

Wildland and Recreation
Management Research Laboratory

University of Montana
Missoula, MT

Technical Report / 2025



Alpine Lakes Wilderness Recreation Allocation Study

Abigail Fuesler, William L. Rice, Christopher A. Armatas, & Hayley A. Johnson



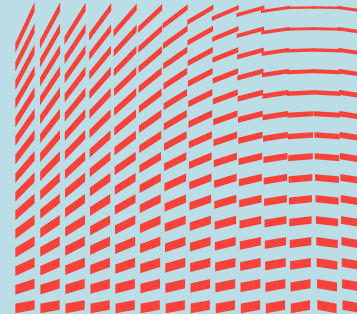


Table of Contents

2 Table of Contents

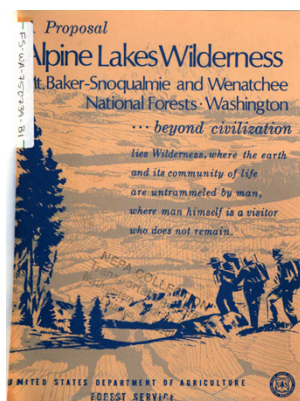
5 Results

3 Understanding the Trailheads

18 Implications

4 Methods

21 Appendix



About the cover

The cover illustration for this report comes from a 1975 U.S. Forest Service “Report on a Proposed Alpine Lakes Wilderness.”

Understanding the Trailheads

Overview of the Alpine Lakes Wilderness

The Enchantments area within the Alpine Lakes Wilderness has long been a popular recreation area, which has led the Forest Service to adopt an overnight permit system and, more recently, to consider a day-use permit system to balance recreation, resource protection, and visitor safety. The Enchantments area includes high-use trails such as those off of Icicle Rd, including Stuart Lake, Eightmile, and Snow Lakes. Current challenges facing managers include ensuring visitor safety, and mitigating crowding and impacts to nature. Current management strategies involve education, infrastructure modifications, permits, and enforcement. Visitors are required to pay for parking online and complete a self-issue, paper permit at trailheads, which is available in unlimited supply. In 2025, the USFS Washington Office, Aldo Leopold Wilderness Research Institute, and University of Montana's Wildland and Recreation Management Lab completed an allocation study to inform management decisions.

Stuart Lake Trailhead

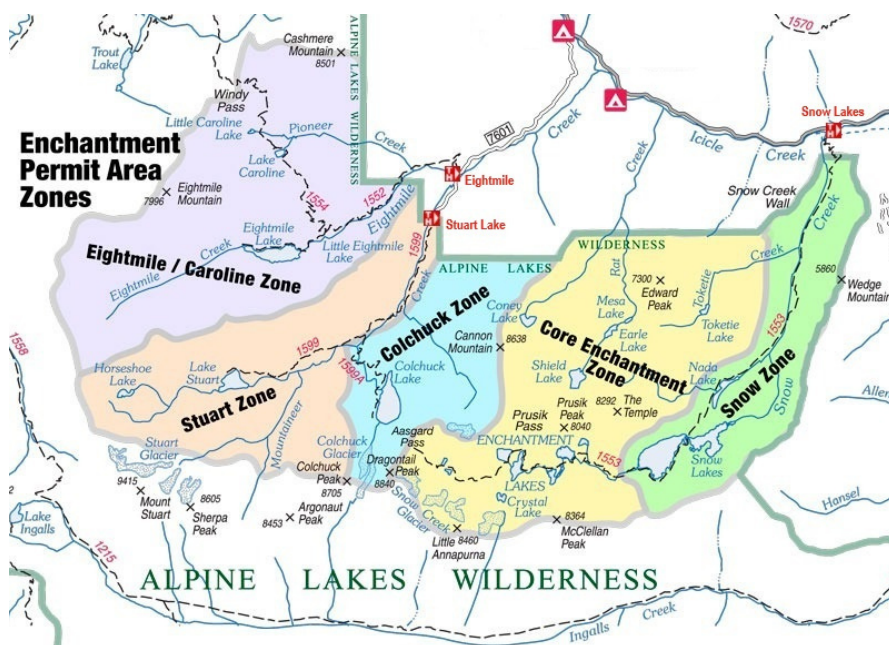
The trailhead provides access to Colchuck Lake (9 miles roundtrip, 2,342-foot elevation gain) and Stuart Lake (9 miles, 1,840-foot elevation gain). Extremely popular for day hikers and backpackers alike, the parking lot is often full by 10am in the summer. Improper human waste disposal is an issue for the entire Enchantments areas, but the issue is particularly acute in the areas around both lakes.

Eightmile Trailhead

The trailhead provides access to an out-and-back hike to Eightmile Lake (6.6 miles roundtrip, 1,404-foot elevation gain). Due to Eightmile's proximity to the Stuart Lake Trailhead, some visitors hike to Eightmile Lake instead of Stuart or Colchuck Lake when they are met with limited parking at the Stuart Lake Parking Lot.

Snow Lakes Trailhead

The trailhead provides access to several hikes of varying length and elevation gain, as well as easy access to climbing routes across Icicle Rd from the trailhead's parking lot. Hikers aiming to complete the Enchantments Traverse in a day often start at the Stuart Lake Trailhead and end their day at the Snow Lakes Trailhead. The Traverse features 4,845 feet of elevation gain and is 18.5 miles, and visitors to the Enchantments that do not win the lottery for backpacking sometimes pivot to completing the Traverse. Snow Lakes Trailhead is also the closest of the three trailheads to Leavenworth, with some residential homes located near the trailhead.



Source: US Forest Service

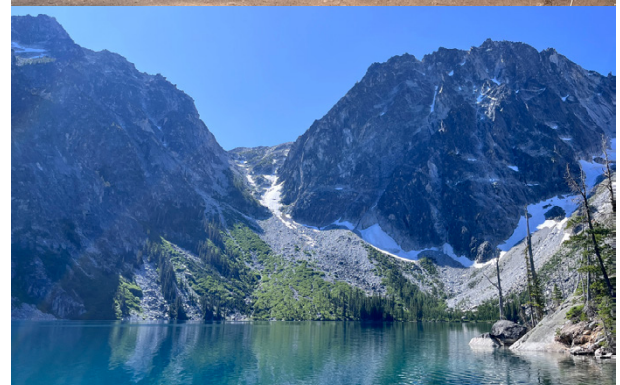
Methods

To support management of the Enchantments, managers with the the U.S. Forest Service (Okanogan-Wenatchee NF), and researchers with the U.S. Forest Service (Aldo Leopold Wilderness Research Institute) and the University of Montana (the Wildland and Recreation Management Lab) conducted an allocation study at the trailheads in question. In pairs, the survey technicians collected visitor experience data to support potential decisions related to developing a rationing strategy for managing access within the forest. The research method we used was on-site data collection through surveys distributed at the three trailheads from July 1-15, 2025. The eligible respondents included anyone over the age of 18 exiting from the trailhead while the technicians were distributing surveys.

Researchers positioned themselves at one of the designated sampling locations during a randomized, predetermined day and time block. Researchers approached every n th person or group departing from their visit and politely asked whether they would like to participate in the on-site survey. Following the brief introduction of the purpose of the survey, the potential respondent (adult group member with the most recent birth date) was asked if they were willing to complete the 8-minute survey administered by the surveyor. If the person refused, they were thanked for their time and kindly asked to answer questions used to check for non-response bias.

Visitors that agreed were asked to complete the survey using a tablet or on paper. The study survey was primarily conducted using a tablet to collect data digitally via Qualtrics and the participants were given a laminated copy of the survey to follow along with as the survey technician verbally administered the survey questions. The survey was only available in English.

A complete copy of the survey can be found in [here](#).



