. This has resulted in more people getting lost or injured and needing assistance from Forest Rangers. Rangers, stewards, and other custodians struggle to handle crowds of people on peak days, let alone enforce parking in crowded lots and along the roadway.

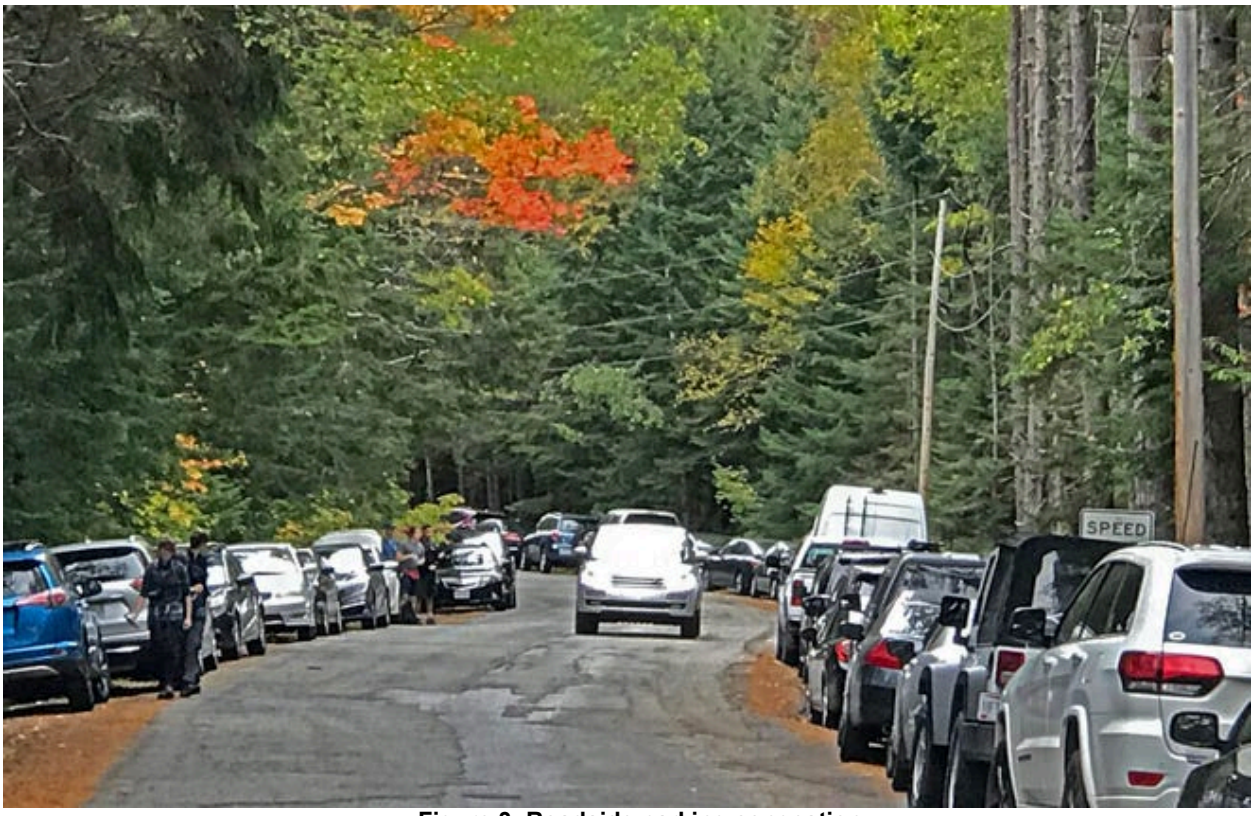


**Figure 3: Roadside parking congestion**
Source: ADK 46ers

Initial feedback included a desire to address the safety concerns that have resulted from recent spikes in visitation. NYSDEC and other stakeholders consulted throughout the course of the project consider restrictions to access to be a tool of last resort, and only employed if necessary. Consensus is also evident regarding the natural resources in the area, particularly the fragile ecosystems, and that resource impacts are paramount when assessing current conditions in the region and addressing resulting issues.

NYSDEC uses guidance from land use and development master plans, as well as wilderness area unit management plans (UMPs), to manage its natural resources. The plans confirm the goals and objectives for managing state lands, as a whole and as distinct areas, as they relate to the agency's mission. Plans often include recommendations for achieving stated goals, as well as guidelines for limiting the amount of recreational use (as appropriate). The project team also reviewed several state plans to confirm a shuttle system is in accordance with latest guidance (see Appendix C: Current Conditions for references).

Wilderness area UMPs note that parking along the corridor also creates issues with critical emergency response access. Parking can be a useful tool in managing access. Limiting authorized parking capacity to an amount consistent with wilderness management principles can ensure access does not exceed

appropriate levels, or damage the resource. Parking and shuttle services are often inter-related.

The experience on Route 73 is that visitors will park along roadsides where it is not safe. Beyond safety concerns of parked vehicles, and people walking along the road shoulder where pedestrian accommodations do not exist, this behavior can degrade biological resources along the roadside. Shuttles can help mitigate unauthorized parking by enabling visitors to access trailheads without parking; however, the shuttle system must have adequate parking available to access the shuttle when visitors arrive, and safe roadside bus stops, clear of parked cars. A balance between shuttle service frequency and parking lot size can help avoid exceeding carrying capacities at given location(s), but parking enforcement may be necessary to maintain that balance.

## 2.1 Visitation

According to a 2018 study from the Regional Office of Sustainable Tourism (ROOST) that covered visitation to Essex, Franklin and Hamilton County (including areas beyond the scope of this study), approximately 85 percent of visitors stated their primary attraction to the region was outdoor activities.[2] In order to focus the scope to determine the need for a shuttle among the visitor population, hiking, cycling, and rock climbing emerged as the primary spring/summer activities that use public trails, and cross country/telemark skiing and snowshoeing to be the primary fall/winter activity. These are the primary outdoor activities surveyed in the ROOST study that may access their recreational activity via shuttle; however, no scenarios provide for winter service at present. The ROOST study found that over 85 percent of visitors selected hiking as a spring/summer activity that they participated in most in the region, whereas around 15 percent selected cycling, and around 3 percent selected rock climbing (see Figure 3).[3] Additionally, around 15 percent of visitors selected cross country/telemark skiing and snowshoeing as something they enjoyed for fall/winter activities on their visit, as shown in Figure 4.

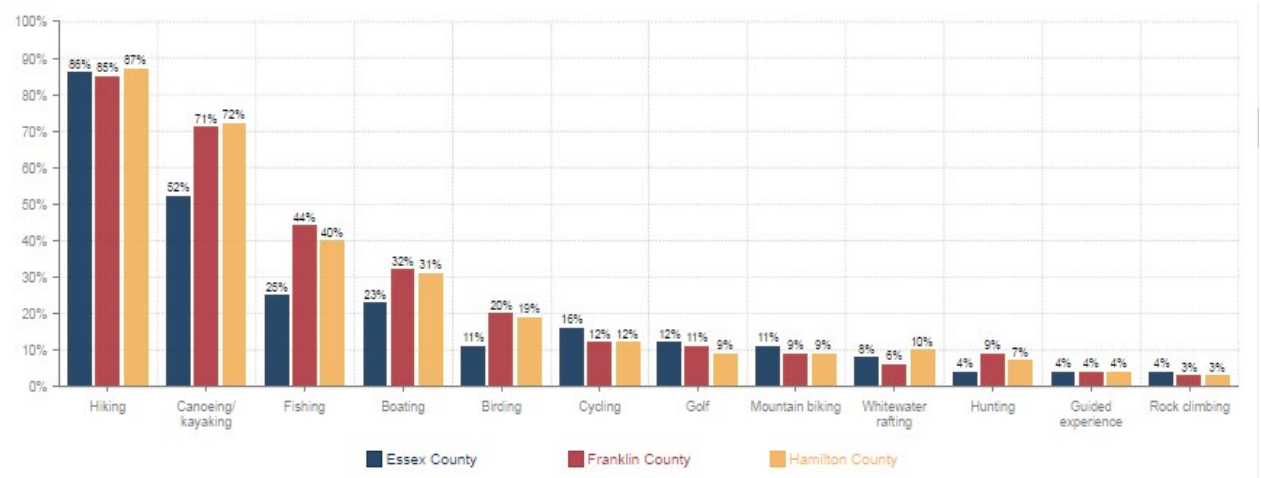


**Figure 4: Outdoor Spring/Summer Activities for All Travelers to High Peaks Region in 2018**
Source: Regional Office of Sustainable Tourism

[2] ROOST. 2019. *Leisure Travel Study: 2018 County Visitor Profiles and Regional Return on Marketing Investment Analysis.* Last retrieved 9/8/2020. https://www.roostadk.com/wp-content/uploads/2019/06/2018-Leisure-Travel-Study-Regional-FINAL.pdf

[3] Survey respondents were able to select more than one activity from the list of options.

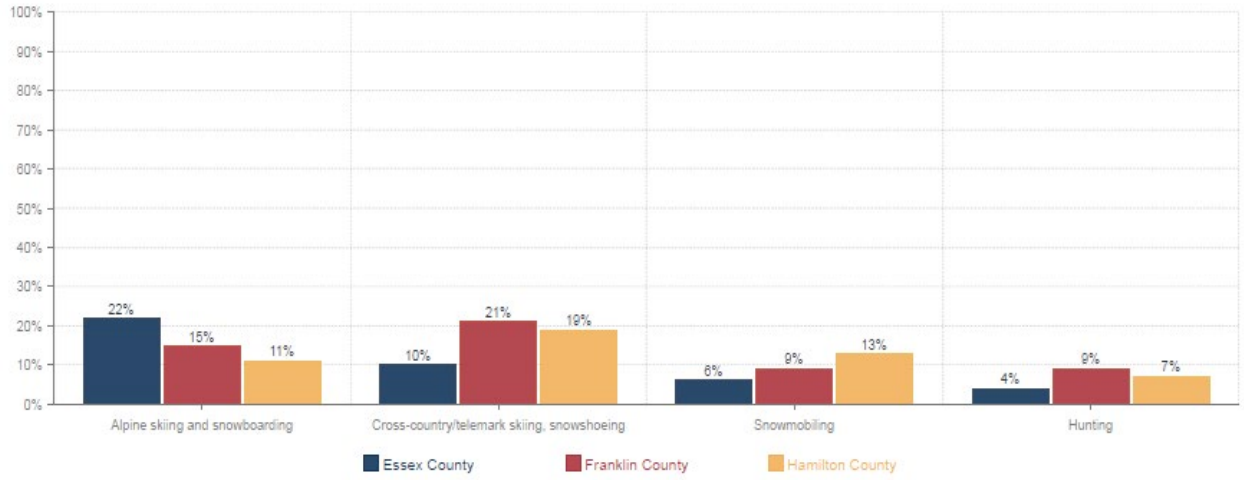


**Figure 5: Outdoor Fall/Winter Activities for All Travelers to High Peaks Region in 2018**
Source: Regional Office of Sustainable Tourism

The ROOST study clearly demonstrates the majority of visitors to the region, especially in spring/summer, partake in activities on public trails and are contributing to congestion, over-parking at trailheads, resource damage, and other issues. This insight regarding trail demand among visitors can help shape plans for a shuttle among the visitor population for our analysis.

### 2.1.1 Hiking & Backpacking

Hiker and backpacker visitation to the High Peaks Wilderness Area has been generally increasing for the past 20 years. In 1999, 95,004 people registered at a High Peaks trailhead. By 2015, this number had almost doubled to 183,907. Figure 6 shows trail registrations from 2014 to 2018, which indicate the high season is from June to October with a peak during the month of August. Stakeholder interviews described peaks in hiker visitation can be random. Instead of consistently busy holiday weekends, peak visitor days tend to be more reliant on weather patterns, with a surge in hiking visitation during especially sunny and temperate weekends that follow periods of rain.

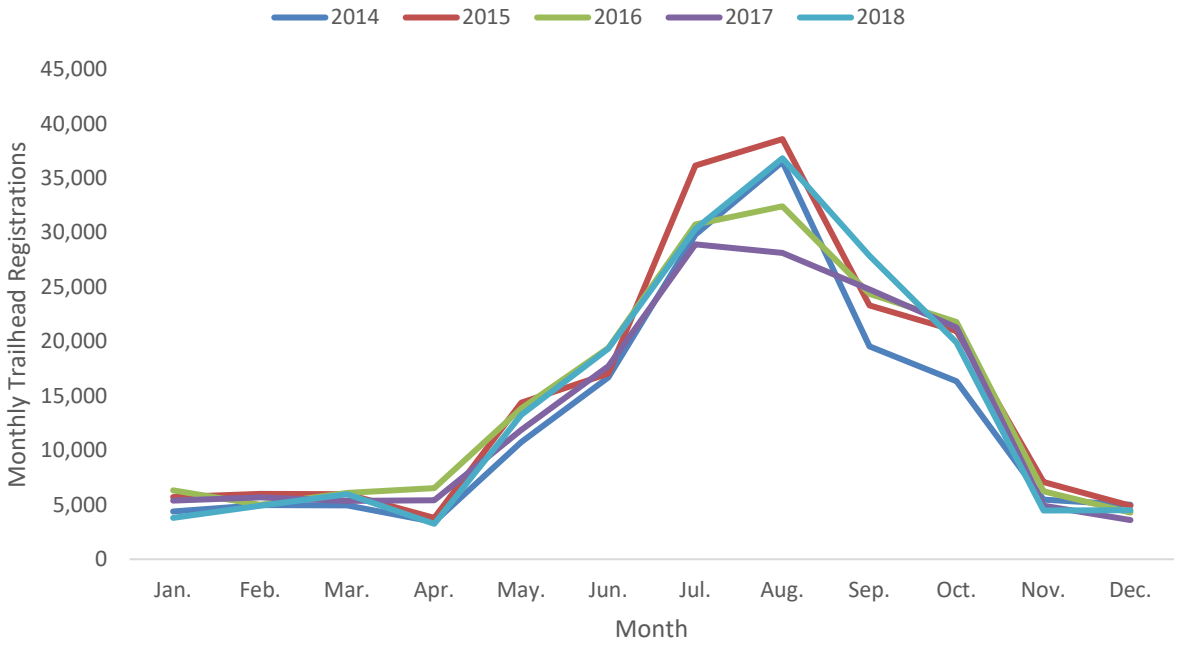


**Figure 6: Trailhead Registrations in High Peaks Wilderness Area, by Month**
Source: Volpe Center, NYSDEC

There are six major mountain ranges along Route 73 and the surrounding area. The social media platform, AllTrails, collects reviews and trail information for hiking and backpacking trails. For the purpose of this report, a web-scraping program collected data on trails in the relevant mountain ranges. There are significant caveats to this data, including a non-representative sample of hikers, reviewer bias on what hikes they choose to review, and a lack of verification. Appendix A includes further exploration of these caveats. Nonetheless, this data provides insights and NYSDEC helped provide verification and context.

In the Adirondack area around Route 73, there are 186 total trails listed on the AllTrails platform, 104 of which are located within the High Peaks Wilderness (the highest out of any wilderness area). By a significant margin, the Cascade Mountain Trail has the most reviews of any hike in the area and is often a hike recommended to visitors.

Many of these trails begin in similar starting points. Figure 7 shows AllTrails reviews, combined with nearby trailheads. Combined, the Adirondack Loj totals thirty-four hikes with 6,167 total ratings of hikes. Other prominent trailheads are Cascade Mountain and Pitchoff, Adirondack Mountain Reserve (AMR), Giant Mountain & Chapel Pond, and the Garden Trail.

