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Mendenhall Glacier Visitor Facility Improvements Project Draft Environmental Impact Statement



Cover photo: Mendenhall Glacier Visitor Center, Juneau, AK. (USDA Forest Service photo by A Sherwin)

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MENDENHALL GLACIER VISITOR FACILITY IMPROVEMENTS PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT | APPENDIX A –
VISITOR CAPACITY ANALYSIS

Appendix A. Visitor Capacity Analysis

Forest Service staff completed an analysis of the visitor capacity¹ for areas that receive commercial use at the MGRA including the Visitor Center Unit, the West Glacier Unit, the Dredge Lakes Unit, some trails, lake access, and river access. Visitor capacity varies among alternatives based on the design elements and proposed infrastructure specific to each alternative. Only facilities and trails that have or are proposed to have commercial use are considered in this analysis.

Other sections of the environmental impact statement (EIS) also address visitor capacity and assumptions that influence visitor capacity. Chapters 1 and 2 of the EIS describe the three management units in the MGRA (Visitor Center Unit, West Glacier Unit, and Dredge Lakes Unit), proposed changes to management unit boundaries, and proposed changes to Recreation Opportunity Spectrum (ROS) designations for specific areas and trails. Chapter 3 of the EIS describes the affected environment including recreational uses on the Mendenhall Glacier Recreation Area (MGRA) and the ROS as applied in the Tongass National Forest Land and Resource Management Plan. It also analyzes the environmental and socio-economic impacts of changes to visitor capacity and changes to ROS designations for specific areas and trails. Commercial Use Allocations and the Adaptive Management Plan in Appendix B describe how service days² would be allocated to permit holders over the next 15 years based on infrastructure availability, monitoring information, and demand for services.

Visitor Capacity Estimates

This section documents the visitor capacities for facilities and trails that have proposed commercial use in the MGRA. It also presents the assumptions and calculations for those capacities.

Visitor capacity calculations presented here are specific to the primary use season because infrastructure is designed to meet the visitor use demands of the primary use season and because commercial permitting is based on that season. In the no action alternative, the primary use season is assumed to be 153 days (May 1 to September 30), as described in the 2015 MGRA Management Plan. For the action alternatives, the primary use season is assumed to be 214 days (April 1 to October 31). Therefore, some of the estimated increase in visitor capacity in the action alternatives is attributable to a longer season in addition to the expanded infrastructure capacity. In all alternatives, a standard day is 10 hours long.

Management Units

The four alternatives analyzed in this EIS are based on estimated visitation now and over the next 30 years. Alternative 1, the no action alternative, is the current condition as described in the 2015 MGRA

¹ Visitor capacity is the maximum amounts and types of visitor use than an area can accommodate while achieving and maintaining the desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established (Interagency Visitor Use Council 2019).

² A service day is an allocation of use constituting a day or any part of a day on NFS lands for which an outfitter, guide, or transporter provides services to a client. Each commercial client that visits the MGRA represents one service day for that vendor. Special use permits are distributed to different commercial outfitter, guide, transport, and other service providers, issued as a total number of service days. See Section 3.2.2.1 for further discussion regarding capacity, special use permits, and service days.

Management Plan and the 2019 MGRA Commercial Capacity Limits Supplemental Information Report. Analyses for these documents assumed that the 462,000 permitted commercial service days at the Visitor Center Unit represented 95% of visitor use in 2014, and that the Visitor Center unit was being used at capacity (USDA Forest Service 2015). After several improvements to existing infrastructure and the addition of a new bathroom trailer in 2019, the Visitor Center unit visitor capacity was increased to 543,000 (USDA Forest Service 2019). Alternative 2 Visitor Center Unit capacity is based on a 2% linear growth projection for the tourism industry over 30 years with actual 2019 visitation as starting point. Alternative 3 Visitor Center Unit capacity is based on a 2% linear growth projection for the tourism industry over 20 years with actual 2019 visitation as starting point. Alternative 4 capacity is based on a 2% linear growth projection for the tourism industry over 15 years with actual 2019 visitation as starting point; this amount also represents the current Juneau harbor capacity for cruise ships.