Results

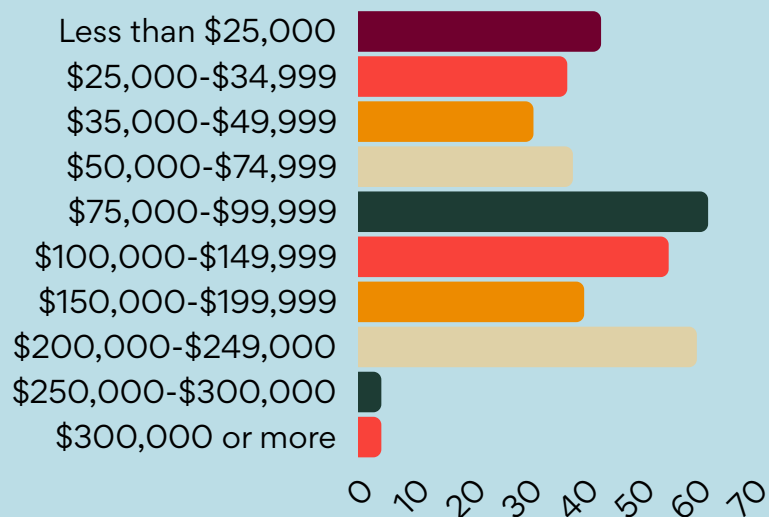
Analysis

A total of **501 valid surveys** were collected from Stuart Lake (424 surveys), Snow Lakes (70 surveys), and Eightmile (7 surveys), resulting in a response rate of 87.4%. Seven groups were unable to respond to the survey due to a language barrier. A t-test revealed a significant relationship between group size and agreement to take the survey, with an average group size for respondents of 2.86 and for refusal groups of 2.1. The effect size was .395, which is minimal to typical and below the substantial threshold of .8. As an additional check, we examined differences across key variables based on group size and found no significant relationships. The responses were analyzed in SPSS and JASP.

The annual household income displayed here is for the entire sample and is on par with the median income for Washington state during the same timeframe.

Income

“What was your annual household income in 2024, before taxes?”



Stuart Lake Visitor Characteristics

Visit History

■ 1st time visiting this year

■ Visited before 2025

65.5%

34.5%

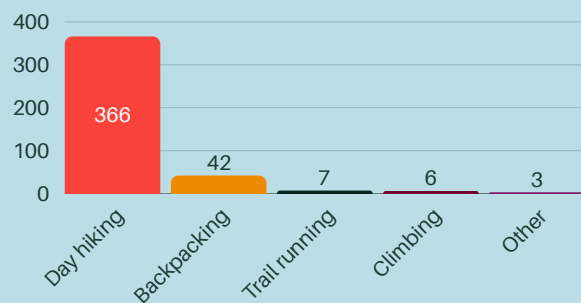
Quick Stats

Average Group Size **2.89**

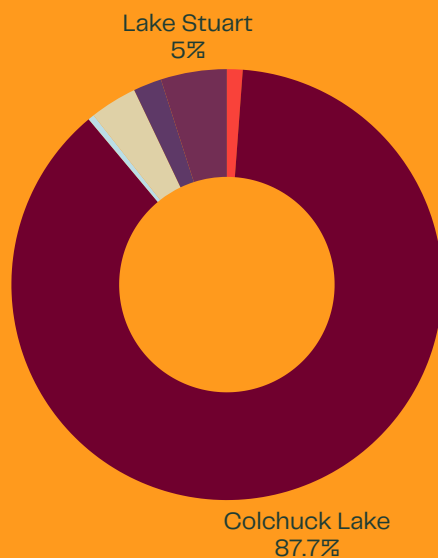
Average Year of First Visit **2022**

Average Age **34 years**

Most Popular Activities



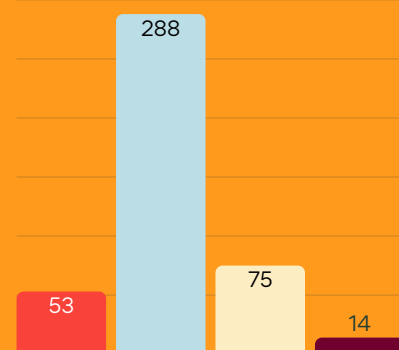
Trip Objective



Ethnicities

(count)

● Hispanic or Latino ● White
● Asian ● Other



59.9% of respondents at **Stuart Lake** said the **Enchantments** within the Alpine Lakes Wilderness **was their primary destination** for their travel plans.

Snow Lakes Visitor Characteristics

Visit History

1st time visiting this year

Visited before 2025

57.4%

42.6%

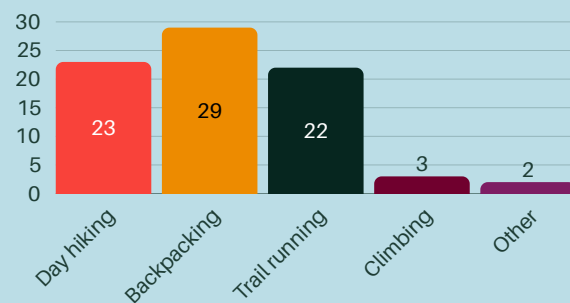
Quick Stats

Average Group Size **2.76**

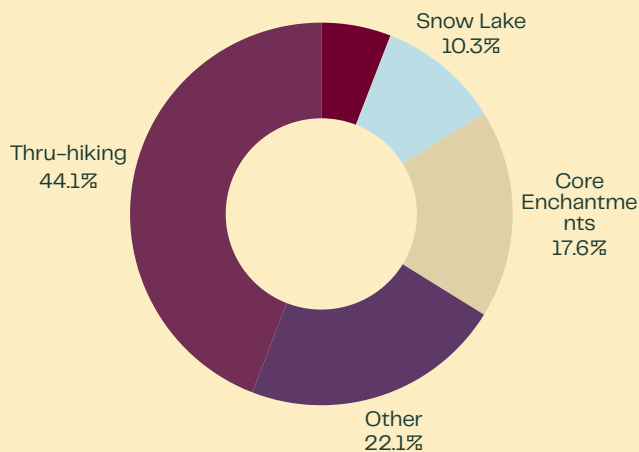
Average Year of First Visit **2020**

Average Age **37 years**

Most Popular Activities

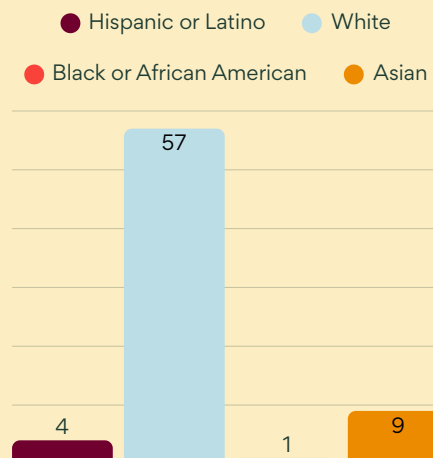


Trip Objective



Ethnicities

(count)

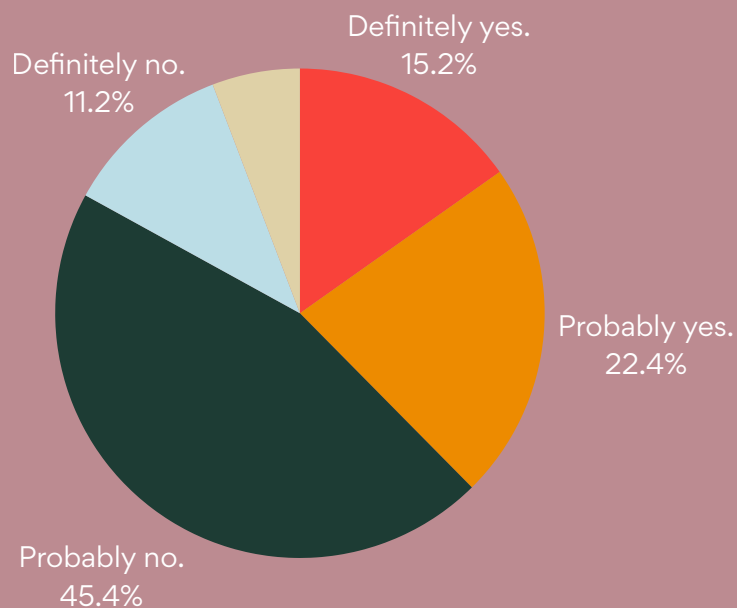


79.7% of respondents at **Snow Lakes** said the **Enchantments** within the Alpine Lakes Wilderness **was their primary destination** for their travel plans.