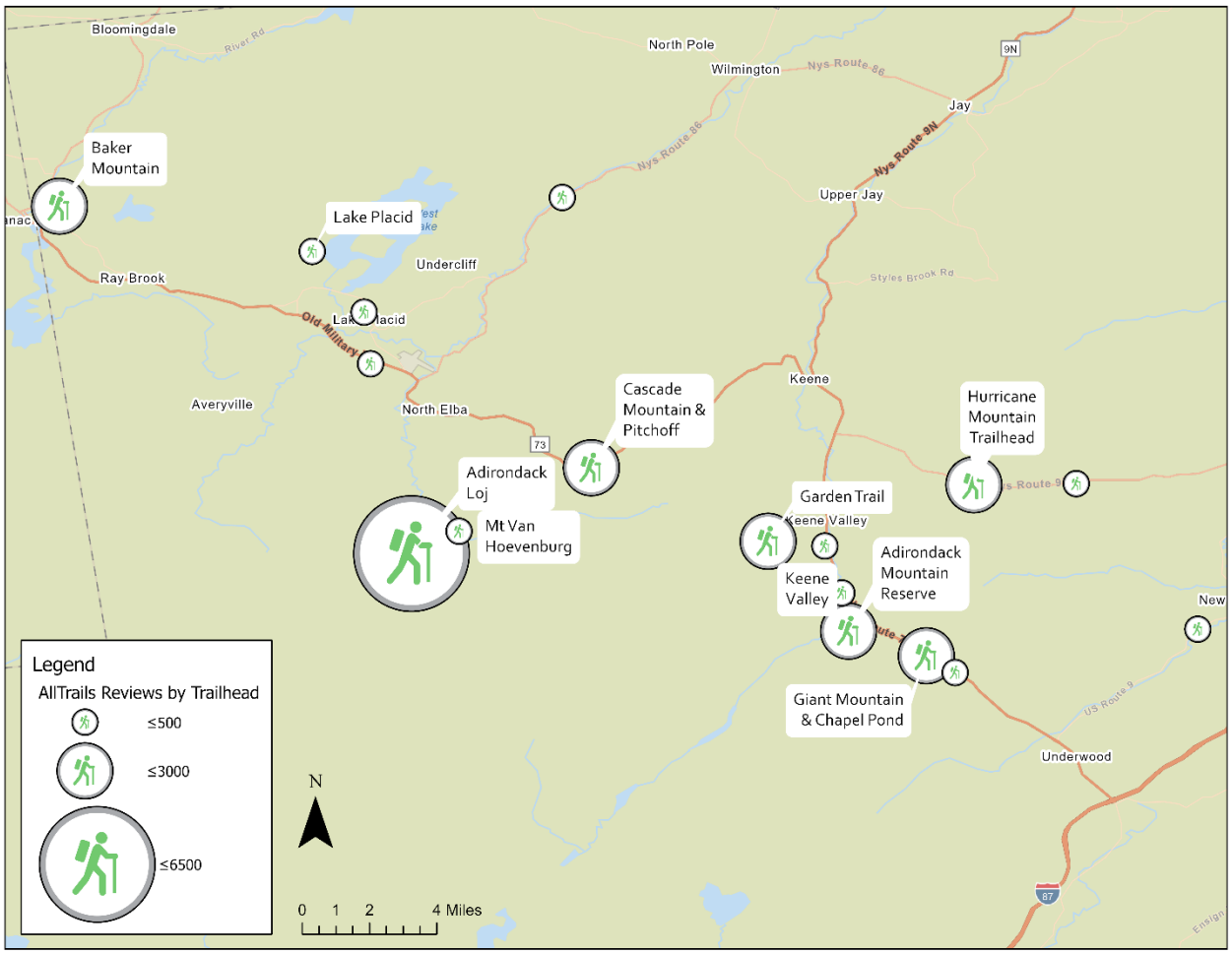


**Figure 7: Aggregated AllTrails User Reviews by Trailhead Location**
Source: Volpe Center, AllTrails

### 2.1.2 Other Activities

Although hiking is the major activity in the High Peaks region in the spring, summer, and fall seasons, visitors enjoy a wide range of other activities as well. Each group has specific travel patterns throughout the region. At specific sites often utilized for swimming, rock climbing, or mountain biking, hikers often arrive early and take available nearby parking spaces. A shuttle system could allow hikers to access these destinations, while preserving local parking access for activities that require more gear or equipment. Such an arrangement requires the addition of a parking reservation or time limited parking system.[4]

Rock climbing came up often during stakeholder interviews. Although it is not as popular as hiking, rock climbing is a well-established activity in the High Peaks region. Popular climbing areas along Route 73 include King Philips Spring, Jewels and Gems, the Chapel Pond area, Beer Walls, and Pitchoff Chimney

[4] Parking Reservation at Muir Woods National Park: https://www.nps.gov/muwo/planyourvisit/index.htm; & Mandatory Parking and Shuttle Reservations at Maroon Bells: https://aspenchamber.org/plan-trip/trip-highlights/maroon-bells.

Cliff. Anecdotally, stakeholders indicate rock climbers tend to come later in the morning and stay later in the day, particularly at certain spots along Route 73. Rock climbers tend to bring substantial equipment to the climbing spot, so they strongly prefer nearby parking, which can be difficult or nearly impossible to find on peak days when hikers have filled all available parking spots early in the morning.

*Key Visitation Takeaways:*

- *Over 85 percent of visitors to the Adirondacks go hiking when they visit the region. This makes it the most popular summer and fall activity. Other popular activities relevant to a shuttle service are kayaking, cycling, swimming, and rock climbing.*
- *The high season is from June to October, with a peak during the month of August. Instead of consistently busy holiday weekends, peak visitor days tend to be more reliant on weather patterns, with a surge in hiking visitation during especially sunny and temperate weekends that follow periods of rain.*
- *The Cascade Mountain Trail is the most visited single trailhead.*
- *Combined, the Adirondack Loj totals thirty-four hikes with the most combined hiking visitors. Other prominent groups of trailheads are Cascade Mountain and Pitchoff, Adirondack Mountain Reserve, Giant Mountain & Chapel Pond, and the Garden Trail.*

## 2.2 Parking

In state and national park areas, parking is inherently limited to protect the environment and, in some instances, to protect the resources (trails and other facilities) by naturally limiting access. Without substantial public transportation or alternative means of transportation to the park, visitors rely on parking to reach their destinations. With limited parking available at popular destinations such as trailheads, drivers tend to wait or circle the parking area until a spot opens up, move to a roadside parking spot, or park illegally. All of these actions create traffic congestion and related safety and environmental concerns in the area.

Significant parking congestion occurs regularly along Route 73, especially during the hiking season. There are large parking lots along Route 73 or nearby, but many of these do not align with the trailheads. As a result, visitors tend to park closer to their destination along the roadway. Table 1 shows the lots and number of designated parking spots by destination area. The largest parking lots are at Adirondack Loj, Mt. Van Hoevenberg, Marcy Field, the Garden trailhead, and Chapel Pond/Ridge Trail. Many of the smaller lots serve specific trailheads and experience significant congestion. On popular peak-hiking days, many of these lots fill up by 7:00 AM and are not emptying until the end of the day.

**Table 1: Route 73 Parking Areas**

Source: NYSDEC, Volpe Center

| Parking Area | Number of Parking Spots | Number of Lots |
|---|---|---|
| **Adirondack Loj** | 200 | 1 |
| **Mt. Van Hoevenberg** | 100 | 1 |
| **Garden Trailhead** | 50 | 1 |
| **Marcy Field** | 50 | 1 |
| **Chapel Pond/Ridge Trail** | 48 | 4 |
| **AMR/Roaring Brook** | 45 | 2 |
| **Cascade/Pitchoff** | 44 | 5 |
| **Beer Walls** | 24 | 2 |
| **Meadows Lane** | 21 | 1 |
| **Rooster Comb** | 15 | 1 |
| **King Philips Spring** | 15 | 1 |
| **Mountain Ln** | 11 | 1 |
| **Cascade Lakes** | 10 | 1 |
| **North Fork Boquet** | 10 | 2 |
| **Round Pond** | 7 | 1 |
| **Sunshine City** | 6 | 1 |
| **Pitchoff East** | 4 | 1 |
| **South Fork Boquet** | 2 | 1 |
| **Route 73 Total** | **672** | **28** |

Congestion along Route 73 influences the surrounding area. Figure 8 maps the parking areas along Routes 73, 86, 9 and 9N. The map also identifies the road segments with restricted parking zones and the congested traffic road segments. There are significant parking areas scattered throughout the region that could act as park-and-ride locations for potential transportation options or otherwise aid congestion mitigation plans.

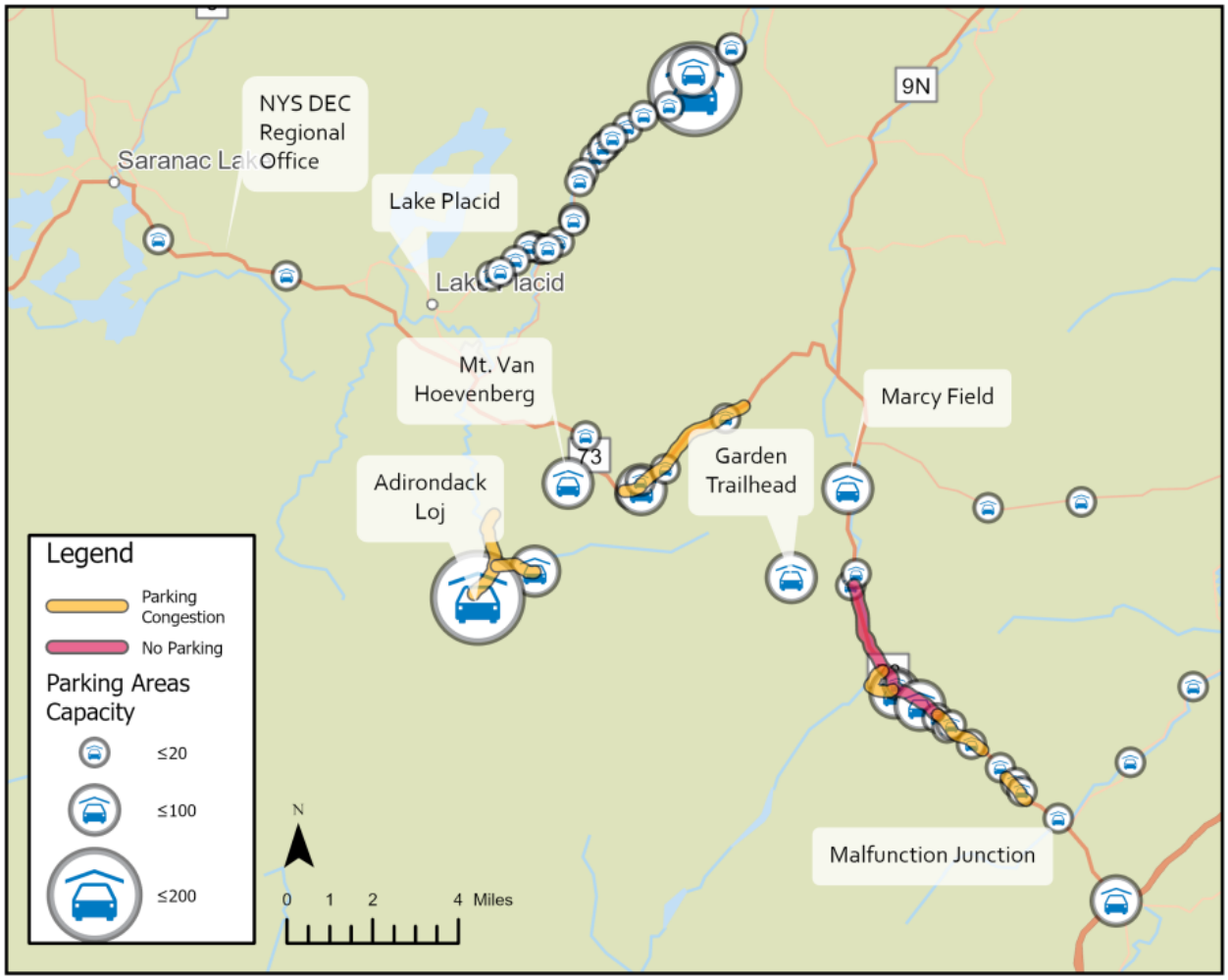


**Figure 8: Parking in Adirondack Region**
Source: NYSDEC, Volpe Center

*Key Parking Takeaways:*

- *Most trailheads have small parking lot areas, generally with less than 20 spots.*
- *Along Route 73 and the surrounding area, the largest parking lots are at Adirondack Loj, Mt. Van Hoevenberg, Marcy Field, and the Garden Trailhead.*

## 2.3 Transportation Issues

### 2.3.1 Congestion

The main routes through Lake Placid and along major roads in the study area experience frequent congestion due to the high rate of visitation and local resident drivers. Figure 9 shows the average traffic along the roads throughout the High Peaks Wilderness Area region. The roads that experience the most traffic are I-87 and Route 86 between Lake Placid and Saranac Lake. These roads are more suited towards commuters and larger numbers of vehicles. Lack of road capacity and visitors parking (often illegally) on road shoulders exacerbates congestion. This happens most often along Route 73, where there are between 1,000 and 5,000 annual average daily traffic counts for every part of the road segment.

Although high average daily traffic plays a role in congestion, above average peak visitation results in transportation issues along Route 73. On these days, congestion issues begin when parking lots become full, after which visitors will park along the roadside of major roads like Route 73, and along adjacent local roads. Hikers walk to trailheads along those roadsides parked with cars, creating a safety issue. Over-parking for trailheads at designated lots and nearby roadways is a contributing factor to increased vehicle congestion and safety concerns on these roads.

Waze, an online application used by drivers for directions and real-time road alerts, collects data that can represent various trends. Described further in Appendix B: Waze Data Collection, the Volpe Center received this data as part of a data-sharing partnership with US DOT and Waze. This data has Waze's user-generated alerts on traffic jams, crashes, and hazardous shoulder parking. Over 3,000 of these Waze event data points have been collected since March 2017.

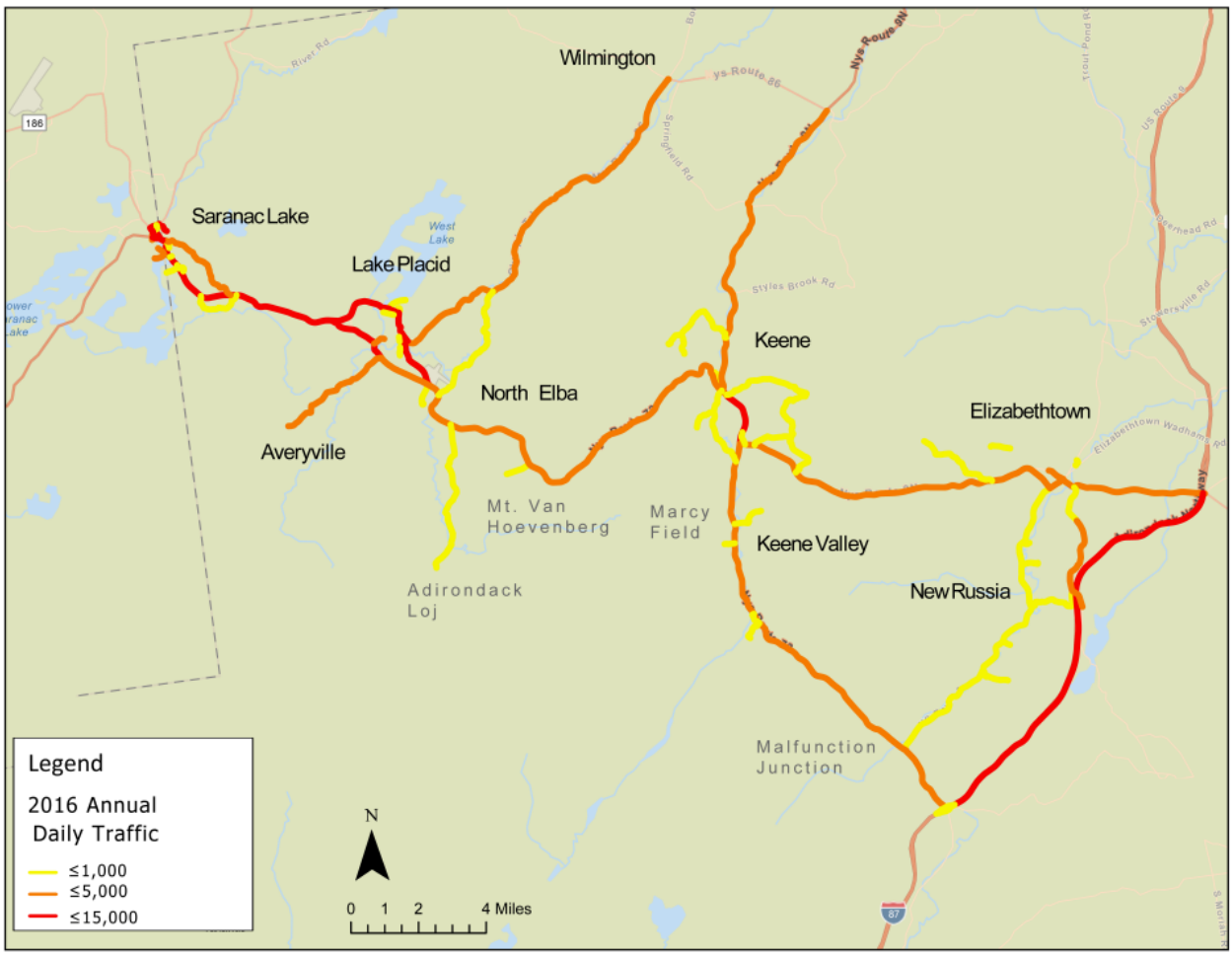


**Figure 9: 2016 Average Annual Daily Traffic (AADT)**
Source: Volpe Center, NYSDOT

Figure 10 shows hourly aggregate alerts of traffic jams, crashes, and hazardous parking. These graphics show the alerts generated at 9:00 to 10:00 AM, 11:00 AM to 12:00 PM, 1:00 to 2:00 PM, 3:00 to 4:00 PM, 5:00 to 6:00 PM, and 7:00 to 8:00 PM. These graphs suggest that congestion is not a major concern before 10:00 AM. This is likely due to the availability of parking at trailheads and available (legal) shoulder parking. However, after 11:00 AM, congestion starts, mainly in the town centers (Keene and Lake Placid), along trailheads (Garden and Cascade Mountain), and by the I-87 exit. These issues persist until late in the evening.