Using these tourism industry projections as a starting point, infrastructure proposals were developed for each alternative to accommodate the projected increase in visitor use during peak arrival times, which occur frequently during the primary use season. For example, Visitor Center Unit capacity is achieved through the capacity of the existing historic Visitor Center and the proposed Welcome Center, plaza, Remote Glacier Area (Alts 2 and 3) and parking lots. West Glacier Unit capacity is based on the capacity of the parking lot and restroom facilities. For alternatives 2 and 3, West Glacier Unit capacity also includes the proposed 30-space parking lot in the campground designed to access the Lakeshore trail and day use area. All management unit estimates were rounded down to the nearest 1,000.

The following assumptions were used to estimate visitor capacity for the Visitor Center Unit (Table 1):

- Current Visitor Center unit capacity following 2019 SIR: 543,000 – Alternative 1
- 30-year tourism growth projection for commercial use season: 999,000 – Alternative 2
- 20-year tourism growth projection for commercial use season: 830,000 – Alternative 3
- 15-year tourism growth projection for commercial use season: 752,000 – Alternative 4

The following assumptions were used to estimate visitor capacity for the West Glacier Unit (Table 1):

- Alternative 1 visitor capacity based on 153-day season and existing parking lot: 150,552
 - ♦ **Existing Lot:** $(49 \text{ vehicles} \times 2 \text{ people/vehicle} \times 3\text{x/day} \times 153 \text{ days}) + (6 \text{ buses} \times 30 \text{ people/bus} \times 3\text{x/day} \times 153 \text{ days}) + (10 \text{ drop off vans} \times 15 \text{ people/van} \times 153 \text{ days}) = (44,982) + (82,620) + (22,950) = 150,552$
- Alternatives 2 and 3 visitor capacities based on 214-day season and existing parking lot, plus proposed parking lot in campground: 249,000
 - ♦ **Existing Lot:** $(49 \text{ vehicles} \times 2 \text{ people/vehicle} \times 3\text{x/day} \times 214 \text{ days}) + (6 \text{ buses} \times 30 \text{ people/bus} \times 3\text{x/day} \times 214 \text{ days}) + (10 \text{ drop off vans} \times 15 \text{ people/van} \times 214 \text{ days}) = (62,916) + (115,560) + (32,100) = 210,576$
 - ♦ **Proposed Campground Lot:** $(30 \text{ vehicles} \times 2 \text{ people/vehicle} \times 3\text{x/day} \times 214 \text{ days}) = 38,520$
- Alternative 4 visitor capacity based on 214-day season and existing parking lot: 210,000
 - ♦ **Existing Lot:** $(49 \text{ vehicles} \times 2 \text{ people/vehicle} \times 3\text{x/day} \times 214 \text{ days}) + (6 \text{ buses} \times 30 \text{ people/bus} \times 3\text{x/day} \times 214 \text{ days}) + (10 \text{ drop off vans} \times 15 \text{ people/van} \times 214 \text{ days}) = (62,916) + (115,560) + (32,100) = 210,576$

The following assumptions were used to estimate visitor capacity for the Dredge Lakes Unit (Table 1):

- ♦ The visitor capacity is based on the Dredge Lakes Outer Loop only since it is the only trail on which commercial use would be permitted. It does not reflect capacity for the rest of the trail network inside the management unit, which would remain excluded from commercial use.

Table 1. Visitor capacity of Visitor Center Unit, West Glacier Unit, and Dredge Lakes Unit for each alternative

Management Unit	Alt 1	Alt 2	Alt 3	Alt 4
Visitor Center Unit	543,000	999,000	830,000	752,000
West Glacier Unit	150,000	249,000	249,000	210,000
Dredge Lakes Unit ¹	n/a	77,040	77,040	n/a

¹ Visitor capacity was not specified for the Dredge Lakes Unit in either the 1996 or 2015 Management Plan Revisions because there has never been commercial use in the Dredge Lakes Unit. Commercial use is proposed in the Dredge Lakes unit for the Dredge Lakes Outer Loop trail in Alternatives 2 and 3.