Limiting Day Use



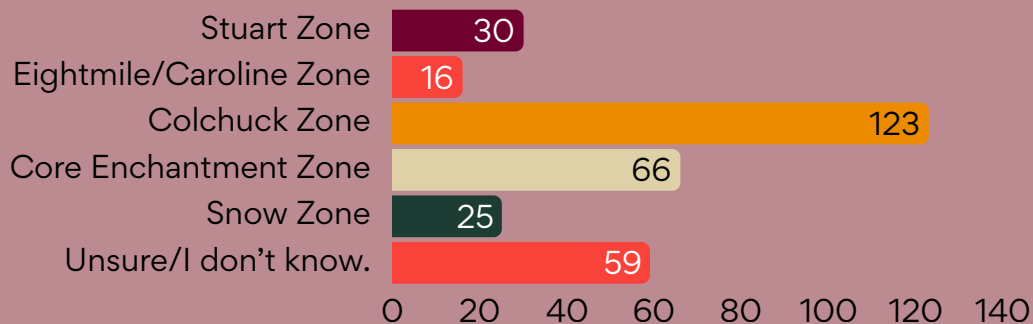
Do you feel limiting day use in the Enchantments is needed?



There was no difference across the trailheads as to whether visitors thought limiting day use was needed.

Zones to Limit Day Use

Visitors who responded with a “yes” were then asked which zones should have limits.



The **top reasons given for limiting use** were to **reduce impacts to nature** (27.1% of respondents) and to **improve the quality of the visitor experience** (24%).

Visitors did not feel that limiting use was necessary to provide more certainty about what to expect (14.1%).



Scenario Summary

As managers approach a potential decision around rationing day-use to the Enchantments area, there was interest in understanding how visitors would support (or not support) four potential scenarios:

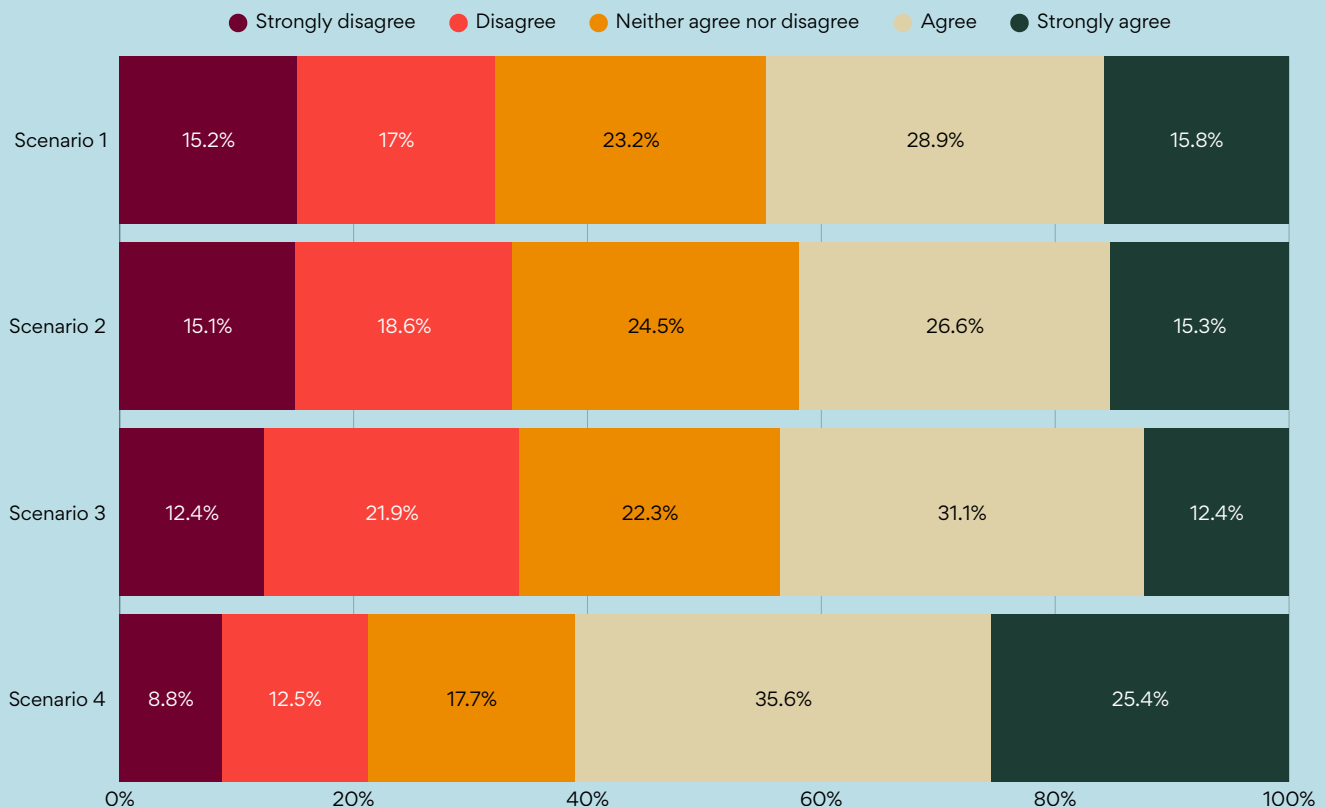
Scenario 1: Limited day-use permit with associated fee

Scenario 2: Advanced reservation parking with strict enforcement

Scenario 3: First come, first served parking with strict enforcement

Scenario 4: Lessen the impact of day-use limits by developing sanctioned public transportation

Below we highlight visitor support for the four scenarios overall, with support being highest for limiting the amount of overall restrictions on day-use by providing alternative transportation options. On the subsequent pages (i.e., pages 10-13), we provide additional details on how visitors reacted to each scenario. Generally, there was greater support for limiting day-use at Stuart Lake (relative to Snow Lakes), and greater support for advanced parking reservations at Snow Lakes (relative to Stuart Lake). And overall, the proposed fee of \$15 was not considered unaffordable by most respondents



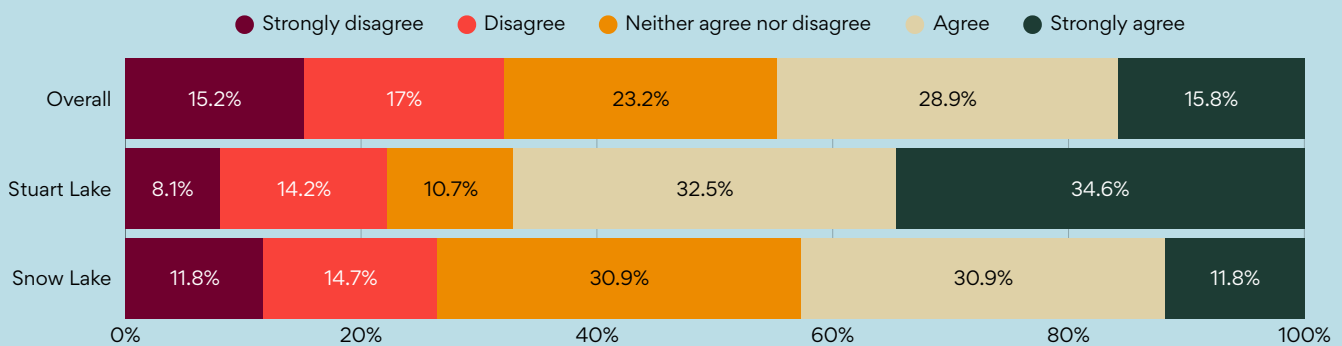
Scenario 1 - Limited day-use permit with associated fee:

What: A limited number of permits will be available in advance for day-use trips (those without a day-use permit would not be allowed to hike in the Enchantments)

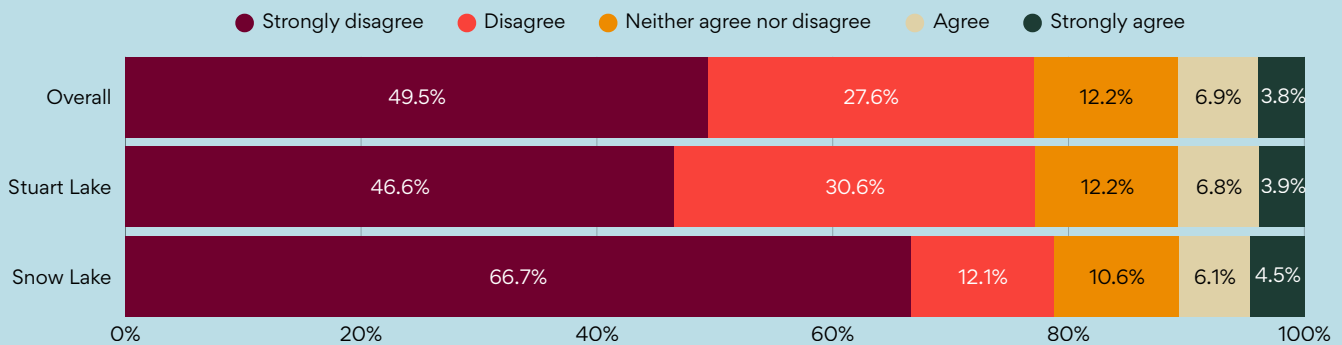
Cost: \$15 per group (up to 8 individuals)