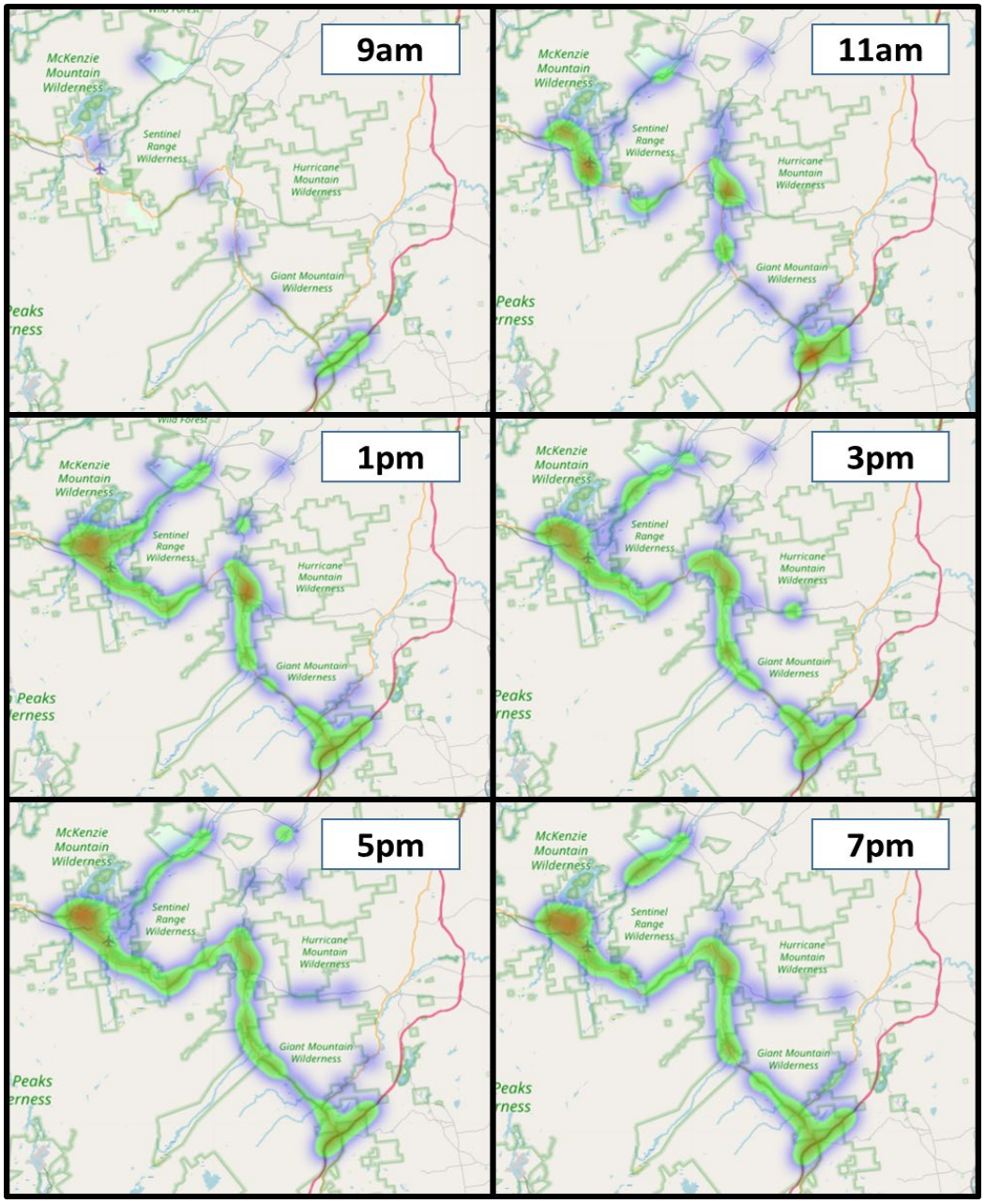


**Figure 10: Heat Map of Waze Alerts (March 2017 to August 2020)**
Source: Volpe Center, Waze

As congestion along Route 73 is mainly created by large groups of hikers, the problem occurs seasonally during the summer and early fall when hiking activity tends to peak. Figure 10 shows the 3,156 Waze alerts flagged in the region, by month, over three years from 2017 to 2020. These identify the peak season as July through September, with June and October being the shoulder seasons. There is another seasonal rise in alerts in December and January, but this is largely created by adverse weather and not likely to be resolved with a shuttle system. Interestingly, traffic jams, hazardous shoulder parking, and crashes generally follow each other, but do not fully align. This suggests that these common congestion

factors do not directly related to each other, but instead may relate more with other factors like weather, driver behavior, and wildlife.

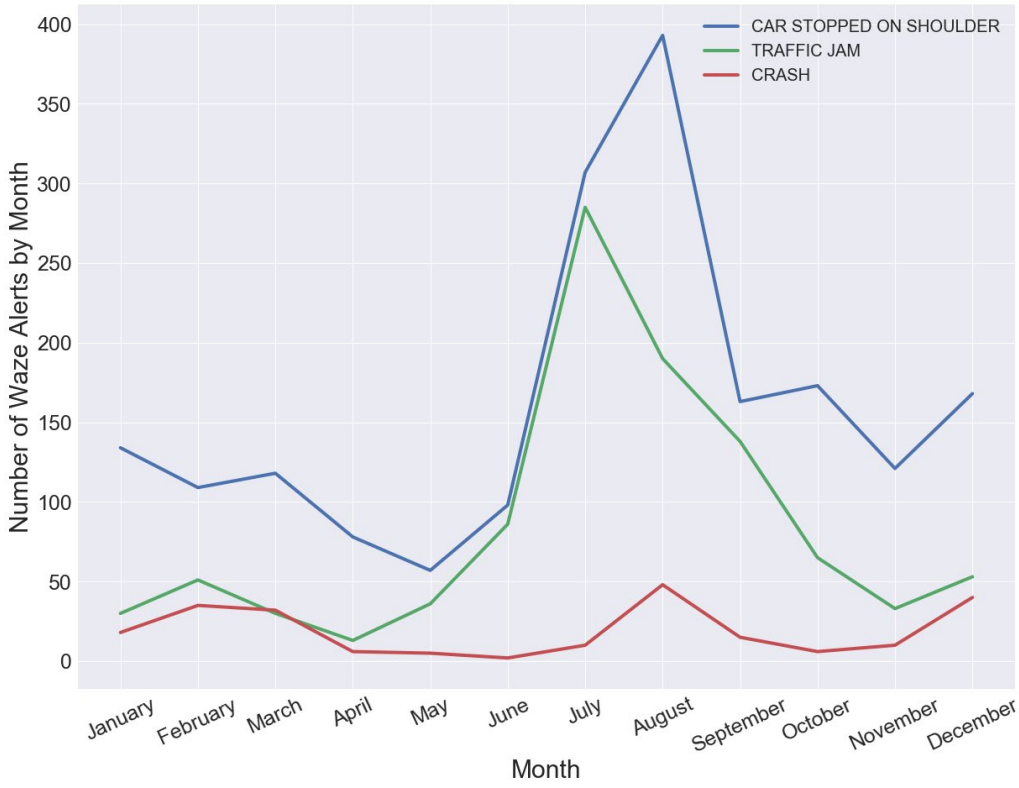


**Figure 11: Monthly Waze Alerts on Route 73 by Alert Type (March 2017 to March 2020)**
Source: Volpe Center, Waze

Residents and visitors generally have specific areas that they go during the day and at night. This affects the traffic direction throughout the day. Figure 11 shows data collected over three to five weekdays during August 2017 or August 2018 across two Route 73 road segments. These display the northbound and southbound traffic counts on the road segments around Keene Valley. The traffic pattern is generally south from Keene and north from the junction of Route 73 and Route 9 ("Malfunction Junction") throughout the morning. This is likely a combination of visitors and residents going into Keene Valley, the AMR, and the Garden trailhead, among other destinations. Traffic trends reverse after about 3:00 PM. Cars vacate the Keene Valley area going northbound to Keene and Lake Placid area and southbound likely to I-87.

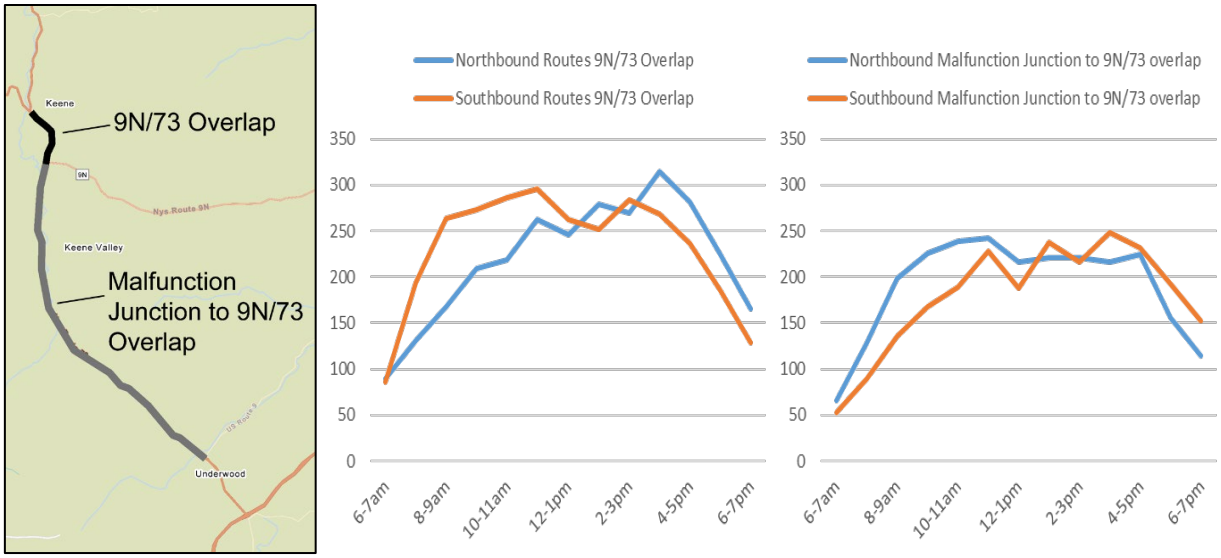


**Figure 12: Average Weekday Traffic Counts by Hour, by Road Segment, Northbound & Southbound**
Reference Map Shown Above
Source: Volpe Center, NYSDOT

Congestion caused by recreational activities is unique compared to typical commuter traffic. Commuters have a relatively low flexibility in when they can travel to and from work, as well as where. People going to hike, swim, or climb can often adjust their visit in response to conditions on the ground. The added flexibility enables resource managers to use a broad range of tools to manage recreational congestion in addition to developing shuttle service. The National Park Service has developed a Congestion Management Toolkit[5] that describes a range of options for land management agencies. These tools include:

- Encourage visitors to arrive at off peak times
- Recommend visitors try less busy areas
- Use roadside signage to notify visitors when a parking area is full
- Use social media updates to post when parking areas are full
- Delineate authorized parking spaces and enforce unauthorized parking

### 2.3.2 Safety

Peak-season hiking congestion creates dangerous situations along Route 73, further exacerbated by other factors associated with a large seasonal traveler population, hazardous or illegal parking, inattentive drivers or drivers unfamiliar with the area, and large numbers of pedestrians. Along Route 73, these hazardous situations occur near town centers of Keene and Lake Placid, around major intersections, and around popular trailheads.

From November 2015 to October 2018, there were 162-recorded crashes along Route 73.[6] Of these, 88 had dry road surface conditions and 72 were on clear days. The most common contributing factors were

[5] National Park Service; (2021) "Managing Congestion: A Toolkit for Parks." https://www.nps.gov/orgs/1548/upload/Congestion_Management_2021-508.pdf.
[6] NYSDOT Safety Information Management System; complete accident data 11/1/15 – 10/31/18.

animal actions, slippery pavement, unsafe speeds, and vehicles following too closely. Although it can be difficult to mitigate crashes during adverse weather, the proportion of crashes on clear weather days and driver-centric contributing factors suggests that many crashes occur due to congestion and unsafe traffic conditions along Route 73.

During prior analysis work, Waze data has been relatively accurate in determining crashes. Previous US DOT studies have shown under-reports of crashes in more rural areas where less Waze users are likely on the road and over-reports in urban areas where more Waze users may be finding minor crashes that may not involve law enforcement. [7]

When looking at the crowdsourced data from Waze shown in Figure 13, crashes generally happen most often in the winter months relative to the other seasons, presumably due to adverse weather and road surface conditions. However, August has the most crashes of any other month. Since August is also the peak of visitation, there seems to be a correlation between a threshold of visitors and crash frequency and severity.

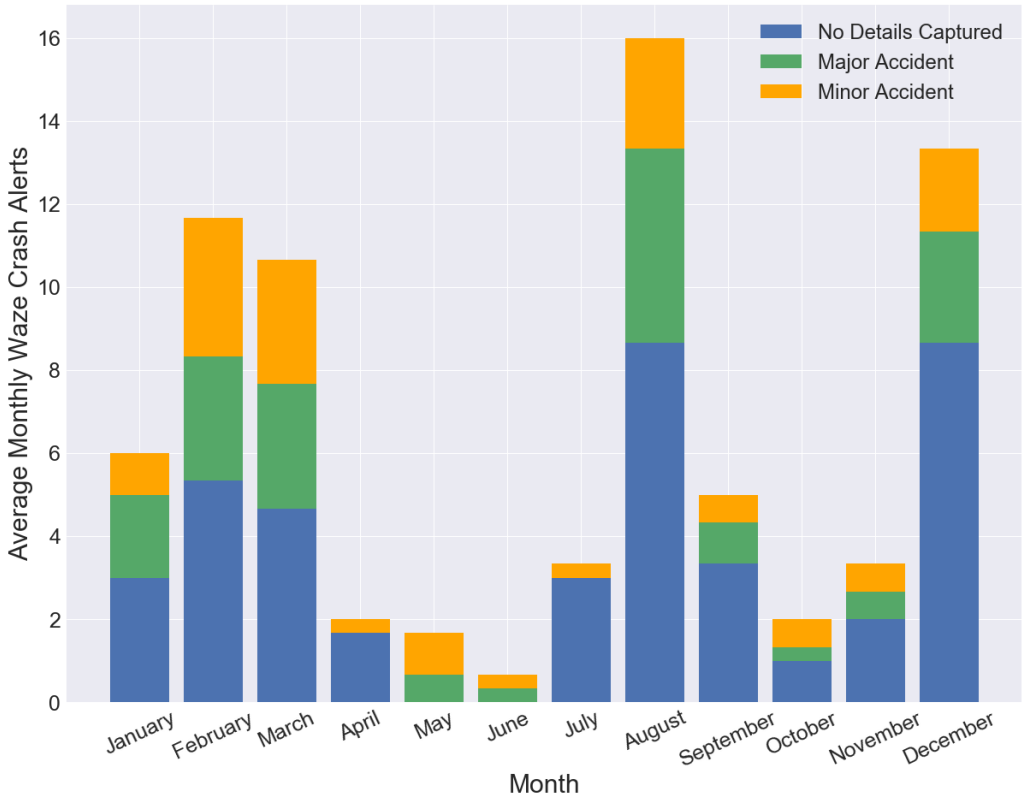


**Figure 13: Average Monthly Waze Crash Alerts in Region by Alert Sub Type March 2017-March 2020**
Source: Volpe Center, Waze

[7] Flynn, Dan; et al.; (2018); Estimating Traffic Crash Counts Using Crowdsourced Data: Pilot analysis of 2017 Waze data and Police Accident Reports in Maryland

*Key Takeaways on Transportation Issues:*

- *Route 73 road segments have annual average daily traffic counts between 1,000 and 5,000.*
- *After 11:00 AM, congestion starts mainly in the town centers (Keene and Lake Placid), along trailheads (Garden and Cascade Mountain) and by the I-87 exit. These issues persist until late in the evening.*
- *Starting at 6am, traffic generally flows south from Keene and north from Malfunction Junction, likely from visitors going into Keene Valley, the AMR, and the Garden Trailhead, among other destinations. Traffic trends reverse after about 3:00 PM, as cars vacate the Keene Valley area, likely going northbound to Keene and Lake Placid area and southbound to I-87.*
- *Between 2015 and 2018, there was a yearly average of 54 crashes on Route 73 in the Adirondack region. The most common contributing factors were animal actions, slippery pavement, unsafe speeds, and vehicles following too closely.*
- *The most crashes on Route 73 appear to occur in the August, December, January, February, and March. The cold-weather months have a greater number of minor crashes, while August has the greatest number of major crashes. Crashes in August are significantly higher than July or September.*

## 2.4 Summary of Current and Previous Shuttle Initiatives

There have been multiple shuttle initiatives over the previous five years, met with mixed results. Future shuttle service(s) should be aware of these previous initiatives and seek lessons learned. Prior or existing services with their operation schedule and available ridership data appear in Table 2 on the following page. The primary shuttle operating along Route 73 is the Garden Shuttle that serves hikers of the Garden trailhead, picking up hikers at the large parking lot at Marcy Field. Other transportation services less focused on hikers include the XPRSS Trolley, Cascade Express, Winter Mountain Valley shuttle, and Greyhound bus service. Each of these fills a niche of transportation needs for visitors and residents in the area. Previous pilot programs may not be part of the current transportation landscape, but may hold lessons regarding how hikers would react to a service or help understand the impact on congestion and parking. Anecdotal ridership feedback on the value of the service was generally positive.