Trail Use

Visitor capacity for hiking and biking trails at the MGRA is managed to offer different visitor experiences on different types of trails. Visitor experience is described in the ROS as the expected scenic quality, ease of access, sense of remoteness, level of visitor management, scale of recreation developments, expected number of social encounters, and amount of visitor impacts (Forest Service 2016 Forest Plan). The visitor capacities for trails that have commercial use are based on the ROS designation for the trail and the associated number of social encounters and group size. Increases in visitor capacity between the no action and action alternatives for trails are due primarily to the increase in season length from 153 to 214 days; the change in ROS designation for the East Glacier, Powerline, Moraine Ecology, and Trail of Time trails; and the increase in estimate of people at one time (PAOT) for urban trails.

The following assumptions were used when estimating visitor capacity for trails (Table 2 and Table 3):

- **Urban ROS:** Forest Plan standards and guidelines (Forest Plan p. I-6) do not state a limit to the number of parties encountered. Capacity calculations for the Urban ROS in Alternative 1 are based on PAOT, as described in the 2015 MGRA Management Plan. Capacity calculations for the Urban ROS in Alternatives 2, 3, and 4 are generally based on 150 PAOT, with some exceptions. In Alternative 3, the Steep Creek and Lakeshore Trails are based on 125 PAOT, and in Alternative 4 the Steep Creek and Lakeshore Trails are based on 100 PAOT due to differences in trail design and anticipated levels of use. People at one time are calculated as equivalent to people per hour.
- **Rural ROS:** Forest Plan standards and guidelines (Forest Plan p. I-6) state that users may meet many (more than 20) other parties per day. Capacity calculations are based on 30 parties of 12 people per day.
- **Roaded Natural ROS:** Forest Plan standards and guidelines (Forest plan p. I-4) state that users meet less than 20 other parties per day on trails and in dispersed areas during at least 80 percent of the primary use season; users may meet numerous other parties on roads. Capacity calculations are based on 20 parties of 12 people per day.

- **Semi-primitive Motorized ROS:** Forest Plan standards and guidelines (Forest plan p. I-3) state that users meet less than 10 other parties per day on trails, roads, and shorelines during 80 percent of the primary use season. Calculations are based on 10 parties of 12 people per day.
- **Semi-primitive Non-motorized ROS:** Forest Plan standards and guidelines (Forest plan p. I-2) state that users meet less than 10 other parties per day on trails and waterways during 80 percent of the primary use season. Calculations are based on 10 parties of 12 people per day.
- **As an example:** Calculations for Alternative 1 for a trail with a “roaded natural” ROS would be based on $(20 \text{ parties} \times 12 \text{ people} \times 153 \text{ days}) = 36,720$
- **As another example:** Calculations for Alternatives 2, 3, and 4 for a trail with a “rural” ROS would be based on $(30 \text{ parties} \times 12 \text{ people} \times 214 \text{ days}) = 77,040$

Table 2. ROS designations for trails that have commercial use for each alternative

Trail	Alt 1	Alt 2	Alt 3	Alt 4
East Glacier Trail	Roaded Natural	Rural	Rural	Roaded Natural
Powerline Trail	Roaded Natural	Rural	Rural	Roaded Natural
Nugget Falls Trail	Urban	Urban	Urban	Urban
Steep Creek Trail	Urban	Urban	Urban	Urban
Moraine Ecology Trail	Roaded Natural	Rural	Rural	Roaded Natural
Trail of Time	Roaded Natural	Rural	Rural	Roaded Natural
Lakeshore Trail (proposed)	n/a	Urban	Urban	Urban
West Glacier Trail	Roaded Natural	Roaded Natural	Roaded Natural	Roaded Natural
Tolch Rock Trail	Roaded Natural	Roaded Natural	Roaded Natural	Roaded Natural
Aak'w Sit' Trail	Roaded Natural	Roaded Natural	Roaded Natural	Roaded Natural
Dredge Lakes Outer Loop (proposed)	N/A	Rural	Rural	N/A