Parking: First come, First Served

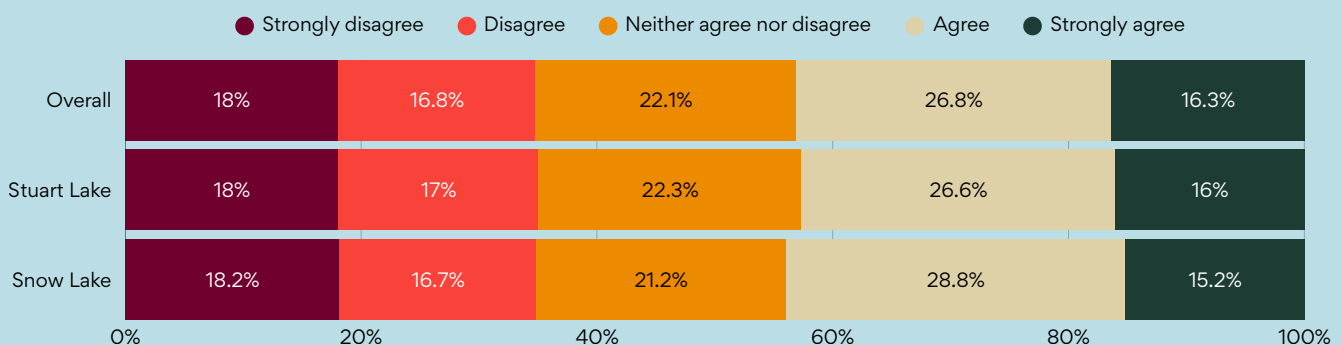
I support this scenario.



I would be unable to afford the cost of this scenario.



This scenario restricts my ability to freely choose a recreation experience that fits my needs.



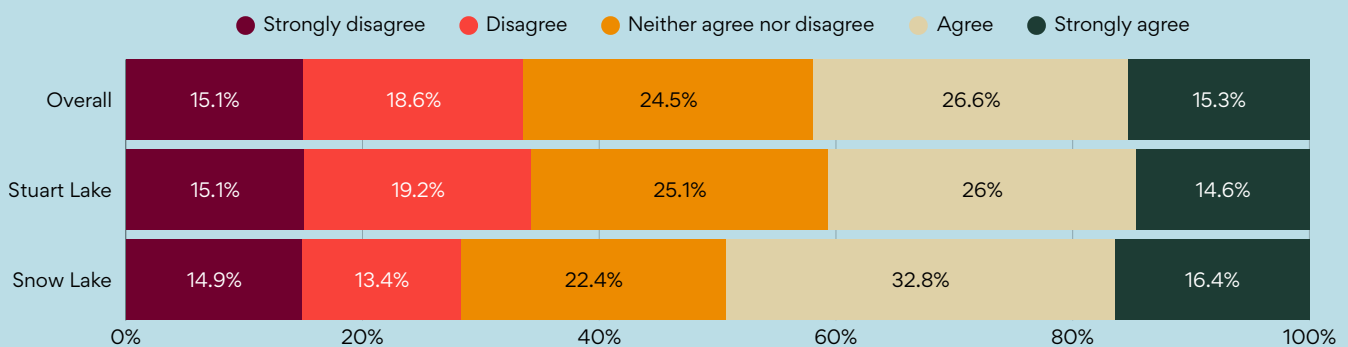
Scenario 2 - Advanced reservation parking with strict enforcement:

What: A limited number of parking permits will be available in advance for day-use trips

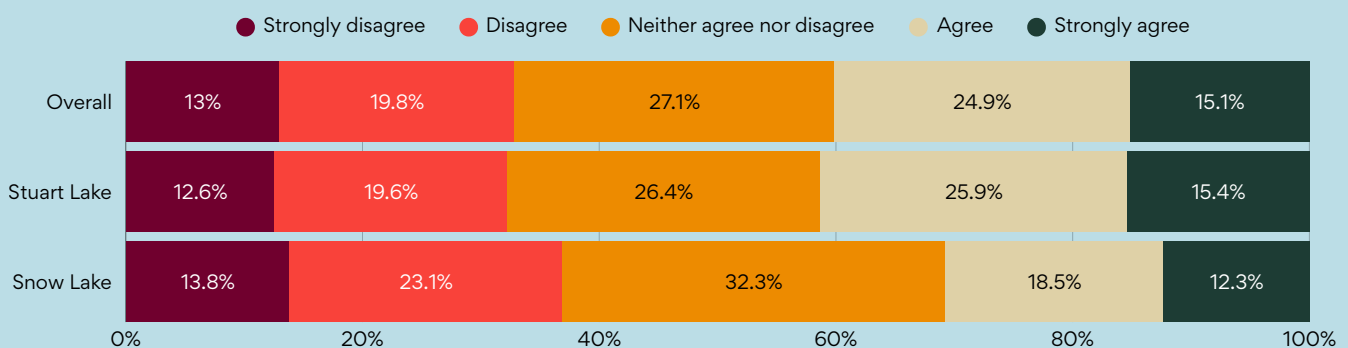
Cost: \$15 per vehicle

Parking: Advanced reservation (access to the Enchantment zones will remain unlimited, which would mean that those without parking permits could still recreate, but they would need to arrange alternative transportation). Parking without a permit in parking areas (or in areas without designated parking) will be strictly enforced with towing or ticketing.

I support this scenario.



This scenario restricts my ability to freely choose a recreation experience that fits my needs.



There was no distribution technique that was preferred by any income group.

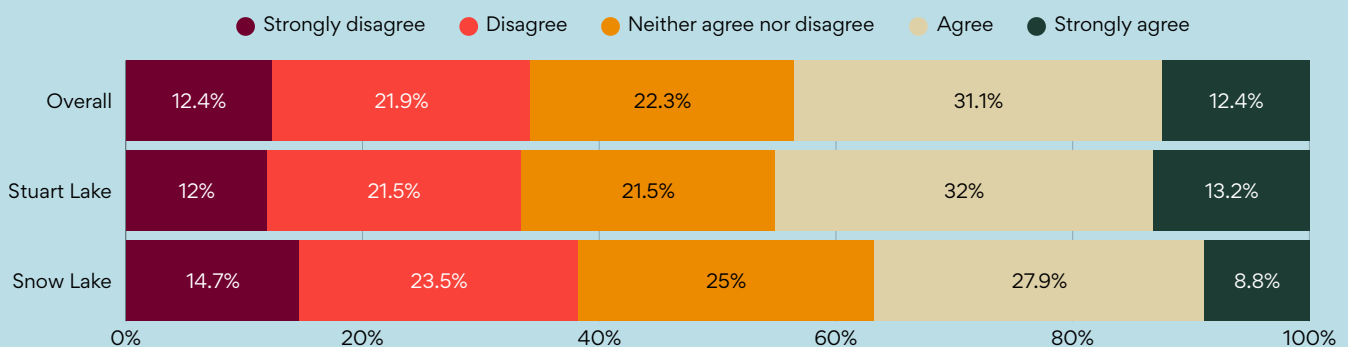
Scenario 3 - First come, first served parking with strict enforcement:

What: A limited number of parking permits will be available on a first-come, first-served basis for day-use trips

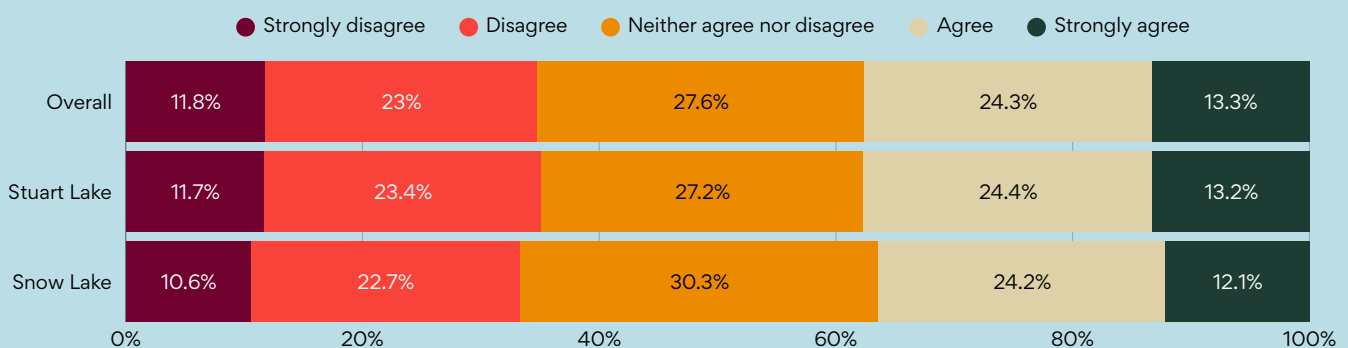
Cost: \$15 per vehicle

Parking: First-come, first served (access to the Enchantment zones will remain unlimited, which would mean that those without parking permits could still recreate, but they would need to arrange alternative transportation). Parking without a permit in parking areas (or in areas without designated parking) will be strictly enforced with towing or ticketing.