**Table 2: Current and Previous Shuttle/Bus Overview**
Source: Volpe Center

| Shuttle (Operator) | Operation Days | Ridership Data | Notes |
|---|---|---|---|
| Garden Shuttle (Town of Keene)[8] | Weekend Service (Suspended due to COVID-19) | • 2017: approximately 2000 riders<br>• 2018: approximately 1600 riders<br>• 2019 (at time of reporting) : 4200 riders | • 3 mile round trip from Marcy Field to Garden trailhead<br>• Funded by town of Keene Valley |
| XPRSS Free Park & Ride Trolley Service (Essex County)[9] | All day service (Suspended due to COVID-19) | Data not available | Free shuttle going from airport to different hotels and destinations around Lake Placid |
| Cascade Express (Essex County) | Weekdays only (Suspended due to COVID-19) | Data not available | Elizabethtown – Keene – Lake Placid – Saranac Lake |
| Winter Mountain Valley Shuttle (Essex County) | Winter Service (Suspended due to COVID-19) | Data not available | Only operated as a shuttle from lodging to Whiteface Mountain skiing |
| Whiteface Mountain Pilot (Essex County) | September – October 2019 (Ended as of 3/15/20) | Approximately 290 riders during the pilot | Pilot service |
| Cascade Mountain Pilot (Essex County) | Columbus Day Weekend 2018 | Approximately 1,300 riders during the pilot | Pilot service |
| Proposed 2020 Pilot Shuttle | N/A | N/A | Proposed shuttle service for 2020 that was cancelled due to COVID-19 |
| Greyhound Bus (Greyhound Bus) | Generally once per day | Data not available | Bus service that comes from Albany and drops off at all towns along Route 73. |

# 3. Stakeholder Outreach

Stakeholder outreach can identify possible uncertainties that may create challenges to a project, build stakeholder buy-in to the planning process, and identify opportunities for a project to meet the needs of and benefit the local community. Outreach informs an understanding of how a shuttle would affect current conditions and what the visitor response to the shuttle may be.

## 3.1 Stakeholders

NYSDEC identified stakeholders invested in the region's safety and protection of its resources, those representing local and county government(s) or local businesses, and people otherwise involved in the community via public organizations or recreational groups. Stakeholder organizations identified during

[8] https://www.townofkeeneny.com/2020-garden-hiker-shuttle-information
[9] https://www.co.essex.ny.us/wp/transportation/

this study fall into nine primary categories, although some span multiple categories (see Table 3). The project team spoke with the High Peaks Advisory Group (HPAG) first, because a number of members overlap with other stakeholders and their initial feedback provided broad perspective and considered a multitude of groups' concerns. Stakeholder feedback informed the shuttle scenarios and analysis in Phase 2 of the project. A full list of stakeholders and stakeholder organizations by category appear in Appendix D: Stakeholder Outreach.

## 3.2 Feedback Summary

Stakeholders provided feedback on a potential shuttle, including their concerns regarding visitor management, trail selection for service, recreation's impact on the region and travel corridor (congestion), access and equity, education, visitor experience, and marketing the shuttle.

Feedback included recommendations that the shuttle operate from a central hub and serve the Keene Valley and Saint Huberts trail network, the Keene trail network, and the Cascade Lakes corridor, as well include stops in communities. Shuttle stops should only serve official trails that can withstand an increase in use and those that have large pull-off areas for safe boarding and exit from the shuttles. In general, there are three main categories of stakeholders' concerns: ***operations***, the ***visitor experience***, and ***bus stops***.

- Regarding ***operations***, stakeholders had questions on the shuttle's capacity, carbon footprint, the system design (in relation to usage levels), funding reliability, staffing consistency, how a new shuttle would interact with the existing Garden shuttle, and management of the shuttle system.
- For ***visitor experience***, stakeholders asked questions regarding maps and schedules, timing (when would the shuttle run), pricing, information sharing, seasonality of operations, whether the shuttle would address hiker traffic, and noted that drivers could provide visitors with a better experience by sharing current conditions or other timely information.
    - The regional tourism group ROOST noted growing visitation from Canadian visitors. Canadian visitors were not included directly in stakeholder outreach; however, considerations for foreign visitors are included below. In particular, foreign visitors will benefit from traveler information materials (including maps and route schedules) available in their native language.
- Concerning ***bus stops***, there were questions about stop locations, roadside parking, if the shuttle will be stopping in travel lanes, how hikers will remain safe from the road and inclement weather while waiting for the shuttle, and if the shuttle will limit access to trails potentially closed for the mud season.

Stakeholder feedback, concerns, and a summary of recommendations appears in Appendix D: Stakeholder Outreach.

# 4. Shuttle Service Analysis

The High Peaks region has a number of popular outdoor activities that are driving growth in visitation and the associated congestion and hazardous road conditions that accompany peak demand during the summer and fall seasons. Visitation-driven congestion tends to peak during weekends and holidays, or are weather-driven (and less predictable). During these times, available parking reaches maximum capacity quickly with available parking often filling up early in the morning. After lots are full, visitors park in dangerous areas along road shoulders, turn around in congested lots or by making 'U-turns' across double-yellow lines, and may be traveling too slowly scanning for parking; each of these decisions creates congestion and presents safety concerns for other drivers and pedestrians.

Expanding parking capacity or building parking facilities would negatively affect wilderness areas and the "look and feel" of the surrounding area; on the other hand, reducing access through reservation or permitting schemes would undoubtedly meet public resistance. When demand for parking near destinations is inadequate and restrictions or unsightly parking expansion are unpalatable, shuttle bus systems can provide a solution to connect visitors between available parking spaces and their desired destination.

Three operational scenarios follow below, developed based on existing conditions and with input from NYSDEC. The initial concept to provide "core service" beginning with a pilot service (the pilot) in the near term[10] is a limited service provided with existing vehicles and funding. This initial pilot operates between ORDA/Mount Van Hoevenberg and Frontier Town. To provide for additional capacity, consider adding vehicles (and reducing headways) if public reception is positive.

The remaining two scenarios are the "hub-and-spoke" and "complete" arrangements. Each illustrate potential paths for growing the core shuttle service, and each could support different future needs. The complete route connects Lake Placid to a site where future economic development could take place, while the hub-and-spoke could support expanded service aimed at recreational visitors, and offer flexible tools for managing visitors.

The scenario for a pilot service aims to confirm the feasibility of an initial shuttle service, carried out with vehicles procured in 2020 by Essex County, and with limited funding ($800,000) to cover all costs associated with the service.[11] Subsequent service beyond the pilot is highly uncertain; resistance to sharing space aboard publicly accessible vehicles may persist as the nation continues to emerge from the global pandemic. NYSDEC, Essex County, and other stakeholders should prepare to rapidly expand service if public reception is positive and likewise prepare for marketing and continued awareness campaigns over subsequent years to slowly grow ridership and support long-term success.

[10] Due to the ongoing COVID-19 pandemic, the ability to pilot shuttle operations in 2021 is uncertain as of the writing of this report.

[11] The FY20-21 Environmental Protection Fund included up to $1.2 million for a shuttle service in Essex County. The cost of four shuttle buses was approximately $400,000, leaving $800,000 for operations and maintenance.

## 4.1 Shuttle Service Goals

Establishing goals for a shuttle service ahead of its inception allows for tracking progress against those stated goals. NYSDEC considers reductions in user access as a tool of last resort and necessity. In addition, addressing general traffic congestion or travel times along road corridors in question would require a broad effort including partnership with the NYSDOT, county, and local governments. NYSDEC and the project team worked through a visioning exercise to understand the goals and evaluation factors for a shuttle service. That exercise yielded the following goal statement:

> *The primary goals of the shuttle service are to ensure safe access to destinations (trailheads) for recreating within the Adirondack High Peaks region and to mitigate congestion and safety-related issues associated with increasing demand for recreational access, including parking.*

## 4.2 Analysis Limitations and Assumptions

Detailed below are the results of a shuttle service analysis for a new shuttle bus system to address the goals above. The scenario for the **pilot service** accommodates the following restrictions and assumptions:

- The funds available for the pilot service are finite and must cover the pilot startup costs, marketing, signage, striping, and maintenance and operation of the service, as well as the operational costs of the Garden shuttle (approximately $500 per day). The pilot operating costs include driver labor, some management of the service contract, and labor for front country stewards.
- The pilot service must operate within existing conditions and without modifications to existing road geometries, entry- and exit-points, and parking lot. Some minor striping of bus stop areas allowed.
- The pilot service will be run with four 20-passenger shuttle buses already purchased and ready for use.
- The pilot service will include data collection in order to evaluate its performance. The data needed includes at least passenger counts, mileage and service hours, that can be collected either via equipment or manual logs.

Scenario modeling included various assumptions and generalized data. Due to the COVID-19 pandemic, the study team was unable to conduct a site visit or perform travel time runs of the proposed service. Travel time estimates rely on average corridor travel times calculated in Google Maps. This travel time influences service hours and cost-per-hour calculations. The model included settings for dwell time, which is the amount of time it takes for passengers to get on and off the bus. Travel time combined with dwell time results in the total round-trip time. Additional time added to stops at the termini provides drivers with a small break or a chance to get back on schedule and overcome unexpected delays. The dwell time used for the pilot service is two minutes per stop with an additional four minutes at the termini. Travel and dwell times can be updated in the future to investigate different operating conditions.

The stop for the Town of Keene is a placeholder while local officials identify a suitable location for a bus to stop. The model analysis relies on travel times between each stop and actual travel times may vary depending on ultimate stop locations.

Several destinations have stops on opposite sides of the road depending on whether the bus is traveling northbound or southbound. Without provisions for bus stops on both sides of the road, pedestrians will inevitably have to cross the road at these locations. Route 73 is a state highway with a posted speed of 55 miles per hour (MPH). NYSDEC aims to minimize the need for pedestrians to cross it. The proposed shuttle structure is to have substantial parking at the ends of the shuttle routes, encouraging people to park and ride from the termini stops rather than from the trailheads.

## 4.3 Common to All Scenarios

For all scenarios in this analysis, including the detailed pilot service scenario (scenario 1) and both longer-term planning scenarios (scenarios 2 & 3), the following are constant:

- Vehicle capacity = 20 seated passengers
- Dwell time = two minutes; termini dwell time = total of six minutes
- Service day = 7:00 AM to 7:00 PM
- At least all four existing vehicles will be operating each day; scenarios 2 and 3 presumes additional vehicles to provide similar headways.
- Garden Shuttle will continue its service separately

All scenarios will service at least the following stops (ordered from north to south)

- ORDA/Mount Van Hoevenberg (MVH)
- Keene
- Saint Huberts
- Chapel Pond (CP)/Giant Mountain Trailhead
- Frontier Town Hub Site

The hub-and-spoke (scenario 2) and complete service (scenario 3) scenarios analyzed also serve additional stops. The route modeling conducted for this analysis is to demonstrate feasibility and does not represent a final route map or service schedule. Additional service planning is required to implement service on the corridor.

The cost analysis for each scenario provides for 100 days of service, or roughly weekends, holidays, and some extremely high demand days between Memorial Day in May and Columbus Day in October. Limiting the number of service days, such as only operating until Labor Day in September, can help reduce costs. The cost estimates in the following tables do not include internal costs, such as NYSDEC contract oversight and administrative coordination with the service provider.

## 4.4 Scenario 1: Pilot Service (Core Route)

Scenario I focuses on the continuous corridor from ORDA/MVH to Frontier Town, which contains the trailheads with the most congested parking and safety concerns (see Figure 14).

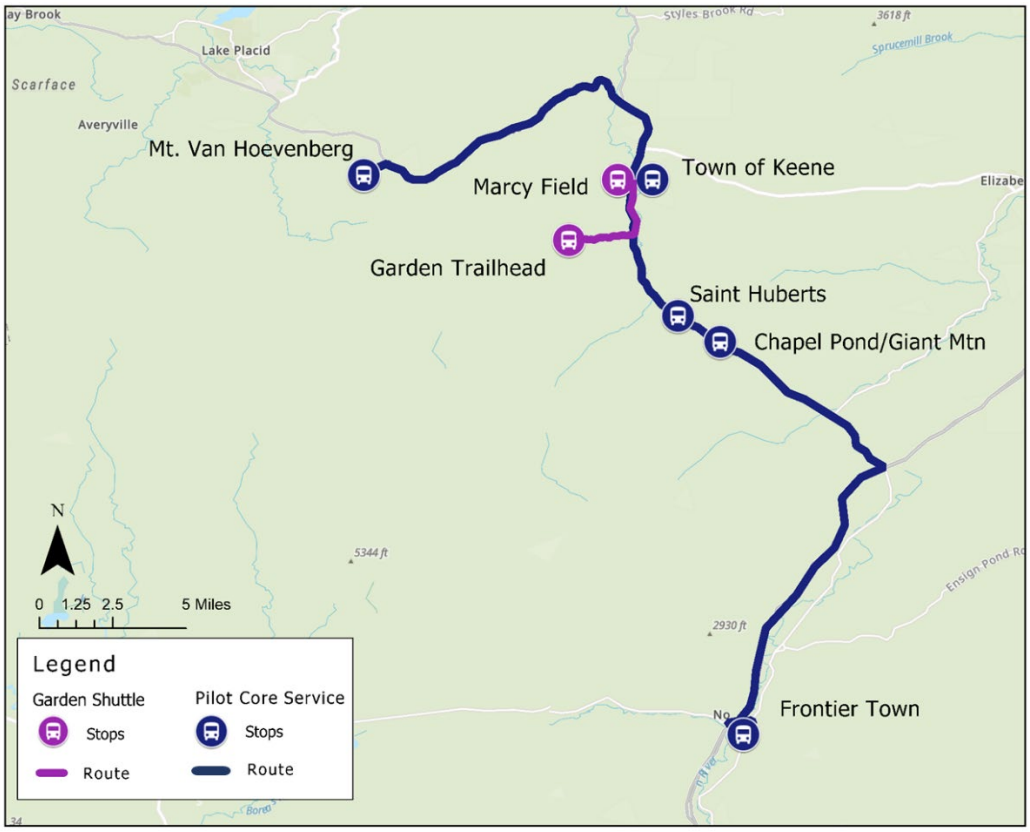


**Figure 14: Route Map for Pilot Service**
Source: Volpe

NYSDEC prioritized this corridor for pilot service in the 2022 peak season. The resulting service characteristics are in Table 3, including travel time and distance between stops.

**Table 3: Pilot Service Operating Details**
Source: Volpe

| Pilot Service Route | Time (minutes) | Distance (in miles) |
|---|---|---|
| Mt. Van Hovenberg/ORDA | | |
| Keene/MF | 0:17 | 11.6 |
| Saint Huberts | 0:07 | 5.3 |
| Chapel Pond/Giant Mtn. | 0:02 | 1.3 |
| Frontier Town | 0:20 | 17 |
| Total Dwell Time (1-way) | 0:08 | n/a |
| One-way with dwell | 0:58 | 35.2 |
| Round trip | 1:56 | 70.4 |

Two vehicles begin the service at 7:00 AM starting from the far termini: one moving south from ORDA/MVH and one moving north from Frontier Town. They will travel the full corridor before heading back in the reverse direction. The second set of buses will depart from ORDA/MVH or Frontier Town about 30 minutes later (the full model schedule is in Appendix G: Scenario Sample Schedules). This model schedule has a shuttle departing from ORDA/MVH and Frontier Town every 30 minutes for the entire day, including a layover of six minutes at the termini. The pilot service scenario covers all five stops.

Table 4 shows the service characteristics for the pilot service route with approximately 30-minute headways. The roundtrip total travel time, including dwell time, is about 120 minutes. Based on service with four buses on the full route, the core route can provide service for 960 to 8,640 passengers per day with buses covering about 1,901 service miles.[12] The buses would complete a combined 27 roundtrips over nearly 48 service hours daily.