Table 3. Visitor capacity for trails that have commercial use for each alternative

Trail	Alt 1	Alt 2	Alt 3	Alt 4
East Glacier Trail	36,720	77,040	77,040	51,360
Powerline Trail	36,720	77,040	77,040	51,360
Nugget Falls Trail	153,000	321,000	321,000	321,000
Steep Creek Trail	153,000	321,000	267,500	214,000
Moraine Ecology Trail	36,720	77,040	77,040	51,360
Trail of Time	36,720	77,040	77,040	51,360
Lakeshore Trail (proposed)	n/a	321,000	267,500	214,000
West Glacier Trail	36,720	51,360	51,360	51,360
Tolch Rock Trail	36,720	51,360	51,360	51,360
Aak'w Sit' Trail	36,720	51,360	51,360	51,360
Dredge Lakes Outer Loop (proposed)	n/a	77,040	77,040	n/a

Lake and River Use

Current and future non-motorized lake and river users access the water from the West Glacier Unit. Proposed motorized lake use would launch from proposed docks in the Visitor Center Unit located west of the proposed Welcome Center.

The following assumptions were used when estimating visitor capacity for lake activities (Table 4):

- Alternative 1 capacity for non-motorized lake and river use is based on Forest Service staff judgment and knowledge of commercial and non-commercial use.
- Non-motorized lake and river capacity for Alternatives 2, 3, and 4 is based on an estimate of 5 boats/tour x 12 users/boat x 5 launches/day x 214 days = 64,200 users.
- Motorized boat use is not currently authorized under Alternative 1 and is not proposed in Alternative 4.
- Motorized lake capacity for Alternative 2 is calculated as: 50 users/boat x 20 trips/day x 214 days = 214,000
- Motorized lake capacity for Alternative 3 is capped at 35 people per boat and 100,000 people per season, calculated approximately as: 35 users/boat x 13 trips/day x 214 days = 97,370

Table 4. Visitor capacity for lake and river use for each alternative

Lake or River Use	Alt 1	Alt 2	Alt 3	Alt 4
Mendenhall Lake Non-motorized (Canoes/Kayaks)	32,480	64,200	64,200	64,200
Mendenhall River (Rafts)	30,000	64,200	64,200	64,200
Mendenhall Lake Motorized (Proposed)	n/a	214,000	100,000	n/a

MENDENHALL GLACIER VISITOR FACILITY IMPROVEMENTS PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT | APPENDIX B –
COMMERCIAL USE ALLOCATIONS AND ADAPTIVE MANAGEMENT
PLAN FOR OUTFITTER, GUIDE, TRANSPORTATION, AND
OTHER SERVICES

Appendix B. Commercial Use Allocations and Adaptive Management Plan for Outfitter, Guide, Transportation, and Other Services

Commercial Use Allocations

For each alternative, the Forest Service designated a percentage of total visitor capacity¹ of facilities and trails for commercial use. This section presents estimated commercial use allocations based on the total visitor capacities calculated in Appendix A and the percentages designated for commercial use for each management unit (Table 1) or permitted activity (remaining tables in this Appendix). Chapter 2 of the EIS provides further detail on commercial allocations for each management unit.

Table 1. Percent of visitor capacity allocated to commercial use for the Visitor Center and West Glacier Units

Management Unit	Alt 1	Alt 2	Alt 3	Alt 4
Visitor Center Unit	95%	87%	87%	87%
West Glacier Unit ¹	33%	40%	40%	45%
Dredge Lakes Unit ²	0%	33%	33%	0%

¹ The West Glacier Unit commercial use percentage is increased for all action alternatives to reflect the high percentage of commercial use for non-motorized lake and river activities.

² Total capacity was not specified for Dredge Lakes Unit in either the 1996 or 2015 Management Plan Revisions, but this document proposes commercial use for this management unit. The proposed percentage of designated commercial use is based on the Dredge Lakes Outer Loop only and does not reflect capacity for the trail network inside the management unit, which would remain excluded from commercial use.