I support this scenario.



This scenario restricts my ability to freely choose a recreation experience that fits my needs.

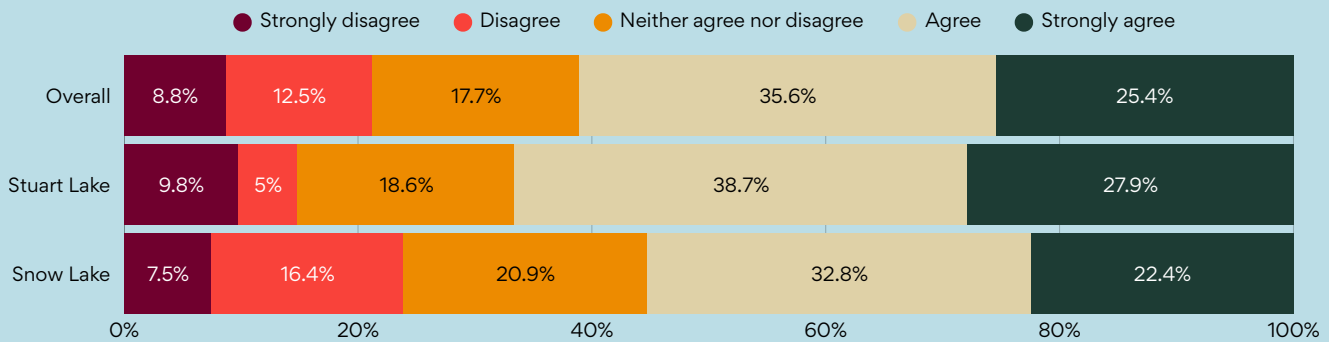


Scenario 4 - Lessen the impact of day-use limits by developing sanctioned public transportation:

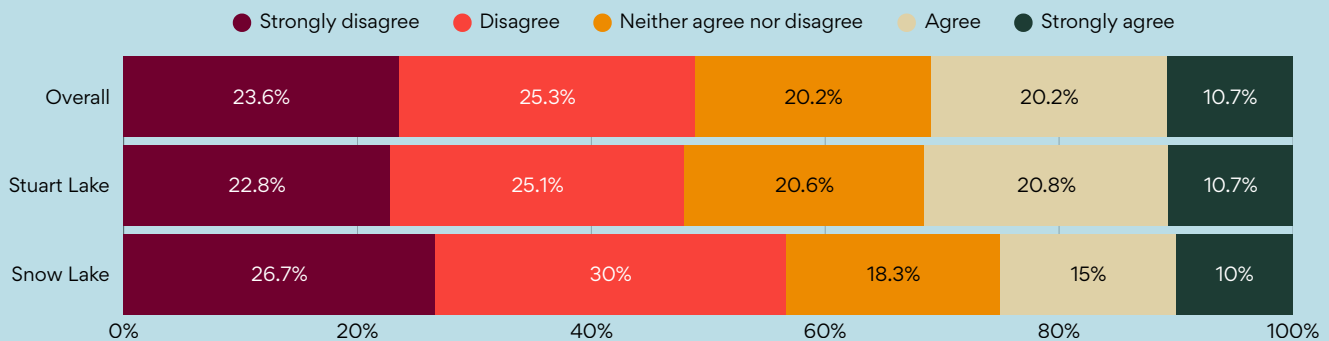
What: The amount of day-use will be limited somehow, but increased recreation opportunities could be supported by sanctioned public transportation (for example, a shuttle system, or valid permits for taxi companies).

Cost: Unknown, but there is likely to be a cost associated with this public transportation.

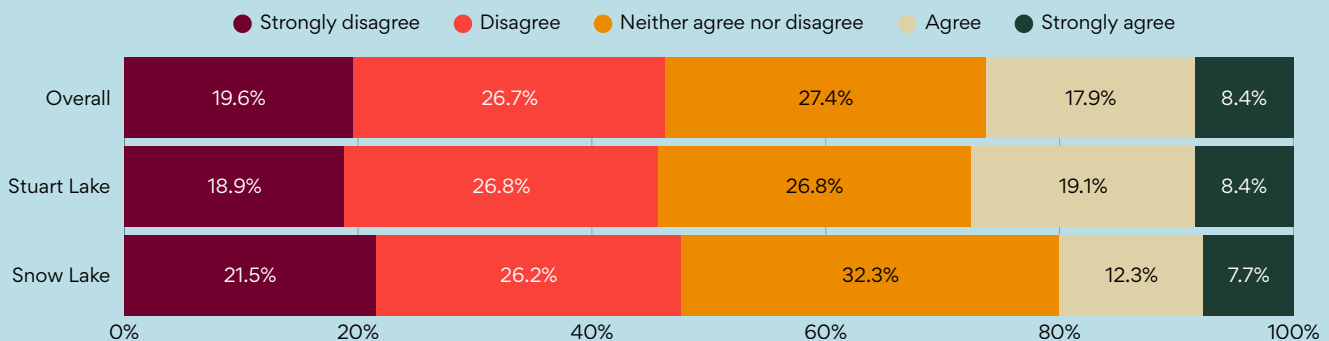
I support this scenario.



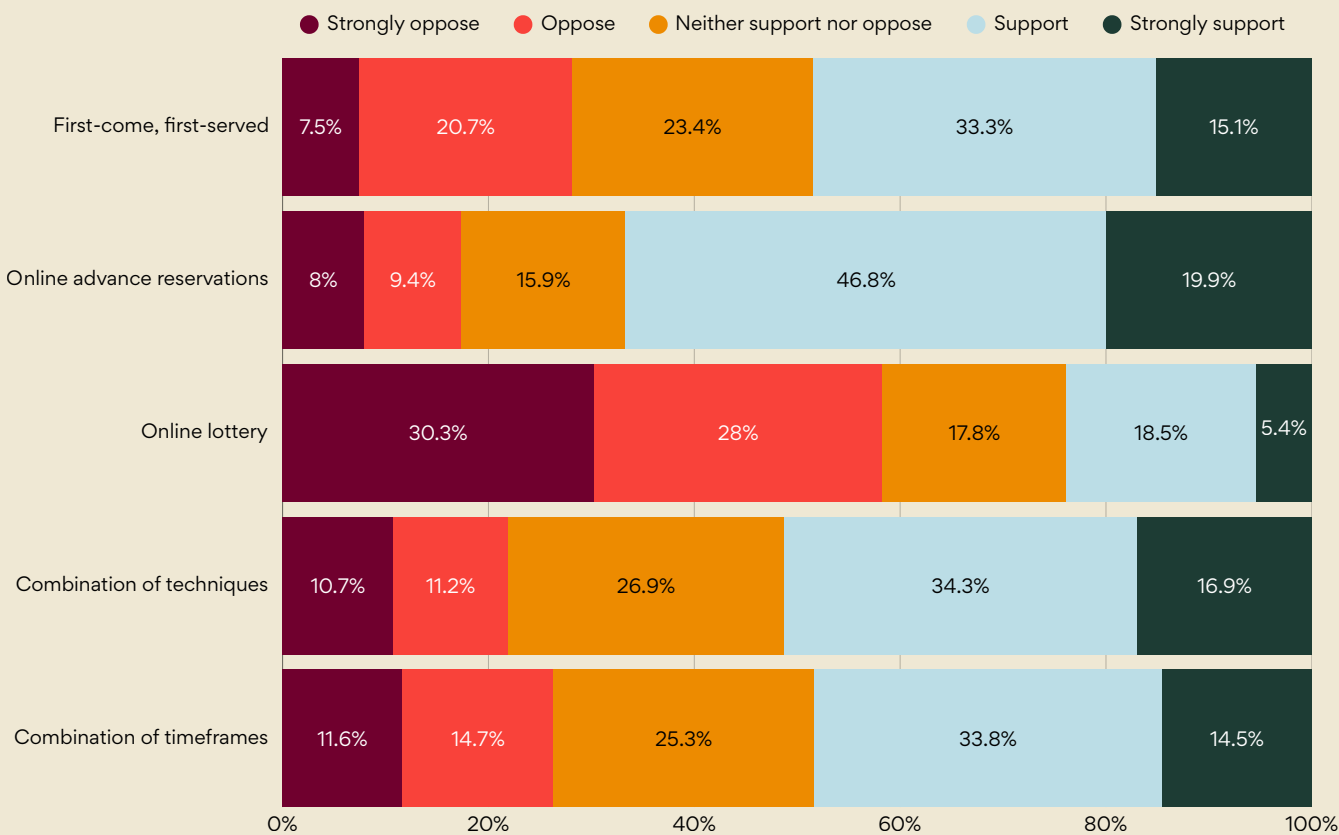
I would personally be uninterested in this scenario.