**Table 4: Pilot Service Modeled Characteristics and Cost Estimates**

Source: Volpe

| METRIC | RESULT |
|---|---|
| **Number of Stops** | 5 – Mt. Van Hovenberg, Keene, Saint Huberts, Chapel Pond, Frontier Town |
| **Start Time/End Time** | 7:00 AM / 7:45 PM |
| **Round Trip Mileage** | 70.4 |
| **Round Trip Travel Time** (no dwell, minutes) | 92 |
| **Round Trip Total Time** (minutes) | 116 |
| **Fleet Size** | 4 |
| **Est. Daily Total Seat Capacity** (low/high*) | 1,080 / 10,800 |
| **Daily Total Mileage** | 1,901 |
| **Daily Total Service Hours** | 48 |
| **Total Round Trips per Day** | 27 |
| **Cost/100 Days** (mileage)** | **$760,320** |
| **Cost/100 Days** (hours)** | **$528,000** |
| **Cost per Passenger Round Trip** (low capacity / high capacity) | $14.08 / $1.41 (mileage-based)<br>$9.78 / $0.98 (hourly-based) |

*Low capacity estimate presumes bus fills to capacity (20 passengers) at each end of the round trip. High capacity presumes bus empties and fills to capacity at each stop.
**The hourly-based daily cost presumes $110 per hour to provide service. Mileage-based daily cost presumes $4 per mile.

Estimated costs per passenger include both cost-per mile and cost per hour estimates to provide a range of anticipated service costs. The cost per passenger round trip by mile ($14.08) is higher than cost per passenger round trip by hour ($9.78) because the route is long with relatively few stops. The cost per passenger round trip for the low capacity estimate is substantially higher than the high capacity

[12] The low capacity estimate assumes the four buses carry a combined 80 passengers per hour for 12 hours. The passengers per hour is relatively low due to the long one-way trip. The high estimate assumes there is complete turnover of passengers every stop (i.e., all passengers board at each stop for five stops per hour). The latter is the maximum capacity for the route.

estimate because they directly relate to the number of passengers. Shuttle services are more efficient on a per passenger basis with higher passenger counts.

Since the Saint Huberts stop is the mid-point of the route, the buses will arrive at nearly the same time throughout the day, potentially resulting in buses that drop off twice the number of hikers to the area at one time, creating a larger "pulse" of hikers that move along in a larger group. NYSDEC notes the Saint Huberts area in general tends to be an activity "hot spot" throughout the season. The total number of transit riders getting off at the Saint Huberts stop at one time is unknown. The maximum without a staggered schedule is 40, as each bus can only carry 20-passengers; however, those ambulatory visitors delivered by bus represents potentially 23 cars' worth of travelers that would otherwise need to locate parking.[13]

*Pilot services provide an opportunity to monitor and evaluate the functional impact of service scheduling, stop locations, and more. Data collection and observation of travel patterns at Saint Huberts during a pilot service will be critical to understanding the impacts in this area.*

## 4.4 Scenario 2: Recreation/Visitation Focus (Hub and Spoke)

*Scenarios 2 and 3 are representations of possible future scenarios with the potential to address different needs or to be responsive to local development and stakeholder partnerships. Routes, hub locations, and bus stops provided for conceptual understanding and planning purposes only.*

A "Hub and Spoke" service scenario relies on a centrally located transportation hub. Typical transit hubs frequently include some kind of visitor/information center with varying levels of amenities provided. A transit hub often provides:

1. Ample safe parking where bus services can be quickly and easily accessed
    a. Lighting for night time security
2. Infrastructure accommodations for a bus service hub include (but are not limited to):
    a. Basic shelter(s) to protect visitors from the elements while they wait to board
    b. Bathrooms and water (fountains / bottle-fill stations or vending)
    c. Resources with relevant traveler information, including static maps / leaflets, variable message boards, kiosks, etc.
    d. Staff present who can answer questions, direct visitors where appropriate, etc.
3. Various bus routes that initiate from the hub location and connect to all primary destinations

The central hub for visitor intake and fixed-route bus service can provide administrative control to manage visitation, and act as a mechanism to interact with visitors between when they arrive and when they reach their ultimate destination. The moment a visitor(s) arrives is a critical point for visitor engagement and offers the opportunity to convey up-to-date information that may influence their journey (such as trail closures, round-trip hiking times, or indications of trail difficulties), or educational information that might encourage resource preservation, or to encourage visitors to seek less-popular or underutilized assets. In extreme cases, altering bus routes or stops can also help meet changing conditions or needs (e.g., if a trail requires comprehensive remediation or repair, a stop associated with

[13] Based on average vehicle occupancy of 1.7 from the National Household Travel Survey (NHTS).

that trail could be closed/skipped while work is performed, ensuring no visitors are delivered to that location).

This scenario primarily serves recreational visitors. Marketing and communications through hiking advocacy groups, tourist groups, and other outlets is crucial to ensure people visiting and seeking recreational opportunities are aware of the transportation service and the destinations it serves.

Figure 15 below is a concept of what a hub and spoke scenario might look like to serve the Adirondack High Peaks region. Actual routes may depend on stakeholder desires, future development, or future shifts in visitation.

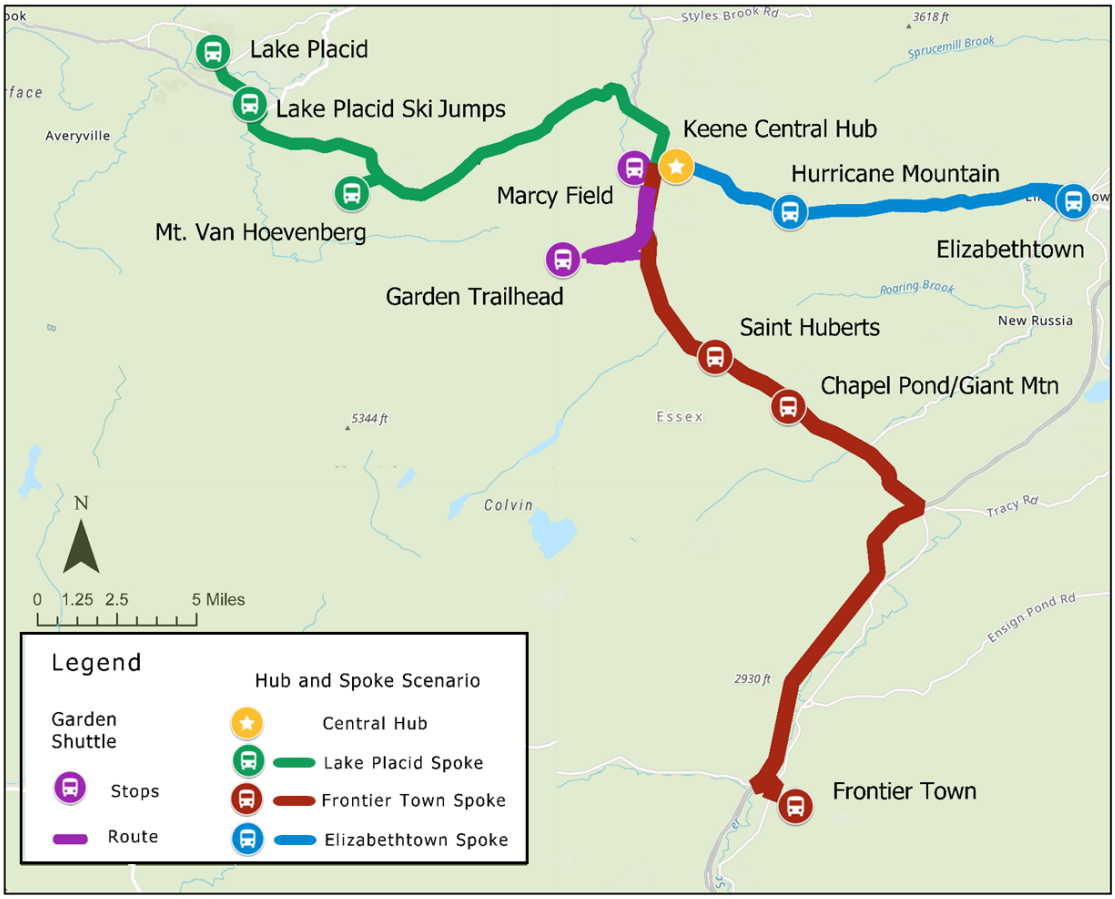


**Figure 15: Route Map for Hub and Spoke Scenario**
Source: Volpe

**Table 5: Hub and Spoke Service Operating Details – All Spokes**
Source: Volpe

| METRIC | RESULT |
|---|---|
| **Number of Stops** | 9 – Lake Placid Visitor Center, Lake Placid Ski Complex, Mt. Van Hovenberg, Keene Central Hub, Saint Huberts, Chapel Pond, Frontier Town, Hurricane Mountain, Elizabethtown |
| **Start Time/End Time** | 7:00 AM / 7:18 PM |
| **Round Trip Mileage** (all 3 spokes) | 117 |
| **Fleet Size** | 6 |
| **Est. Daily Total Seat Capacity** (low/high*) | 2,360 / 8,440 |
| **Daily Total Mileage** | 2,244 |
| **Daily Total Service Hours** (all buses) | 72 |
| **Total Round Trips per Day** | 59 |
| **Cost/100 Days** (mileage)** | **$897,440** |
| **Cost/100 Days** (hours)** | **$792,000** |
| **Cost per Passenger Round Trip** (low capacity / high capacity) | $7.61 / $2.13 (mileage-based)<br>$6.71 / $1.88 (hourly-based) |

**Table 6: Details by Spoke as Modeled**
Source: Volpe

| Metrics | Lake Placid Spoke | Frontier Town Spoke | Elizabethtown Spoke |
|---|---|---|---|
| Headway (minutes) | 22 | 19 | 26 |
| Stop Count | 4 | 4 | 3 |
| Round Trip Total Time (minutes) | 1 hour 28 minutes | 1 hour 18 minutes | 52 minutes |
| Round Trips per Day | 8 | 9 | 12 |
| Round Trip Route Mileage | 39 | 47 | 31 |

Table 5 shows the service characteristics for the hub and spoke scenario in total while Table 6 provides the detail by proposed spoke. The headways vary by spoke since the number of stops and miles are different. Based on service with six buses, operating two per spoke, the hub and spoke scenario can provide service for 2,360 to 8,440 passengers per day with buses covering about 2,244 service miles.[14] The buses would complete a combined 59 roundtrips over about 72 service hours daily.

[14] The low capacity estimate assumes the six buses carry a combined 120 passengers per hour for 12 hours. The high estimate assumes there is complete turnover of passengers every stop. The latter is the maximum capacity for the scenario.

## 4.5 Scenario 3: Economic/Development Focus (Complete Route)

*Scenarios 2 and 3 are representations of possible future scenarios with the potential to address different needs, or to be responsive to local development and stakeholder partnerships. Routes, hub locations and bus stops provided for conceptual understanding and planning purposes only.*

This third concept could benefit the regional economy and leverage potential future development in the Frontier Town area. This linear route lacks some of the administrative control of the hub and spoke scenario, but provides a connection from the highway to Lake Placid with the potential to allow for more "car-free" exploration of the High Peaks region for both recreational visitors and general tourists alike. Cost sharing among local stakeholders connected to the system could help fund the service.

Parking is located at each termini (off the highway at Frontier Town or parking in and around Lake Placid) as opposed to a more central location, necessitating information and potential accommodations at two locations versus one central transit hub. However, it would provide for more parking and greater flexibility and has the potential to eliminate more cars and associated traffic congestion from local corridors by offering a frequent service that connects popular destinations, not just trailheads.

Providing the connection to Lake Placid may encourage recreational visitors to visit, shop, or dine in Lake Placid and would allow them to do so without having to drive their car and find parking (again). This concept is also responsive to the anticipation of future development and local business/partnership interests surrounding the Frontier Town area, which aims to become a "gateway" attraction for visitors arriving to the Adirondack region from the south.

Table 7 provides characteristics of the modeled service. Figure 16 shows a conceptual route and potential stops for a service between Frontier Town and Lake Placid.

**Table 7: Complete Service Scenario Operating Details**

Source: Volpe

| METRIC | RESULTS |
|---|---|
| **Number of Stops** | 7 – Lake Placid Visitor Center, Lake Placid Ski Complex, Mt. Van Hovenberg, Keene Central Hub, Saint Huberts, Chapel Pond, Frontier Town |
| **Start Time/End Time** | 7:00 AM / 7:55 PM |
| **Round Trip Mileage** | 86.2 |
| **Round Trip Travel Time** (no dwell, minutes) | 126 |
| **Round Trip Total Time** (minutes) | 158 |
| **Fleet Size** | 6 |
| **Est. Daily Total Seat Capacity** (low/high*) | 1,060 / 6,360 |
| **Daily Total Mileage** | 1,983 |
| **Daily Total Service Hours** | 72 |
| **Total Round Trips per Day** | 23 |
| **Cost/100 Days** (mileage)** | **$793,040** |
| **Cost/100 Days** (hours)** | **$792,000** |
| **Cost per Passenger Round Trip** (low capacity / high capacity) | $14.96 / $2.49 (mileage-based)<br>$14.94 / $2.49 (hourly-based) |


**Figure 16: Route Map for Complete Scenario**
Source: Volpe

## 4.6 Considered and Dismissed: Splitting the Core Route

The project team also modeled a scenario that split the core corridor into two separate routes, one operating between ORDA/MVH and Saint Huberts, and the other operating from Frontier Town to Saint Huberts. The initial hope was that this split service arrangement could minimize delays on one portion of the corridor if there was substantial congestion elsewhere and potentially provide additional capacity. However, after further analysis, the split route did *not* provide operational benefits compared to one continuous service with simplified operation. A split service would require visitors to exit one bus and get on another bus to continue to a destination past Saint Huberts in either direction. Additionally, a split service schedule is likely to confuse visitors as it lacks consistent timing across both routes. The project team considers the split core route as not feasible as it would not provide operational benefits and could negatively affect the visitor experience.

## 4.7 Additional Considerations Public Outreach and Marketing

The success of a shuttle service largely depends on visitor use. A robust ridership requires a considerable outreach and marketing campaign. NYSDEC may be able to conduct a large portion of the effort in house and with partners from the HPAG and other stakeholders. Social media coverage and website information can be low cost and effective at increasing awareness of the service.

### Signage and Pavement Markings

As visitors learn to navigate the corridor with the new shuttle service, safety remains of paramount importance. Signage and road markings are critical to inform drivers of where bus stops are located and pedestrian use is highest. Passenger vehicles must not block bus stops to ensure the buses have a safe place to stop and let passengers on and off. Successfully managing bus stop access requires signage, markings, and enforcement. Signage can also help pedestrians navigate between the bus stops and trailheads. Consult the High Peaks Wilderness Complex Unit Management Plan for guidance on pedestrian warnings and signage.

### COVID-19 Impacts

The COVID-19 pandemic disrupted public transit services across the country in 2020. It is unclear at the time of writing this report how the pandemic will affect transit in 2021 and beyond. Transit operating procedures introduced by transit agencies in 2020 included boarding only through the rear door (when possible), installing driver barriers, eliminating fare collection, and limiting the passenger load below the seating capacity. TRB's National Cooperative Highway Research Program and Transit Cooperative Research program jointly issued 'A Pandemic Playbook for Transportation Agencies,' created to improve agency responses to the pandemic.[15] While these practices and resources can help provide safer service for the passengers and drivers, they add to the cost of providing a service. The four buses planned for the pilot service are equipped with driver barriers. Otherwise, NYSDEC and partners should monitor current trends during the upcoming season and follow guidance from the New York governor's office and the Federal Transit Agency on operating a safe shuttle service.

### Congestion Management Tools

Congestion influences many recreational corridors across the country and no single solution or "silver bullet" exists to fit every context. Shuttle services are only one element of achieving broader congestion, safety, and visitor experience goals. Within the region, primary concerns revolve around inadequate parking for visitors looking to recreate and the associated safety and congestion issues that arise once limited parking resources have reached capacity and visitors illegally park, or circle while seeking parking.

[15] A Pandemic Playbook for Transportation Agencies, Transportation Research Board, National Cooperative Highway Research Program and Transit Cooperative Research Program. NCHRP Research Report 963/TCRP Research Report 225. Available for purchase online at: http://www.trb.org/Publications/Blurbs/181482.aspx.

The National Park Service developed a congestion management toolkit[16] that provides potential solutions for addressing congestion in park settings. Types of congestion management approaches include tools to address congestion across six problem areas: parking areas, entrance stations, roadways, transit and trails, vehicle/roadway safety, and bicycle/pedestrian safety. Based on the context of the High Peaks region and Route 73, the most applicable tools relate to parking areas, transit and trails, and roadway safety.

Many of these tools apply to improving parking area congestion. They include managing parking for special events, managing visitation patterns through parking restrictions or reservations, modifying pavement markings to delineate authorized and unauthorized parking, enforcing parking restrictions, implementing parking fees, increasing parking supply, and providing parking status information in advance of arrival (e.g., redirect to another parking area when one is full).

Private, third party services, such as Lot Spot,[17] are software tools that could assist with visitor management, including directing visitors to available parking spaces.