Visitor Center Transportation

The total service days² allocated for Visitor Center Unit transportation permits are based on the capacities for the Visitor Center Unit developed for each alternative and the percentage of total visitor capacity designated for commercial use. Service days allocated to trail outfitter and guide services are subtracted from the total commercial use allocation to calculate the number of service days allocated to transportation permits (Table 2). All service day estimates are rounded down to the nearest 10.

¹ Visitor capacity is the maximum amounts and types of visitor use than an area can accommodate while achieving and maintaining the desired resource conditions and visitor experiences that are consistent with the purposes for which the area was established (Interagency Visitor Use Council 2019).

² A service day is an allocation of use constituting a day or any part of a day on NFS lands for which an outfitter, guide, or transporter provides services to a client. Each commercial client that visits the MGRA represents one service day for that vendor. Special use permits are distributed to different commercial outfitter, guide, transport, and other service providers, issued as a total number of service days. See Section 3.2.2.1 for further discussion regarding capacity, special use permits, and service days.

Table 2. Commercial use allocation and service days for Visitor Center transportation permits for each alternative

Alternative	Capacity	Designated Commercial Use	Commercial Allocation (Transport + Trails)	Trails service days*	Estimated transportation service days
Alt 1	543,000	95%	515,850	53,840	462,010
Alt 2	999,000	87%	869,130	178,460	690,670
Alt 3	830,000	87%	722,100	167,760	554,340
Alt 4	752,000	87%	654,240	121,100	533,140

*Commercial use on the East Glacier, Powerline, Nugget Falls, Steep Creek, Moraine Ecology, Trail of Time, and Lakeshore Trails is summed for the trails portion of the total Visitor Center Unit commercial use allocation.

Trail Use

Service days for trail use are calculated based on the percentage of total visitor capacity designated for commercial use (Table 3 to Table 7). All service day estimates are rounded down to the nearest 10.

Table 3. Comparison of commercial allocations for trail use by alternative

Trail	Alt 1	Alt 2	Alt 3	Alt 4
East Glacier Trail	7,340	15,400	15,400	10,270
Powerline Trail	11,010	23,110	23,110	15,400
Nugget Falls Trail	3,060	6,420	6,420	6,420
Steep Creek Trail	3,060	32,100	26,750	21,400
Moraine Ecology Trail	18,360	46,220	46,220	30,810
Trail of Time	11,010	23,110	23,110	15,400
Lakeshore Trail (proposed)	n/a	32,100	26,750	21,400
West Glacier Trail	7,340	10,270	10,270	10,270
Tolch Rock Trail	3,670	5,130	5,130	5,130
Aak'w Sit' Trail	5,600	10,270	10,270	10,270
Dredge Lakes Outer Loop	n/a	23,110	23,110	0

Table 4. Alternative 1 total capacity, percent capacity designated for commercial use, and estimated service days allocated for trails

Trail	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
East Glacier Trail	36,720	20%	7,340
Powerline Trail	36,720	30%	11,010
Nugget Falls Trail	153,000	2%	3,060
Steep Creek Trail	153,000	2%	3,060
Moraine Ecology Trail	36,720	50%	18,360
Trail of Time	36,720	30%	11,010
Lakeshore Trail (proposed)	n/a	n/a	n/a
West Glacier Trail	36,720	20%	7,340
Tolch Rock Trail	36,720	10%	3,670
Aak'w Sit' Trail	36,720	15%	5,600
Dredge Lakes Outer Loop	n/a	n/a	n/a

Table 5. Alternative 2 total capacity, percent capacity designated for commercial use, and estimated service days allocated for trails

Trail	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
East Glacier Trail	77,040	20%	15,400
Powerline Trail	77,040	30%	23,110
Nugget Falls Trail	321,000	2%	6,420
Steep Creek Trail	321,000	10%	32,100
Moraine Ecology Trail	77,040	60%	46,220
Trail of Time	77,040	30%	23,110
Lakeshore Trail (proposed)	321,000	10%	32,100
West Glacier Trail	51,360	20%	10,270
Tolch Rock Trail	51,360	10%	5,130
Aak'w Sit' Trail	51,360	20%	10,270
Dredge Lakes Outer Loop	77,040	30%	23,110