This scenario restricts my ability to freely choose a recreation experience that fits my needs.



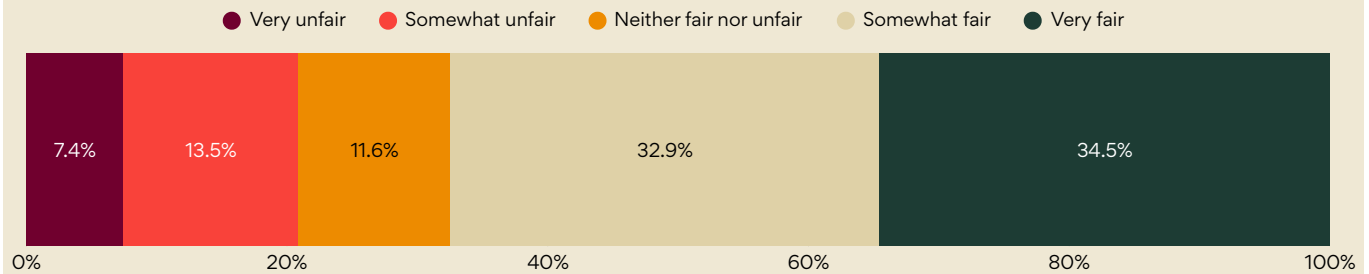
Support for Permit Distribution Techniques



Potential Booking Windows

How far in advance would you prefer to book a reservation?		Possible Booking Windows based on survey data.	
Mean	approx. 1 month	1 window (not supported by the data)	2 weeks
Median	14 days	2 windows	1 week / 30 days
Min. / Max.	0 days / 9 months	3 windows	2 days / 2 weeks / 5 weeks
Mode (most frequently reported)	0 days		

If day-use trips are permitted, how fair do you think an associated fee of \$15 is for supporting management of the permitted area?

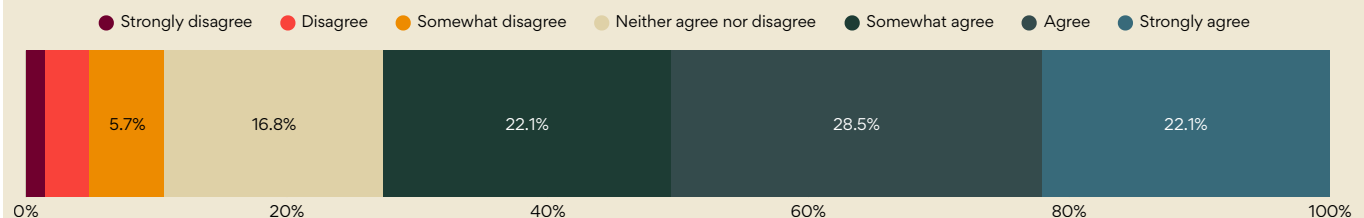


A one-way ANOVA revealed a statistically significant difference in perceived fairness of a \$15 day-use fee across household income categories ($p = .019$), with higher-income respondents generally rating the fee as more fair. The effect size was small, which means income explained only a modest portion of the variance, and the direction of the relationship affirms that fees may be perceived and experienced differently across income groups.



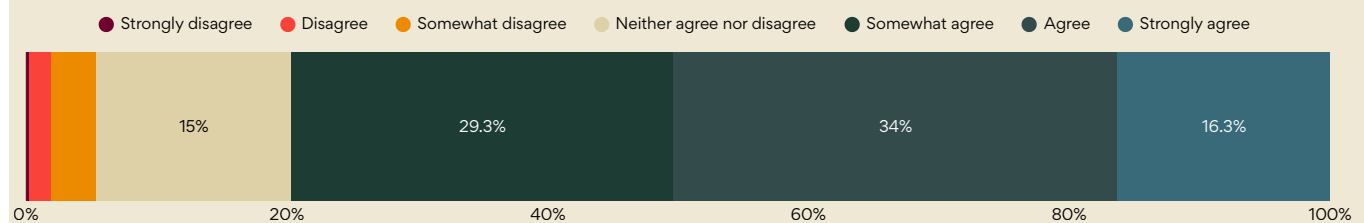
Fee Stewardship

Measuring if visitors believe fee payment is a form of stewardship



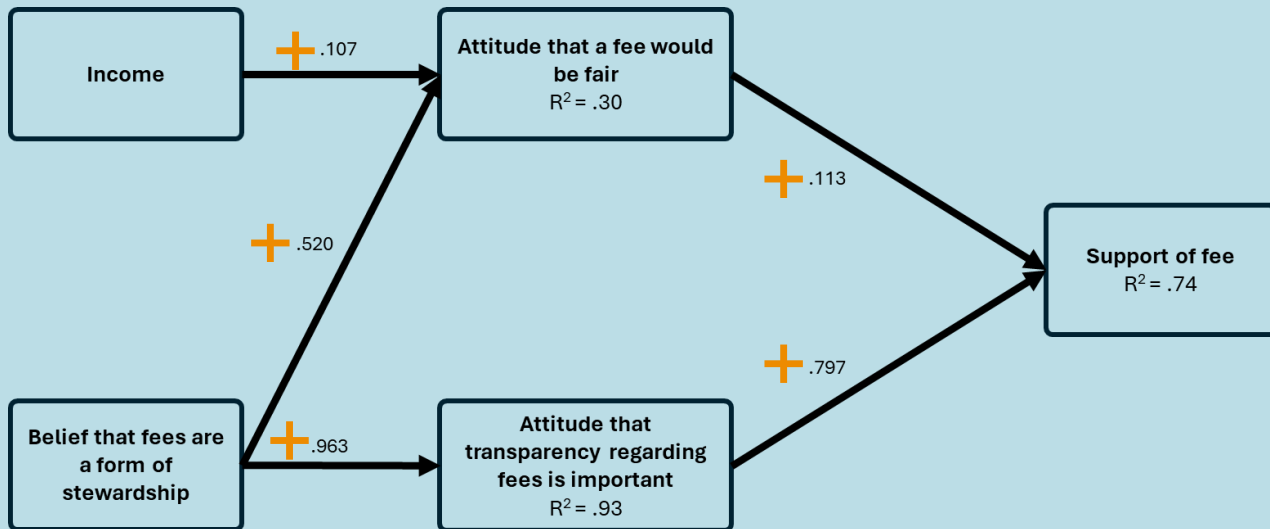
Fee Transparency

Measuring how important it is to clearly conveying to visitors where fees are going



How do the following impact support for a visitor fee in the Enchantments?

- Income
- Belief that fees are a form of stewardship toward this place
- Attitude that transparency regarding fees is important
- Attitude that a fee would be fair



A structural equation model, illustrated above, supports our hypotheses that (1) support of a fee is based on a more fundamental belief that fees are a form of stewardship; (2) believing that fees are a form of stewardship informs attitudes related to fee transparency and fairness and; (3) visitors' household income predicts attitudes related to fee fairness. The belief that fees are a form of stewardship explained **93%** of the variation in **attitudes regarding transparency** of fees being important. Combined with income, this belief also helped explain **30%** of the variation in the attitudes regarding **fee fairness**. Our two attitudes explained **74%** of the variation in **support for a fee**.