The transit and trails tools have similar approaches. Tools to mitigate transit and trail congestion include managing visitor timing and distribution, using reservations, conducting transportation or visitor use management plans, creating new or improving existing transit systems, and providing timely information on the congestion status of relevant locations. Tools with impacts on road safety include distributing visitor arrivals across locations and across the day, enforcing traffic and parking regulations, and undertaking or implementing road safety audits, road marking changes (acceleration/deceleration lanes, turn lanes, etc.), circulation changes, and variable message signs to communicate road and congestion status.

Finally, data collection, analysis, and monitoring efforts benefit all problem areas by giving the land management agencies information on where, when, and how often congestion and related issues occur. The data collected may include parking duration/occupancy, trail counts, traffic volumes, bus passenger counts, etc.

[16] Congestion Management Toolkit, National Parks Service, December 2020. Accessed online at: https://www.nps.gov/orgs/1548/upload/Congestion_Management_2021-508.pdf.
[17] Lot Spot Intelligent Visitor Management https://lotspot.co/

# 5. Conclusion

Given year-over-year increases in visitation and the surging popularity of outdoor recreation in the Adirondack High Peaks region, there are clear and evident opportunities for a shuttle-bus service to provide safe parking and reliable transport to popular trailheads for future visitors. The primary focus of this study was to explore the feasibility of an initial pilot shuttle service, given existing resources and realities along the proposed route(s). The proposed pilot service as presented above is feasible and a key first-step towards establishing a robust transportation service. However, many pilot shuttle services begin with promise and fail to establish themselves as a sustainable service. Several uncertainties face the future of the High Peaks shuttle bus service. In order to support the long-term success of the service, a host of supporting elements are required, including:

- A reliable pool of drivers, often a roster of drivers can be more difficult to maintain with seasonal services offering temporary employment. Ongoing public health concerns are also causing transportation operators difficulties in recruiting and retaining drivers.
    - Potential mitigation could include vehicles limited to 15-passengers (plus the driver), which do not require a Commercial Driver's License (CDL) to operate; however, roughly twice as many vehicles would be required to provide equivalent capacity service.
- A robust marketing and outreach plan with relevant visitor information and continuous engagement with the recreating public to ensure they are aware of the system and its benefits.
    - Include both digital and physical media, and in-person outreach through staff, volunteers, rangers, trail stewards, etc.
- Consistent or enhanced enforcement of no parking areas and direction of traffic to designated parking areas. Plan for additional staff to assist in enforcement and traffic direction, including collaborating with local law enforcement entities and volunteer groups to achieve consistent enforcement, visibility and outreach throughout initial season(s) of operation.
- An ability to respond to growing demand or to ensure reserve capacity is available to handle surges in visitation. Initial shuttle bus services are often stood-up with a limited fleet of vehicles and can become popular quickly; if all available vehicles are full and people waiting cannot board a bus, the visitor experience will suffer. Consider contract mechanisms to provide supplemental vehicles and drivers on an as-needed basis, including leasing vehicles, contracting with a local service/transit provider, or forming partnerships with other local transportation providers who may have spare/idle vehicles or reserve drivers available for use (e.g., school buses).
- Permanent infrastructure to maintain, fuel/charge, and operate the shuttle bus fleet. Established, sustainable transportation services benefit from infrastructure investments that can help lower long-term operational costs.
    - A future fleet of electric buses would require less maintenance and a reduced footprint compared to siting requirements for on-site refueling infrastructure (in other words, a more basic maintenance facility with chargers where the buses park overnight).

# Next Steps

Essex County, in partnership with NYSDEC, has already acquired four, 20-passenger shuttle buses in anticipation of beginning a pilot service. The COVID-19 pandemic delayed the originally planned launch in 2020, cancelled due to social distancing requirements. NYSDEC can work with independently and with local partners to make required improvements to support the pilot service. Potential next steps include:

- Consider purchase of, or short-term leasing arrangements for, additional shuttle buses to ensure spare or surge-capacity vehicles are available when needed or during high-demand
    - Pilot service scenario presumes all four existing buses are in use simultaneously
- Review the National Park Service updated (2021) "Managing Congestion: A Toolkit for Parks." https://www.nps.gov/orgs/1548/upload/Congestion_Management_2021-508.pdf.
    - The toolkit lists various operational and management approaches to address several areas of concern related to recreational visitation, including roadway congestion, vehicle/roadway safety, pedestrian/bicyclist safety, improving the visitor experience, and improving resource conditions. Establishing a shuttle service is one of the 40 plus tools outlined.
- Work in partnership with Essex County to:
    - Finalize the bus route, stops, and schedule
    - Initiate minor improvements such as striping, signage, benches, etc. at bus stops to formalize where the bus will stop and where people can wait to board
- Work in partnership with NYSDOT to:
    - Identify locations with potential pedestrian cross-traffic, analyze sightlines or other safety risks and deploy potential pedestrian safety countermeasures such as crosswalks, lighted or static pedestrian warning signs at safety critical locations
- Collaborate with select members of the High Peaks Advisory Group and other local stakeholders to support the pilot service:
    - Establish roles, responsibilities, administrative processes, and funding streams
    - Develop communications and outreach materials for dissemination through social media outlets, local news organizations, and other relevant sources of recreational information in the region
    - Establish operations and funding agreements
    - Publish user materials to promote the service, including route maps, schedules, parking locations and other general information to be available at NYSDEC's website, partner websites, at trailheads, and regional visitor centers
- Work independently to:
    - Develop internal policies and plans for parking enforcement or other ranger activities (enforcement of illegal parking should ramp-up during shuttle service pilots, and take place regularly throughout the season)
    - Develop plans for NYSDEC staff, local/state police, and volunteers to aid in traffic control and visitor engagement during early-season and peak visitation
    - Develop a data collection and analysis plan that outlines critical data points to evaluate the pilot shuttle's effectiveness and support decision making

# Appendix A: AllTrails Data Collection

AllTrails is an online platform where users can add, rate and review trails, primarily for hiking and backpacking. AllTrails contains roughly 150 trails from the Adirondack region. Each of these trails has information about the level of difficulty, average number of stars rating, pictures, videos, and comments, among other fields.

## Methodology

A Python package using Selenium (called Chromedriver) collected data by automatically opening a Google Chrome browser, visiting relevant trail websites, and scraping them for desired information. The websites group trail listings into the following eight park areas on AllTrails: High Peaks Wilderness, Giant Mountain Wilderness, McKenzie Mountain Wilderness Area, Adirondack Mountain Reserve, Sentinel Range Wilderness, Dix Mountain Wilderness, Henry's Woods, and Mount Van Hoevenberg Recreation Area.

Trailhead locations include circles with a 500-foot radius around each official trailhead coordinate, and merge overlapping circles into a single trailhead with aggregated statistics, like the sum of reviews and a count representing the number of trailheads. These merged trailheads use nearby major park landmarks for identification/naming purposes.

## Caveats

AllTrails data helps identify general trends of trail use in the area. The platform's data inevitably carries inherent biases, important to acknowledge. These are:

- **Non-representative sample of users**: There is reason to think that the people that use AllTrails are going to be a skewed subset of the population, likely younger, more tech-savvy, less familiar with the area, and more likely to be hikers rather than other types of users. This data is not the sole source to determine congestion in an area.
- **Biased commenters and ratings:** On most online platforms, a small subset of users take the time to do more than browse the site or app, and contribute ratings. This subset of users may not correlate with all users of trails. This is especially prevalent with some mountains like Mt Marcy (the tallest mountain in New York State), or others in close proximity to local homes or tourist destinations.
- **Older timeline:** Some of these trails include ratings dating back to 2011; some trails may no longer exist, or might experience different trends more recently.
- **Lack of verification:** To our knowledge, there is no verification process for these trails, and there is no procedure for removal of trails not located correctly. Some trail information, especially those with less comments and ratings, may not be correct.

# Appendix B: Waze Data Collection

Waze is a mapping and directions application. The application is available for any smart phone user, and uses smart phone locations to direct users, primarily drivers, to a destination. Waze provides unique functionality to alert drivers on important road issues. These include traffic jams, road closures, road hazards, weather hazards, crashes, and speed traps. Waze collaborates with government agencies through the Waze Connected Citizens Program.[18] Through this program, Waze works with U.S. Department of Transportation to share certain data useful for transportation planning and analysis. This data is available since 2017 and receives near-real-time updates to the internal USDOT Secure Data Commons (SDC).

## Methodology

The project team accessed data from the SDC using an R-based SQL package. Then filtered the data for all roadway traffic events in New York, and for those between latitude and longitude coordinates around the Adirondack High Peaks region. All Waze data shown removes weather-related events, because those are not relevant to roadway events underpinning this analysis.

## Caveats

Although Waze provides useful data to understand conditions in the region, there are significant reasons to believe that Waze data will have necessary caveats.

These include:

- **Roadway events are subjective:** The categories for Waze roadway events are subjective. For instance, a traffic jam can have different levels for moderate traffic, heavy traffic, and standstill traffic.
- **Extrapolated trends:** Waze does not provide absolute numbers on traffic, parking, or crashes. A relative sample of Waze data determines trends. Previous DOT studies have found crash data to be highly accurate of actual crashes; however, may under- or over-estimate depending on Waze traffic volume.[19]
- **Non-representative sample of users**: Similar to AllTrails, there is no reason to believe that Waze users comprise a representative group of road users. This means that certain roadway events may be over- or under-reported depending on the types of users that are on Waze.
- **Lack of verification**: Also similar to AllTrails, crowdsourced data does not have an extensive verification process, so data may not be accurate. Waze has certain processes to group data that are likely the same event, but this method will not be 100% effective at deduplicating our events.

In addition to these general data caveats, there have been internal data transfer errors that may have created discrepancies in the data. Specifically, this issue noted a significant drop in data transfer during April and May 2019, as shown in Figure 15.

[18] https://www.waze.com/ccp

[19] Flynn, Dan; et al.; (2018); Estimating Traffic Crash Counts Using Crowdsourced Data: Pilot analysis of 2017 Waze data and Police Accident Reports in Maryland

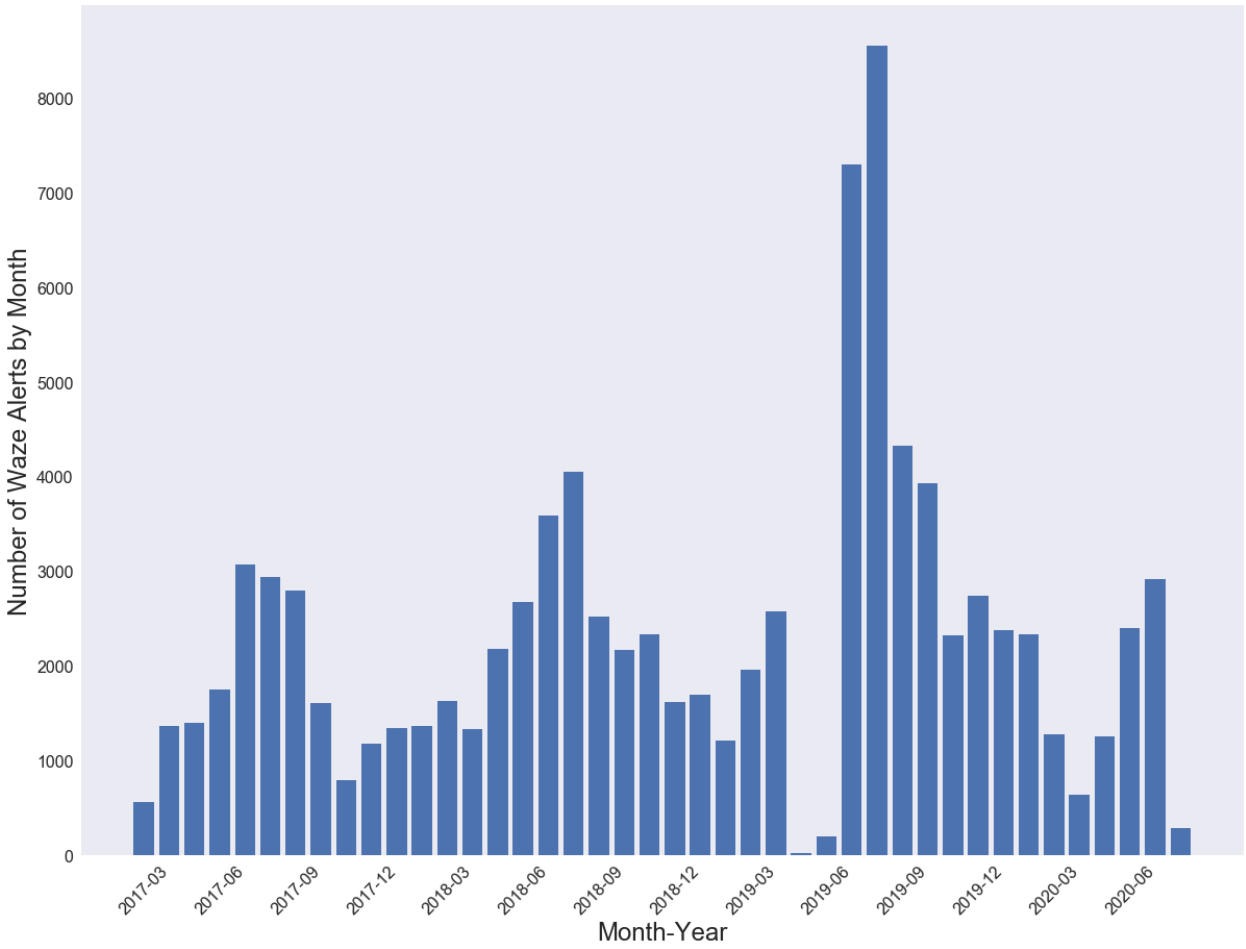


**Figure 17: Total Regional Waze Alerts (March 2017- August 2020)**
Source: Volpe Center, Waze Data

# Appendix C: Current Conditions

## Unit Management Plans (UMPs)

Understanding the carrying capacity for various trailheads served by a shuttle is crucial to ensure the system achieves desired outcomes, and does not deliver too many people all at one time (or over the course of the day) to a particular destination. NYSDEC would have to collect data on the visitation level of the area(s) by monitoring use, including mode of arrival. Fortunately, there are a number of technologies available to count shuttle passengers automatically.

Many of the individual UMPs identify parking as a major challenge involved in managing state lands. For example, the 2004 Dix Mountain Wilderness Area Unit Management Plan suggested improving pull-off areas for roadside parking and limiting parking to preserve the forest resources. UMPs note that parking along the corridor also creates issues with critical emergency response access. Parking can be a useful tool in managing access. Limiting authorized parking capacity to an amount consistent with wilderness management principles can ensure access does not exceed appropriate levels, or damage the resource. Parking and shuttle services are often inter-related.

The High Peaks Wilderness Complex Unit Management Plan clearly indicates that NYSDEC tries to use education to mitigate negative activities and accepts that "direct restrictive law enforcement measures" may be needed if other methods do not result in compliance. The experience on Route 73 is that visitors park along roadsides where it is not safe or pull off the road and degrade biological resources along the roadside. Shuttles can help mitigate unauthorized parking by enabling visitors to access trailheads without parking at them; however, the shuttle system must have adequate parking available to access the shuttle when visitors arrive, as well as safe roadside bus stops clear of parked cars. A balance between shuttle service frequency and parking lot size can help avoid exceeding carry capacities at given location(s), but parking enforcement may be necessary to maintain that balance.

Several of the plans also include recommendations related to signage and wayfinding to address safety and to designate authorized parking areas from unauthorized, or no parking zones. In particular, the High Peaks Wilderness Complex Unit Management Plan includes a management action to "Work cooperatively with the NYS Dept. of Transportation to post pedestrian warning and trailhead parking signs at proper sight distances. Request "No Parking - Tow Away" zones be placed along Route 73 above and below the designated parking areas for greater vehicle and pedestrian safety."[20] Signage also plays an important role to support a shuttle service, by designating bus stops, direction to parking areas, warning of pedestrian crossings, etc. All signage should comply with Federal and state requirements, as well as the aesthetic/context of the area.

[20] New York State Department of Environmental Conservation. 1999. "High Peaks Wilderness Complex Unit Management Plan."

# Appendix D: Stakeholder Outreach

Due to the COVID-19 pandemic, the Volpe team was unable to perform a typical site visit or hold a stakeholder workshop. Instead, the team worked with NYSDEC to identify stakeholders in the area and draft outreach questions. NYSDEC staff emailed stakeholders, copying Volpe staff on the correspondence. Additionally, Volpe and NYSDEC joined a meeting with the High Peaks Advisory Group (HPAG) to discuss the project and questions or concerns from the group. The Feedback Summary provides an overview of the stakeholder responses and general feedback.