Table 6. Alternative 3 total capacity, percent capacity designated for commercial use, and estimated service days allocated for trails

Trail	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
East Glacier Trail	77,040	20%	15,400
Powerline Trail	77,040	30%	23,110
Nugget Falls Trail	321,000	2%	6,420
Steep Creek Trail	267,500	10%	26,750
Moraine Ecology Trail	77,040	60%	46,220
Trail of Time	77,040	30%	23,110
Lakeshore Trail	267,500	10%	26,750
West Glacier Trail	51,360	20%	10,270
Tolch Rock Trail	51,360	10%	5,130
Aak'w Sit' Trail	51,360	20%	10,270
Dredge Lakes Outer Loop	77,040	30%	23,110

Table 7. Alternative 4 total capacity, percent capacity designated for commercial use, and estimated service days allocated for trails

Trail	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
East Glacier Trail	51,360	20%	10,270
Powerline Trail	51,360	30%	15,400
Nugget Falls Trail	321,000	2%	6,420
Steep Creek Trail	214,000	10%	21,400
Moraine Ecology Trail	51,360	60%	30,810
Trail of Time	51,360	30%	15,400
Lakeshore Trail	214,000	10%	21,400
West Glacier Trail	51,360	20%	10,270
Tolch Rock Trail	51,360	10%	5,130

Trail	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
Aak'w Sit' Trail	51,360	20%	10,270
Dredge Lakes Outer Loop	n/a	n/a	n/a

Lake and River Use

Service days for lake and river use are calculated based on the percentage of total capacity designated for commercial use (Table 8 to Table 12). All service day estimates are rounded down to the nearest 10.

Table 8. Comparison of service days for lake or river use by alternative

Lake or River Use	Alt 1	Alt 2	Alt 3	Alt 4
Mendenhall Lake Non-motorized (Canoes/Kayaks)	16,240	32,100	32,100	32,100
Mendenhall River (Rafts)	15,000	32,100	32,100	32,100
Mendenhall Lake Motorized (Proposed)	n/a	214,000	100,000	N/A

Table 9. Alternative 1 total capacity, percent capacity designated for commercial use, and estimated service days allocated for lake or river use

Lake or River Use	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
Mendenhall Lake Non-motorized (Canoes/Kayaks)	32,480	50%	16,240
Mendenhall River (Rafts)	30,000	50%	15,000
Mendenhall Lake Motorized (Proposed)	n/a	n/a	n/a

Table 10. Alternative 2 total capacity, percent capacity designated for commercial use, and estimated service days allocated for lake or river use

Lake or River Use	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
Mendenhall Lake Non-motorized (Canoes/Kayaks)	64,200	50%	32,100
Mendenhall River (Rafts)	64,200	50%	32,100
Mendenhall Lake Motorized (Proposed)	214,000	100%	214,000

Table 11. Alternative 3 total capacity, percent capacity designated for commercial use, and estimated service days allocated for lake or river use

Lake or River Use	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
Mendenhall Lake Non-motorized (Canoes/Kayaks)	64,200	50%	32,100
Mendenhall River (Rafts)	64,200	50%	32,100
Mendenhall Lake Motorized (Proposed)	100,000	100%	100,000

Table 12. Alternative 4 total capacity, percent capacity designated for commercial use, and estimated (service days) allocated for lake or river use

Lake or River Use	Total Capacity	Designated Commercial Use	Commercial Allocation (Service Days)
Mendenhall Lake Non-motorized (Canoes/Kayaks)	64,200	50%	32,100
Mendenhall River (Rafts)	64,200	50%	32,100
Mendenhall Lake Motorized (Proposed)	N/A	N/A	N/A

West Glacier Other Services

Other services authorized in the West Glacier Unit include miscellaneous shoreline events such as weddings and tours that access the glacier and adjacent rock peninsula via the West Glacier Unit's West Glacier Trail or Mendenhall Lake. Through approved operating plans, permit holders with West Glacier Trail or Mendenhall Lake allocations may be allowed to take clients on tours that incorporate the shoreline areas, rock peninsula or glacier terminus. Miscellaneous service days for the West Glacier Unit are calculated based on the percentage of total capacity designated for commercial use (Table 13). Calculation of other service days within the West Glacier Unit or Mendenhall Lake allocated under each alternative