Taken together, this tells us that support for a fee is largely a function of perceived fairness and transparency regarding where visitors' fee dollars go, both impacted significantly by the belief that fees are a form of stewardship. Therefore, managers may consider 1) the importance of fairness when instituting fees, 2) being fully transparent regarding where fees go (i.e., locally, regionally, nationally, and to third-party vendors), and 3) framing fees as a stewardship action in messaging.

Crowding



4.7 out of 9 average level of **crowding** reported by visitors at **Stuart Lake**.

3.5 out of 9 average level of **crowding** reported by visitors at **Snow Lakes**.

There was a significant difference ($p < .001$) in perceived crowding between Stuart Lake and Snow Lakes Trailheads. Despite the popularity and general busy conditions of the Enchantments area, perceptions of crowding were relatively muted, which may be explained in part by the large number of first-time visitors.

Also, given the popularity of the Enchantments area, the recreation population is likely well-informed about what to expect in terms of recreation conditions in the Enchantments.

Displacement

“If you are unable to access the Enchantments area for recreation as much as you would like, how are you most likely to spend your time instead?”

35% of visitors would **recreate somewhere outside of the Alpine Lakes Wilderness, far from the Enchantments area.**

30% of visitors would **go somewhere else within the Alpine Lakes Wilderness.**

23% of visitors would **recreate somewhere outside of the Alpine Lakes Wilderness, BUT still within 35 miles of the Enchantments area, including Leavenworth.**

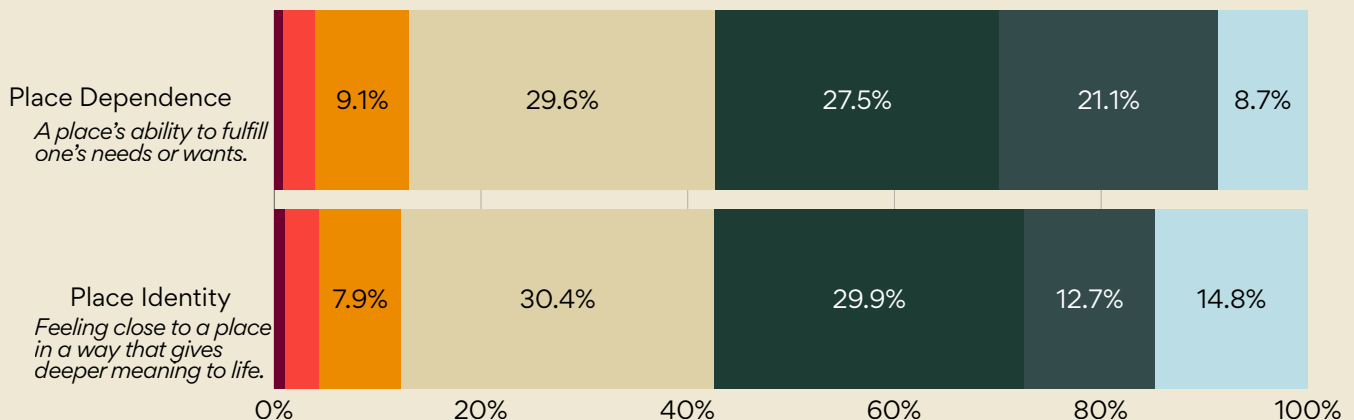
12% of visitors would **do something instead of public land recreation.**



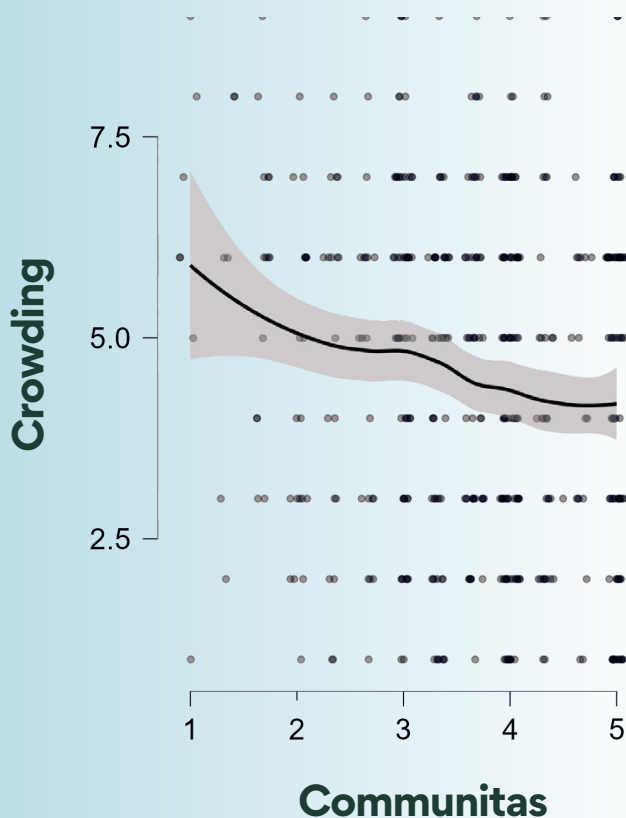
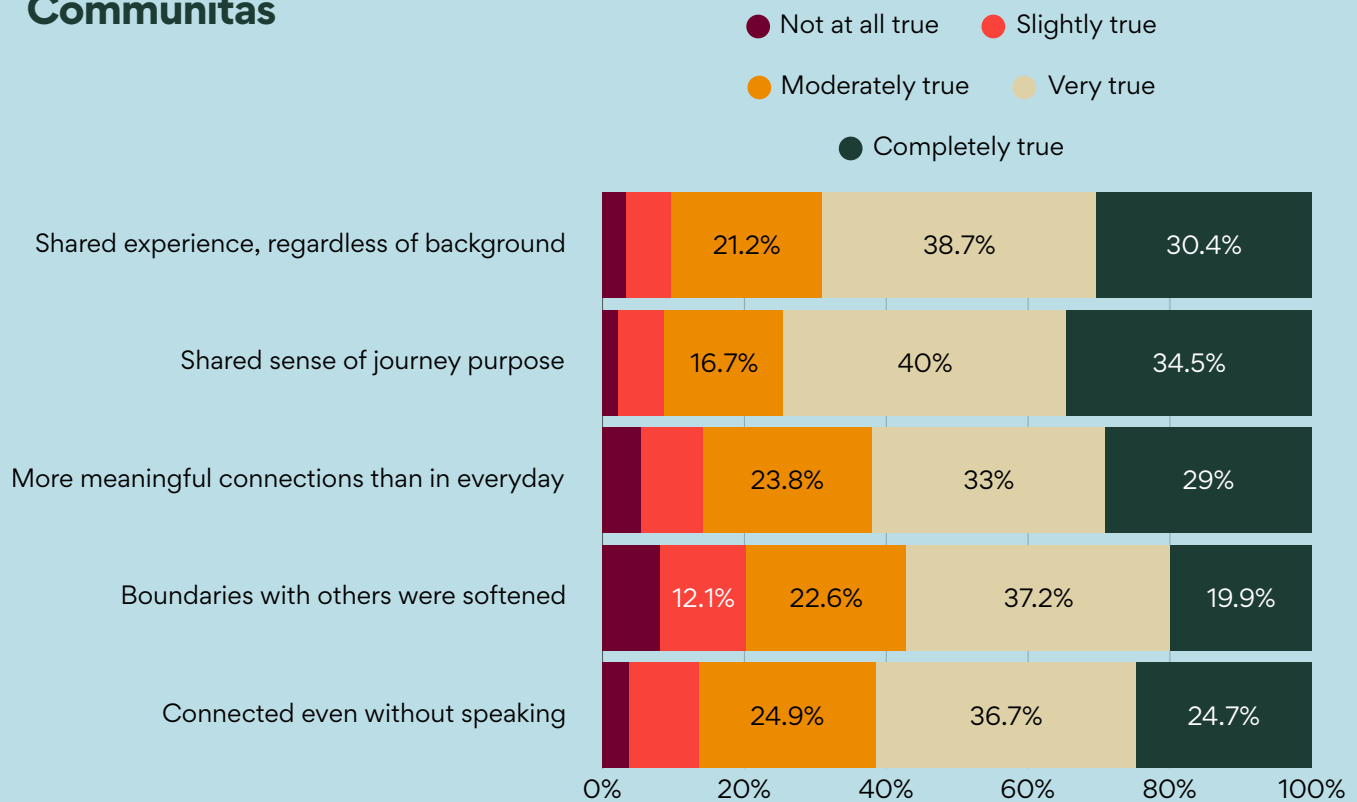
Place Attachment

One's connection to a particular place.