## Stakeholder Organizations

**Table 8: Stakeholder Organizations by Category**
Source: Volpe Center

| Stakeholder Category | Organization(s) Contacted |
|---|---|
| State Government | Adirondack Park Agency, NYSDEC, NYSDOT |
| County Government | Essex County |
| Local Government | Lake Placid, Saranac Lake, North Elba, Keene, Harrietstown, Newcomb |
| Quasi Government | Olympic Regional Development Authority |
| Private Landowner | Ausable Club, Adirondack Mountain Reserve (AMR) |
| Economic Development | North Country Chamber of Commerce, Lake Placid Business Association |
| Non-Profit/Advocacy | Adirondack Camping Association, Adirondack WILD, SUNY ESF,* Adirondack North Country Association, Adirondack Diversity Initiative, Adirondack Mountain Club (ADK), Protect the Adirondacks ROOST |
| Recreation | Adirondack Mountain Club, Intercollegiate Outing Club Association, Barkeater Trails Alliance, Adirondack 46ers, Adirondack Climbers' Coalition |

*State University of New York College of Environmental Science and Forestry

The High Peaks Advisory Group (HPAG), formed in 2019 by the NYSDEC Commissioner Basil Seggos, aims to "provide advice to NYSDEC on how to balance critical issues associated with increased public use in the High Peaks region in order to protect the area's natural resources for future generations."[21]

## Feedback Summary

Stakeholders expressed concerns related to ***increasing visitation and natural resource impacts***, including the impact of concentrated batches of hikers on trails, hiker education, shuttle capacity (relating to trail capacity), the ability of a shuttle to spread trail use/impacts across multiple trails, and how an electric shuttle would relate to its success.

Regarding ***traffic and parking,*** stakeholders voiced a desire for the shuttle to limit traffic congestion, expressed their concerns about parking along the highway, and communicated a need for new parking

[21] NYSDEC. "High Peaks Strategic Planning Advisory Group." Accessed December 2, 2020. https://www.dec.ny.gov/lands/119187.html.

lots. Some thought parking restrictions would complement a shuttle, but conceded that current restrictions are not working (people are parking in no parking areas anyway). Some asked if there would be parking hubs for the shuttle.

Stakeholders had positive responses regarding ***traveler information***, indicating that currently deployed variable message signs (VMS) are successful in notifying motorists of other places to recreate, and to upcoming pedestrian traffic. Stakeholders recommended including graphics-rich reference materials and staffing at the hub or stops to provide information to visitors on recreating safely and matching visitors' planed activity level to appropriate trails. Recommendations also included seeking sponsorship from local groups to help offset the costs of materials, to include bilingual information in English and French (for Canadian visitors), and to ensure communication of Leave No Trace information.

***Cost*** concerns included comments that the shuttle will need to be cheap or free, but many people may be willing to pay for in-demand services like parking or a shuttle. Some suggested a type of prioritization for locals or in-state residents and asked if there would be a fee-per-family option.

Comments on ***timing/hours*** included recommendations a shuttle service begin early in the morning and end late at night, run at least every 15 minutes so people are likely to use it, and that a service should be dynamic and able to serve different usage levels.

***Safety*** concerns expressed by stakeholders were about usage spikes on the highway, unsafe driving on the highway, and hikers frequently walking along the highway to get to their destination. Requests also included calls for cell coverage at the shuttle stops.

Feedback regarding ***equity*** included that efforts to promote diversity are minimal and/or not well known, and the local tourism offices lack people of color on staff, which is a potential deterrent for people of color looking to visit. Tourism offices could develop partnerships with trusted entities in diverse communities. A shuttle system could also help provide access for diverse communities, if it connects to larger public transportation systems. The shuttle can further support diverse visitation if the shuttle is inexpensive, reliable, frequent, and has a diverse staff.

***Trip planning*** feedback included that the shuttle and its informational materials could help encourage visitors to recreate at other times of year to avoid crowds, or provide resources for advance trip planning (provided schedules and other trip-planning materials are available). Feedback also included the shuttle should stop in town(s) so visitors can shop while waiting for the shuttle and that the shuttle should include provisions for large overnight packs, equipment, and dogs.

Stakeholders noted that the shuttle's ***marketing*** would benefit from the ROOST's assistance to make it a well-known resource for visitors.

# Stakeholder Participants

**Table 9: Stakeholder Participant List**
Source: Volpe Center

| CONTACT NAME | ORGANIZATION | TITLE |
|---|---|---|
| Aaron Kellett | ORDA | Venue Manager - Whiteface Mountain |
| Benita Law-Diao | Private Resident | |
| Chris Kostoss | NYSDEC | Forest Ranger |
| Corrie Magee | NYSDEC | Forester (Hammond Pond Wild Forest, Frontier Town) |
| Dave Winchell | NYSDEC | Public Affairs |
| David Gibson | Adirondack WILD | Executive Director/Partner |
| Jay Rand | Town of North Elba Government | Town Supervisor |
| Jim McKenna | HPAG, ROOST | CEO |
| Joe Pete Wilson | HPAG; Town of Keene Government | Town Supervisor |
| John Schuler | Adirondack Mountain Reserve / Ausable Club | General Manager |
| Josh Wilson | Barkeater Trails Alliance (BETA) | Executive Director |
| Kris Cheney-Seymour | ORDA | Venue Manager - Mount Van Hoevenberg |
| Pat Barnes | HPAG; NYSDOT | Regional Director |
| Pat Ryan | NYS State Police | Captain |
| Pete Nelson | HPAG; Adirondack Diversity Initiative | Member; journalist |
| Rick Weber | HPAG; Adirondack Park Agency | Deputy Director, Planning |
| Robbi Mecus | NYSDEC | Forest Ranger (High Peaks/Route 73) |
| Rocci Aguirre | HPAG; Adirondack Council | Member |
| Sandi Allen | HPAG | Member; former NYSDEC attorney |
| Seth Jones | HPAG; ADK | Member |
| Siobhan Carey-Nesbitt | Adirondack 46ers | President |
| Stephanie Dezalia | Town of North Hudson Government | Supervisor |
| Tate Connor | NYSDEC | Forester (High Peaks, Giant Mountain Wilderness Area) |
| Teresa Cheetham-Palen | HPAG; Town of Keene | Member; board member; local guide service |
| Will Roth | Adirondack Climber's Coalition | President |

# Appendix E: Electrification Planning

In 2020, New York State Governor Andrew M. Cuomo announced initiatives to electrify transit buses, boost access to clean transportation and to build healthier communities.[22] NYS is a member of the U.S. Climate Alliance[23] maintaining a formal target of 80% reduction in greenhouse gas (GHG) emissions by 2050. Throughout public engagement efforts during the shuttle feasibility study, stakeholders often inquired about electrification of the shuttle bus service. Amidst this background, NYSDEC requested assistance evaluating the feasibility of, and planning for, the potential electrification of the High Peaks region shuttle buses.

The Edison Electric Institute (EEI) provided guidance on 'Preparing to Plug-In Your Fleet' in 2019.[24] Their 10 key things to consider before electrifying a fleet are:

1. Engage with your electric company early and often
2. Keys to success: Minimizing fuel cost and choosing the right use case
3. Electricity is delivered in real time. What does that mean for fleets?
4. Your electric bill depends on how you charge.
5. Work with your electric company to get your facility ready for charging
6. Before buying the EV, plan how to charge it.
7. Choosing a charging solution that meet your needs.
8. EV fleets require cooperation between fleet operators and energy managers
9. Electricity as a fuel means thinking about fuel availability in new ways
10. EV fleet operations have many options to manage costs.

The EEI guidance referenced above can help familiarize NYSDEC with fleet vehicle charging considerations and how planning for the operational realities are critical to successful fleet deployment.

## High Peaks Shuttle Service Electrification

For the proposed High Peaks Shuttle Service beginning with Pilot services, the ***most critical element*** is to establish a reliable and sustainable service. A successful shuttle bus service is one that is reactive to local transportation needs, has clearly defined (and attainable) goals, attains broad awareness within its intended ridership, is able to react quickly to increasing demand, and one who's core operations are sized and funded to be sustainable. A key element of sustainability is transparency with funding providers regarding the goals of the system. Some shuttle bus systems have a goal to be financially self-sustaining (e.g., take in sufficient fares to offset operational costs), while others have a goal to be free-to-all and accessible; or, perhaps a goal might be to minimize illegal parking and enhance safety near trailheads.

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[22] 'Governor Cuomo Announces Initiatives to Electrify Transit Buses, Boosting Access to Clean Transportation and Building Healthier Communities,' website of New York State Governor Andrew Cuomo, available at: https://www.governor.ny.gov/news/governor-cuomo-announces-initiatives-electrify-transit-buses-boosting-access-clean.

[23] United States Climate Alliance website, available at: http://www.usclimatealliance.org/.

[24] 'Preparing to Plug In Your Fleet,' Edison Electric Institute, October 2019. Available online at: https://www.eei.org/issuesandpolicy/electrictransportation/Documents/PreparingToPlugInYourFleet_FINAL_2019.pdf.

For the High Peaks Shuttle Pilot Service, the primary goal is "to ensure safe access to destinations (trailheads) for recreating within the Adirondack High Peaks region; and, to mitigate congestion and safety-related issues associated with increasing demand for recreational access including parking."

NYSDEC and partners will have to decide how to fund the system beyond the short-term pilot phase, in a permanent, ongoing manner. State funding may be available, fare collection (either during boarding or at parking facilities) could provide some funding, or sponsorships and partnerships with local stakeholders could help financially support the shuttle service.

In all cases, demonstrating the need, establishing a successful service, and providing data that demonstrates demand and efficacy of the service as it pertains to achieving relevant goals are critical elements that will aid in justifying and securing appropriate funding, particularly as it pertains to making significant, lasting investments in battery-electric buses and supporting charging infrastructure.

Outlined below is an overview for proceeding from a service concept plan to launching a pilot service; growing that pilot service or establishing a regular, sustainable service; and then electrifying the service based on a demonstrated need and with infrastructure to accommodate electric vehicles.

### *Establish a service, learn, refine operations & then electrify*

The potential shuttle bus service is not yet established; however, current plans are to initiate the service include utilizing ***already purchased***, diesel-powered shuttle buses. If successful, this pilot service will reduce GHG emissions through eliminated personal car trips and associated excessive idling while people wait for, or look for parking. The diesel-powered shuttle buses can also begin operating immediately without significant capital investments in new electric vehicles and charging infrastructure, making them ideally suited to carrying out a pilot shuttle service that will hopefully grow and evolve over the initial few years as awareness grows and service scheduling, routing, and general operations evolve based off experience.

The immediate future is uncertain amidst the ongoing pandemic, with transportation services at large struggling for ridership, and operators who are finding it difficult to recruit drivers. NYSDEC and other stakeholders have to consider an initial lukewarm reception to a pilot shuttlebus service, while at the same time anticipate for rapid growth due to high-demand (as we begin to emerge from the pandemic) should the service begin to gain traction. Given immediate uncertainties, additional investments in new, expensive vehicles or infrastructure would carry significant risk.

Once a permanent, regular service meeting core goals is established, NYSDEC can begin to collect information critical to planning for an electric fleet including:

- Route profiles (length, elevation change, etc.),
- Ridership data – actual capacities/counts, including any unmet demand (riders left behind)
    - Riders unable to board a bus indicate need for reduced headways or larger vehicles

This data will help establish a picture of the ideal future vehicle type (similar, larger, etc.) that can inform future bus weighting (passenger capacities + bus curb weight). These factors are required to define a duty cycle for the electric buses' in terms of range (miles per charge) and passenger capacity.

Then an operations analysis can consider daily bus assignments, headways, recovery time and layover locations to approximate the number of buses required for peak service, establish an adequate spare ratio, and explore bus assignment and scheduling scenarios that account for the time it takes to charge each bus and when those charging events will occur. There may be several charging scenarios to consider, including (but not limited to):

- Charging buses overnight at storage/maintenance facility (presumes buses have adequate range for daily use requirements);
- En-route charging, which provides for continuous operation with buses charging every time they run their route; or
- A combination of overnight slow charging with mid-day opportunity charging (for a partial recharge, to extend the daily range).

With operational charging scenarios established, NYSDEC can work with the local utility provider to conduct a rate analysis. A rate analysis will assist in understanding the cost implications of various charging scenarios. Generally, charging during "off-peak" times (e.g.; slow charging overnight) will incur a much lower rate than charging during "peak" times in the middle of the day (when air conditioning and office/building electrical use is highest). Slow charging over a longer period can also help alleviate demand loads.

Beyond electric rates, each scenario should consider the cost of the charger (roughly $50k per slow charger, capable of charging 3-4 buses; or $500k per fast-charger, capable of charging 8-10 buses on a shared route), labor costs (do drivers or maintenance personnel have to perform the plugging-in, and un-plugging of buses, etc.), and maintenance costs (for both buses and chargers). A GIS analysis can then help identify charger locations and associated installation costs.

After the above is complete, the number of buses required, the number and location of chargers required, and an idea of costs for vehicles, chargers, labor and maintenance will inform a lifecycle cost analysis that will provide capital costs and operational costs to inform electrification and funding plans.

# References and Best Practices

Some useful resources for considering fleet electrification are:

Guidebook for Deploying Zero-Emission Transit Buses, Transportation Research Board, Transit Cooperative Research Program, TCRP Research report 219. Available for purchase online at: http://www.trb.org/Publications/Blurbs/180811.aspx.

Best Practices for Implementing Battery Electric Buses into Your Fleet, APTA Emerging Leaders, 2019. Available online: https://www.apta.com/wp-content/uploads/Group-5_Implementing-BEB.pdf.

King County Metro Transit Bus Electrification: Best Practices Review, 2020. Largely county-specific, provides useful illustrations of various planning activities and includes a checklist that summarizes guidance for fleet electrification. Available online: https://www.kingcounty.gov/~/media/depts/auditor/new-web-docs/2020/electrification-2020/electrification-2020.ashx?la=en.

Electric Vehicle Charging Guidebook for Medium- and Heavy-Duty Commercial Fleets, 2019. By Gladstein Neandross & Associates. Available online: https://www.gladstein.org/gna_whitepapers/electric-vehicle-charging-guidebook-for-medium-and-heavy-duty-commercial-fleets/.

# Electric Shuttle Bus Market

A limiting factor for electrified shuttle bus platforms, particularly "cutaway" vehicles built upon commercial truck chassis (e.g., Ford F550, Freightliner) is the vehicle's Gross Vehicle Weight Rating (GVWR). Early battery-electric applications often required large, heavy batteries to achieve suitable range, limiting the capabilities of smaller, 15 to 30 passenger offerings. Developments in battery technologies are allowing options to come to market that are more capable, and able to deliver equivalent performance compared to their diesel counterparts.

As of this report, no work truck original equipment manufacturer (OEM) offers an electrified chassis to shuttle bus manufacturers directly. Like propane vehicles that feature gasoline or diesel engines retrofitted with propane fuel systems, electric shuttle buses available on the market today sit atop a work-truck platform that has been electrified by a third party. For example, Ford maintains a Qualified Vehicle Modifier program that includes companies that develop and install electrified powertrains for commercial vehicles. Other manufacturers have similar programs. Vehicles modified by a QVM or equivalent partner retain full factory warranty backing from the OEM. Often the electrification provider will have a formal partnership with the chassis OEM. Electric shuttle buses available for model year 2021 include the following options on Ford chassis:

## Motiv

Motiv is a Ford eQVM partner and offers its Electric Power Intelligent Chassis (EPIC) across popular Ford chassis platforms including applications for step vans, school buses, box trucks, shuttle buses and trolleys. The Motiv shuttle bus based on the E-450 chassis has 105 miles of claimed range and is limited to 14,500 lbs. GVWR. More information available online: https://www.motivps.com/application/shuttle-bus/.

## Lightning eMotors

Lightning eMotors is a Ford eQVM partner and offer their Lightning Repower on Ford Transit passenger vans, E-450, and F-550 shuttle buses. The Lightning Electric F-550 has 100 miles of claimed range and a GVWR of 17,500 – 19,500 lbs. More information available online: https://lightningemotors.com/lightningelectric-f550/.

## Phoenix Motorcars

Phoenix Motorcars offer their Zeus 400 shuttle bus on the Ford E-450 chassis with available range up to 160-miles and either a 15,500 or 17,500 lbs. GVWR (depending on configuration) chassis. Payload for their electrified platform is claimed 6,500 lbs. More information available online: https://www.phoenixmotorcars.com/products/

# Appendix F: Business Model Alternatives

Prior work supporting the National Park Service informs information presented below, and is for reference only. This section does not include an analysis for NYSDEC or the High Peaks region and relevant local factors.

## Service profile

Establishing a new shuttle bus service has several capital and operational costs to accommodate. The generic cost model diagram below identifies these costs, including direct and indirect costs to consider.

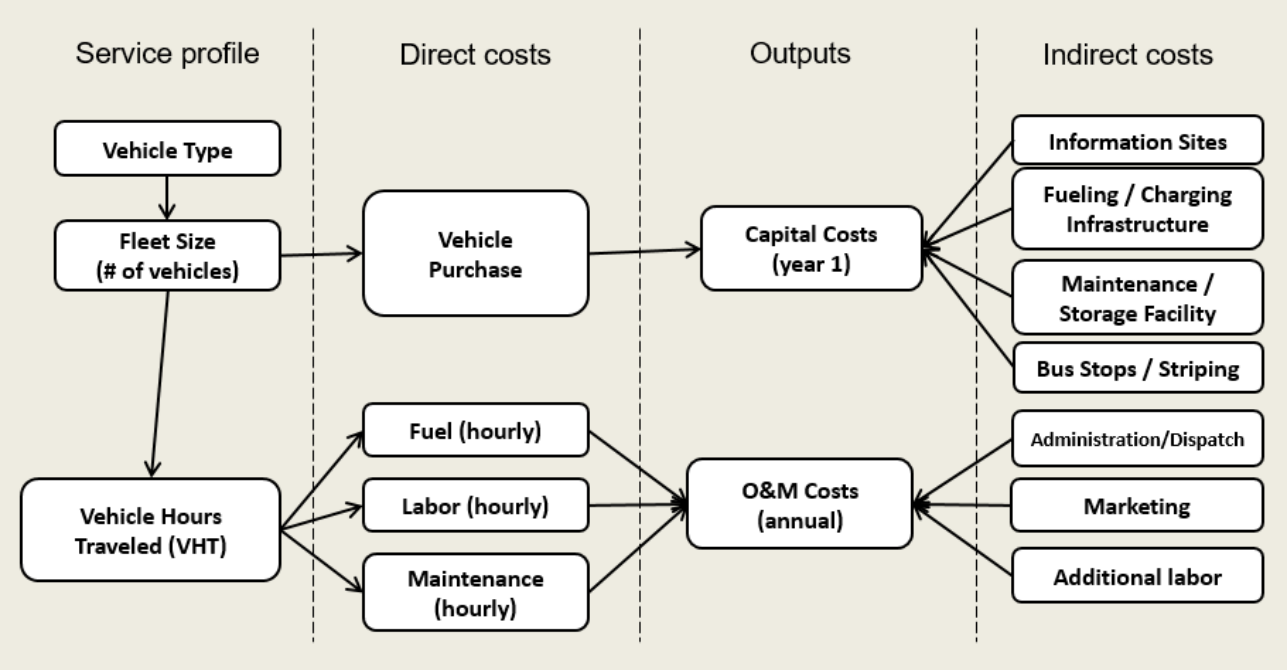


**Figure 18: Shuttle Bus Service Cost Model**
Source: Volpe Center

# Ownership framework

Typical transportation service frameworks include park owned and operated shuttle service, park owned shuttle service, operated by a private provider, and a privately owned and operated shuttle service.

## Park Owned and Operated Shuttle Service

This business model involves the park assuming full responsibility of owning and maintaining the vehicles and operating the shuttle service. The feasibility of this business model is largely dependent on the financial capabilities of the park to cover upfront costs of purchasing vehicles and ongoing operations and maintenance costs. If park staff operate the vehicles, they should obtain an appropriate Commercial Driver Licenses (CDL).[25] Federal law requires that all commercial vehicle operators obtain a CDL through their home state. Depending on the weight of the vehicle and the passenger capacity, different types of licenses may be required.[26]

## Park Owned, Shuttle Service Operated by Private Provider

Under this business model, the park purchases the vehicles and contracts for operations under a service contract. The park would be responsible for procuring the vehicle and paying for transportation service, while a service contractor would conduct the day-to-day operations of the service.

With this business model, the park can exercise greater control of selecting the most appropriate vehicles to provide the desired shuttle service concept. The park would not need to make time, labor, and training investments to become a proficient transit operator. A private sector partner would operate and maintain the shuttle service, potentially ensuring greater efficiency in maintaining the shuttle schedule while not overburdening park staff. However, this option depends on the availability of a private sector entity in the area that is interested in operating the service. Many potential local providers can help drive costs down through competition.

## Privately Owned and Operated Shuttle Service

If a park finds that owning and/or operating a shuttle are beyond the scope of their financial and personnel capabilities, business models that privatize both the ownership and operation of the shuttle service can be beneficial. Common structures for non-park owned/operated models include concessions contracts, commercial uses authorizations (CUAs), and service contracts.

[25]Federal requirements regarding Commercial Driver Licenses: https://www.fmcsa.dot.gov/registration/commercial-drivers-license

[26] For passenger vehicles with a Gross Vehicle Weight Rating (GVWR) of 26,000 pounds or less or a vehicle designed to transport 16 or more passengers (including the driver), operators will need a "C" license. Passenger vehicles designed to carry 16 or more passengers (including the driver) require a "P" endorsement, which involves completing a knowledge test and a road test. Special applications for a "C" license or "P" endorsement may not be required if the shuttle service uses a smaller van.

# Appendix G: Scenario Sample Schedules

**Sample Schedule for Pilot Core Service**
Source: Volpe

| Core Route - southbound | | | | | Core Route - northbound | | | |
|---|---|---|---|---|---|---|---|---|
| ORDA/MVH | Town of Keene/MF | Saint Huberts | Chapel Pond | Frontier Town | Chapel Pond | Saint Huberts | Keene/ MF | ORDA/ MVH |
| | | | | 7:05 | 7:14 | 7:18 | 7:27 | 7:50 |
| | | | | 7:34 | 7:43 | 7:47 | 7:56 | 8:19 |
| 7:00 | 7:19 | 7:28 | 7:32 | 7:51 | 8:00 | 8:04 | 8:13 | 8:36 |
| 7:29 | 7:48 | 7:57 | 8:01 | 8:20 | 8:29 | 8:33 | 8:42 | 9:05 |
| 7:50 | 8:09 | 8:18 | 8:22 | 8:41 | 8:50 | 8:54 | 9:03 | 9:26 |
| 8:19 | 8:38 | 8:47 | 8:51 | 9:10 | 9:19 | 9:23 | 9:32 | 9:55 |
| 8:36 | 8:55 | 9:04 | 9:08 | 9:27 | 9:36 | 9:40 | 9:49 | 10:12 |
| 9:05 | 9:24 | 9:33 | 9:37 | 9:56 | 10:05 | 10:09 | 10:18 | 10:41 |
| 9:26 | 9:45 | 9:54 | 9:58 | 10:17 | 10:26 | 10:30 | 10:39 | 11:02 |
| 9:55 | 10:14 | 10:23 | 10:27 | 10:46 | 10:55 | 10:59 | 11:08 | 11:31 |
| 10:12 | 10:31 | 10:40 | 10:44 | 11:03 | 11:12 | 11:16 | 11:25 | 11:48 |
| 10:41 | 11:00 | 11:09 | 11:13 | 11:32 | 11:41 | 11:45 | 11:54 | 12:17 |
| 11:02 | 11:21 | 11:30 | 11:34 | 11:53 | 12:02 | 12:06 | 12:15 | 12:38 |
| 11:31 | 11:50 | 11:59 | 12:03 | 12:22 | 12:31 | 12:35 | 12:44 | 13:07 |
| 11:48 | 12:07 | 12:16 | 12:20 | 12:39 | 12:48 | 12:52 | 13:01 | 13:24 |
| 12:17 | 12:36 | 12:45 | 12:49 | 13:08 | 13:17 | 13:21 | 13:30 | 13:53 |
| 12:38 | 12:57 | 13:06 | 13:10 | 13:29 | 13:38 | 13:42 | 13:51 | 14:14 |
| 13:07 | 13:26 | 13:35 | 13:39 | 13:58 | 14:07 | 14:11 | 14:20 | 14:43 |
| 13:24 | 13:43 | 13:52 | 13:56 | 14:15 | 14:24 | 14:28 | 14:37 | 15:00 |
| 13:53 | 14:12 | 14:21 | 14:25 | 14:44 | 14:53 | 14:57 | 15:06 | 15:29 |
| 14:14 | 14:33 | 14:42 | 14:46 | 15:05 | 15:14 | 15:18 | 15:27 | 15:50 |
| 14:43 | 15:02 | 15:11 | 15:15 | 15:34 | 15:43 | 15:47 | 15:56 | 16:19 |
| 15:00 | 15:19 | 15:28 | 15:32 | 15:51 | 16:00 | 16:04 | 16:13 | 16:36 |
| 15:29 | 15:48 | 15:57 | 16:01 | 16:20 | 16:29 | 16:33 | 16:42 | 17:05 |
| 15:50 | 16:09 | 16:18 | 16:22 | 16:41 | 17:00 | 17:19 | 17:38 | 17:57 |
| 16:19 | 16:38 | 16:47 | 16:51 | 17:10 | 17:29 | 17:48 | 18:07 | 18:26 |
| 16:36 | 16:55 | 17:04 | 17:08 | 17:27 | 17:36 | 17:40 | 17:49 | 18:12 |
| 17:05 | 17:24 | 17:33 | 17:37 | 17:56 | 18:05 | 18:09 | 18:18 | 18:41 |
| 17:57 | 18:16 | 18:25 | 18:29 | 18:48 | | | | |
| 18:26 | 18:45 | 18:54 | 18:58 | 19:17 | | | | |
| 18:12 | 18:31 | 18:40 | 18:44 | 19:03 | 19:12 | 19:16 | 19:25 | 19:48 |

**Sample Schedules for Hub and Spoke Service**

Source: Volpe

| Lake Placid Spoke | | | | | | |
|---|---|---|---|---|---|---|
| Keene Central Hub | ORDA/MVH | Lake Placid Ski Jump Complex | Lake Placid Visitor Center | Lake Placid Ski Jump Complex | ORDA/MVH | Keene Central Hub |
| | | | 7:00 | 7:08 | 7:21 | 7:44 |
| | | | 7:22 | 7:30 | 7:43 | 8:06 |
| 7:44 | 8:03 | 8:16 | 8:24 | 8:32 | 8:45 | 9:08 |
| 8:06 | 8:25 | 8:38 | 8:46 | 8:54 | 9:07 | 9:30 |
| 9:08 | 9:27 | 9:40 | 9:48 | 9:56 | 10:09 | 10:32 |
| 9:30 | 9:49 | 10:02 | 10:10 | 10:18 | 10:31 | 10:54 |
| 10:32 | 10:51 | 11:04 | 11:12 | 11:20 | 11:33 | 11:56 |
| 10:54 | 11:13 | 11:26 | 11:34 | 11:42 | 11:55 | 12:18 |
| 11:56 | 12:15 | 12:28 | 12:36 | 12:44 | 12:57 | 13:20 |
| 12:18 | 12:37 | 12:50 | 12:58 | 13:06 | 13:19 | 13:42 |
| 13:20 | 13:39 | 13:52 | 14:00 | 14:08 | 14:21 | 14:44 |
| 13:42 | 14:01 | 14:14 | 14:22 | 14:30 | 14:43 | 15:06 |
| 14:44 | 15:03 | 15:16 | 15:24 | 15:32 | 15:45 | 16:08 |
| 15:06 | 15:25 | 15:38 | 15:46 | 15:54 | 16:07 | 16:30 |
| 16:08 | 16:27 | 16:40 | 16:48 | 16:56 | 17:09 | 17:32 |
| 16:30 | 16:49 | 17:02 | 17:10 | 17:18 | 17:31 | 17:54 |
| 17:32 | 17:51 | 18:04 | 18:12 | 18:20 | 18:33 | 18:56 |
| 17:54 | 18:13 | 18:26 | 18:34 | 18:42 | 18:55 | 19:18 |

| Frontier Town Spoke | | | | | | |
|---|---|---|---|---|---|---|
| Keene Central Hub | Saint Huberts | Chapel Pond | Frontier Town | Chapel Pond | Saint Huberts | Keene Central Hub |
| | | | 7:00 | 7:22 | 7:26 | 7:39 |
| | | | 7:19 | 7:41 | 7:45 | 7:58 |
| 7:39 | 7:48 | 7:52 | 8:14 | 8:36 | 8:40 | 8:53 |
| 7:58 | 8:07 | 8:11 | 8:33 | 8:55 | 8:59 | 9:12 |
| 8:53 | 9:02 | 9:06 | 9:28 | 9:50 | 9:54 | 10:07 |
| 9:12 | 9:21 | 9:25 | 9:47 | 10:09 | 10:13 | 10:26 |
| 10:07 | 10:16 | 10:20 | 10:42 | 11:04 | 11:08 | 11:21 |
| 10:26 | 10:35 | 10:39 | 11:01 | 11:23 | 11:27 | 11:40 |
| 11:21 | 11:30 | 11:34 | 11:56 | 12:18 | 12:22 | 12:35 |
| 11:40 | 11:49 | 11:53 | 12:15 | 12:37 | 12:41 | 12:54 |
| 12:35 | 12:44 | 12:48 | 13:10 | 13:32 | 13:36 | 13:49 |
| 12:54 | 13:03 | 13:07 | 13:29 | 13:51 | 13:55 | 14:08 |
| 13:49 | 13:58 | 14:02 | 14:24 | 14:46 | 14:50 | 15:03 |
| 14:08 | 14:17 | 14:21 | 14:43 | 15:05 | 15:09 | 15:22 |
| 15:03 | 15:12 | 15:16 | 15:38 | 16:00 | 16:04 | 16:17 |
| 15:22 | 15:31 | 15:35 | 15:57 | 16:19 | 16:23 | 16:36 |
| 16:17 | 16:26 | 16:30 | 16:52 | 17:14 | 17:18 | 17:31 |
| 16:36 | 16:45 | 16:49 | 17:11 | 17:33 | 17:37 | 17:50 |
| 17:31 | 17:40 | 17:44 | 18:06 | 18:28 | 18:32 | 18:45 |
| 17:50 | 17:59 | 18:03 | 18:25 | 18:47 | 18:51 | 19:04 |

| Elizabeth Town Spoke | | | | |
|---|---|---|---|---|
| Keene Central Hub | Hurricane Mountain | Elizabeth Town | Hurricane Mountain | Keene Central Hub |
| 7:00 | 7:07 | 7:22 | 7:37 | 7:48 |
| 7:26 | 7:33 | 7:48 | 8:03 | 8:14 |
| 7:52 | 7:59 | 8:14 | 8:29 | 8:40 |
| 8:18 | 8:25 | 8:40 | 8:55 | 9:06 |
| 8:44 | 8:51 | 9:06 | 9:21 | 9:32 |
| 9:10 | 9:17 | 9:32 | 9:47 | 9:58 |
| 9:36 | 9:43 | 9:58 | 10:13 | 10:24 |
| 10:02 | 10:09 | 10:24 | 10:39 | 10:50 |
| 10:28 | 10:35 | 10:50 | 11:05 | 11:16 |
| 10:54 | 11:01 | 11:16 | 11:31 | 11:42 |
| 11:20 | 11:27 | 11:42 | 11:57 | 12:08 |
| 11:46 | 11:53 | 12:08 | 12:23 | 12:34 |
| 12:12 | 12:19 | 12:34 | 12:49 | 13:00 |
| 12:38 | 12:45 | 13:00 | 13:15 | 13:26 |
| 13:04 | 13:11 | 13:26 | 13:41 | 13:52 |
| 13:30 | 13:37 | 13:52 | 14:07 | 14:18 |
| 13:56 | 14:03 | 14:18 | 14:33 | 14:44 |
| 14:22 | 14:29 | 14:44 | 14:59 | 15:10 |
| 14:48 | 14:55 | 15:10 | 15:25 | 15:36 |
| 15:14 | 15:21 | 15:36 | 15:51 | 16:02 |
| 15:40 | 15:47 | 16:02 | 16:17 | 16:28 |
| 16:06 | 16:13 | 16:28 | 16:43 | 16:54 |
| 16:32 | 16:39 | 16:54 | 17:09 | 17:20 |
| 16:58 | 17:05 | 17:20 | 17:35 | 17:46 |
| 17:24 | 17:31 | 17:46 | 18:01 | 18:12 |
| 17:50 | 17:57 | 18:12 | 18:27 | 18:38 |
| 18:16 | 18:23 | 18:38 | 18:53 | 19:04 |

**Sample Schedules for Hub and Spoke Service**

Source: Volpe

| Complete Route - southbound | | | | | | Complete Route - northbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lake Placid Visitor Center | Lake Placid Ski Jump Complex | ORDA/ MVH | Town of Keene | Saint Huberts | Chapel Pond/ Giant Mtn | Frontier Town | Chapel Pond/ Giant Mtn | Saint Huberts | Town of Keene | ORDA/ MVH | Lake Placid Ski Jump Complex | Lake Placid Visitor Center |
| | | | | | | 7:00 | 7:22 | 7:26 | 7:35 | 7:58 | 8:11 | 8:23 |
| | | | | | | 7:28 | 7:50 | 7:54 | 8:03 | 8:26 | 8:39 | 8:51 |
| | | | | | | 7:56 | 8:18 | 8:22 | 8:31 | 8:54 | 9:07 | 9:19 |
| 7:00 | 7:08 | 7:21 | 7:40 | 7:49 | 7:53 | 8:15 | 8:37 | 8:41 | 8:50 | 9:13 | 9:26 | 9:38 |
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| 8:24 | 8:32 | 8:45 | 9:04 | 9:13 | 9:17 | 9:39 | 10:01 | 10:05 | 10:14 | 10:37 | 10:50 | 11:02 |
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