● Strongly disagree ● Disagree ● Somewhat disagree
● Neither agree nor disagree ● Somewhat agree ● Agree
● Strongly Agree



Communitas



Communitas is an experience that can be found in recreation and tourism settings, wherein **visitors find a spontaneous feeling of shared experience, belonging, and kinship with their fellow hikers.** When comparing the relationship between communitas and crowding, we find that the two experiences were significantly, negatively correlated (-.202) in this study. This suggests that **those who experienced communitas were less likely to experience crowding.**

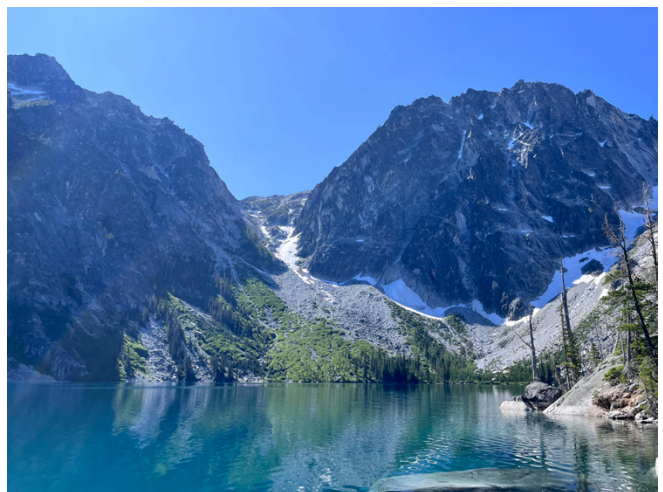
Rationing Implications from Visitor Perspectives

As Enchantments managers consider rationing recreation, data shows that 56.6% do not feel that limiting day-use is needed; highlighting the importance of clear rationales and communication regarding allocation decisions. If use is limited via recreation allocation, here are possible strategies and considerations.

Partial Rationing with Spatial Variation and Multiple Booking Windows

The most reported (i.e., mode) timeframe for preferred booking window as 0, meaning that many visitors would prefer to obtain their permit on a first-come, first-served basis. This serves local visitors and people who cannot plan far in advance. With that in mind, using the two window strategy and setting aside a percentage of permits to be obtained first-come, first-served, would meet a variety of needs and planning styles.

There is relatively more support for day-use allocation at the Stuart Lake trailhead. Therefore, implementing a use limit at the Snow Lakes Trailhead or parking area does not seem to be an immediate need. This will allow the Forest to maintain as much access to the Enchantments as possible. Maintaining unfettered access to the Snow Lakes trailhead may be beneficial, considering its proximity to the town of Leavenworth, its location along a maintained road, and that it provides easy, quick access to roadside climbing and the river. If it becomes evident that a use limit is necessary, it will be important to consider the rationing strategy used at Stuart Lake and Eightmile when making decisions to ensure a “mosaic of management” (Rice et al., in press).



Rationing Strategy

If a rationing strategy is necessary at Stuart Lake and Eightmile trailheads, consider an online advance reservation system paired with first-come, first-served.

At Snow Lakes trailhead, it may be prudent to wait and see if limiting access is absolutely necessary, and for that strategy to be informed by whatever is determined to be appropriate at Stuart Lake and Eightmile trailheads.

Possible Booking Windows Based on Survey Data

If proceeding with implementing a rationing strategy at Stuart Lake and Eightmile trailheads, the data suggest appropriate booking windows would have permits released 1 week in advance, 30 days in advance, and a portion set aside for first-come, first-served, which are released on a same-day basis.

At Snow Lakes trailhead, mirror booking windows across areas to ease administration burden and aid visitor comprehension while aligning with visitor feedback from the survey.



For support, reach out to Liz Townley (elizabeth.townley@usda.gov), Chris Armatas (christopher.armatas@usda.gov), or Will Rice (william.rice@umontana.edu).

Rationing Implications

To determine an appropriate rationing strategy, we utilized Phillips et al.'s (2024) guidebook and framework.



Offering a variety of booking windows aids fairness since it means a variety of lifestyles and planning horizons have the opportunity to access the trails. Setting aside a portion of the permits to be first-come, first-served (FCFS) helps to provide opportunities to locals alongside non-locals.

Further reading: [Glass & More \(1992\)](#); [Phillips & Rice \(2024\)](#)



Administering permits through an advanced online system allows minor tweaks and informational updates to be delivered to permit holders in real time. The system will likely evolve, and making updates online will aid in smooth updates.

Further reading: [Dimara & Skuras \(1998\)](#)



An online system (as opposed to an in-person system) will reach visitors who intend to travel to the Leavenworth area for recreation. However, maintaining spatial variation in permitted and unpermitted access will allow people who are looking for a brief or last-minute experience in the ALW to enjoy their time without needing to plan as far in advance

Further reading: [Rice \(2025\)](#)



By providing a variety of booking windows (including FCFS), in addition to spatial variation in approaches, the system maintains balance and a “mosaic of management” in its recreation allocation, reaching a broad range of visitors.

Further reading: [Rice & Phillips \(2023\)](#); Rice et al. (in press)



The summer 2025 survey, fee collection information, and prior research that utilized survey data, Recreation.gov data, and cell phone data all informed this approach. Continued data collection to evaluate any updates to the rationing decision is encouraged.

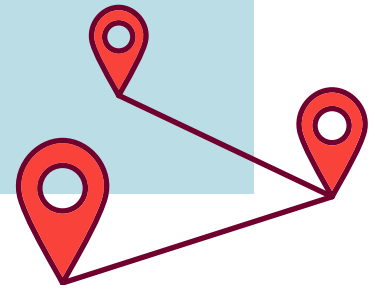
Further reading: [Rice et al. \(2025\)](#)



This approach goes beyond meeting requirements and achieves the best management practices by adhering to the principles laid out in the Allocation Framework.

Further reading: [Phillips & Rice \(2025\)](#)

Overall Implications



> Engineering & Design

Accept Offline Fee Payment at Trailheads. Visitors that did not realize they had to pre-pay for parking online or download the recreation.gov app prior to leaving cell service to pay out of range, were unable to pay for their parking space since there is no cell phone reception at the trailheads. Better messaging may be required for effective utilization of new cashless payment systems being put in place by National Forests. It would be interesting to know if the current system of collecting fees is working by comparing this year's fees to last years fees.

Establish Public Transportation to Trailheads. Visitors were generally supportive of the scenario that involved using public transportation to access the trailheads, so it likely makes sense to continue to pursue this option of access.

Designate Parking Spaces. If the rationing determination merits parking permits, it may be useful to designate parking spaces to ensure people are parking in a way that the maximum amount of cars can safely and efficiently fit in the parking lot.

> Enforcement

Develop a means of enforcing out-of-bounds parking.

Managers may consider their ability to police parking in concert with their development of a permitting system.

> Education

Utilize existing partnerships. Consider developing a more thorough training with the Recreation Ambassador program through the Leavenworth Chamber of Commerce, since they have significant face time with volunteers. Furthermore, it could be worth expanding relationships with stakeholder groups like the Alpine Lakes Foundation and Leavenworth Mountain Association.

Develop trailhead signage. Determine if it is suitable to update trailhead signage to include maps, guidance about disposing of human waste, and develop clearer instructions for how to cover the parking fee. The day-use permit instructions could also be clearer and redesigning the paper permit could help clarify those instructions.



Appendix

- [Allocating Recreation with Fairness at the Forefront: A Research-Based Planning and Management Guidebook](#)
- [AllTrails Public Lands Program](#)
- [Recreation Ambassadors Program](#)
- [A Mosaic of Management \(StoryMap\)](#)
- Rice, W. L., Foster, M. J., Park, S., & Armatas, C. A. (In Press). Are wilderness recreation experiences more regulated? Measuring and mapping recreation confinement in wilderness and other protected areas in Colorado. *International Journal of Wilderness*, 32 (1).
- Summer 2025 [Survey](#)





Made with love & data in
Missoula, Montana USA.

Abigail Fuesler, William L. Rice,
Christopher A. Armatas, & Hayley A. Johnson



warmlab.org