Table 13. Calculation of other service days within the West Glacier Unit or Mendenhall Lake allocated under each alternative

Alternative	Capacity	Designated Commercial Use	Total Commercial Allocation	Trails and Lake Service Days	Other Service Days
Alt 1	150,000	37%	55,000	47,850	7,150
Alt 2	249,000	40%	99,600	89,870	9,730
Alt 3	249,000	40%	99,600	89,870	9,730
Alt 4	210,000	45%	94,500	89,870	4,630

Adaptive Management Plan

Alternatives 2, 3, and 4 include an adaptive management plan to increase commercial use at the Mendenhall Glacier Recreation Area (MGRA) as the decision is implemented. Forest Service Regulations for compliance with the National Environmental Policy Act (NEPA) define adaptive management as “a system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes; and, if not, to facilitate management changes that will best ensure that those outcomes are met or re-evaluated” (36 CFR 220.3). For this proposed action and alternatives, the system of management practices includes the construction and maintenance of facilities and the Forest Service special use permitting process. Intended outcomes include positive visitor experiences at the MGRA; limited negative interactions with wildlife; and support to the local economy through authorizing commercial outfitter, guide, and transportation services. Monitoring will focus on those intended outcomes. The intent of the adaptive management plan is twofold: (1) to give special use permit holders (including outfitter/guide services and transportation services) an understanding and assurance in how commercial allocations could increase throughout project implementation and (2) to give the public an assurance that the increases in commercial use allocations will be based on monitoring information and will be phased in rather than allocated in bulk following the decision. By incorporating adaptive management into the alternatives in this environmental analysis,

commercial use allocations can be increased without additional environmental analysis, if all conditions (such as upgrades to facilities) and monitoring requirements are met.

This adaptive management plan includes (1) the commercial activities for which service days are anticipated to increase following a decision on the Mendenhall Glacier Visitor Facilities Improvements project (2) conditions required to initiate an increase in commercial use allocations, based on the permitting process and infrastructure completion, and (3) monitoring indicators to inform if commercial use allocations will be held stable, increased, or decreased to achieve intended outcomes related to visitor experience, interactions with wildlife, and demand for commercial services. The plan is organized by commercial activity; conditions and monitoring indicators are described specific to each activity. A detailed monitoring plan will be developed based on the indicators identified in this Adaptive Management Plan.

Alternative 1

Alternative 1, the no action alternative, does not have an adaptive management plan in place. However, the supplemental information report prepared in 2019 allowed an increase in commercial use of 10% on the West Glacier Unit and 12% on the Visitor Center Unit as a result of improved and additional infrastructure. It is uncertain if changes in management such as an extension to the season can be authorized under the 2015 MGRA Management Plan Decision Notice.

Alternatives 2, 3, and 4

Commercial activities for which the Forest Service anticipates an adaptive approach to management under Alternatives 2, 3, and 4 include: transportation services to the Mendenhall Glacier Visitor Center; outfitter/guide services for use of trails on the Visitor Center Unit, West Glacier Unit, and Dredge Lakes Unit; and outfitter/guide services for motorized and non-motorized use on Mendenhall Lake and Mendenhall River. One of the purposes of the adaptive management plan is to phase in the extended primary use season. Analysis of the action alternatives assumes a primary use season that will extend from the current 153-day season to a 214-day season. Because permitted service days are not required to be used evenly across the season, a phased in approach will prevent use of the full increase in service day allocations until demand increases during the earliest and latest times of the primary use season.

Visitor Center Transportation Services

Baseline information

- Special use permits are issued to authorize transportation services to the Mendenhall Glacier Visitor Center. Transportation permittees include bus, van, taxi, and car services.
- The Capacity Analysis is based on 214 days available for commercial use each year between April and October. Current (2021) service days are based on a 153-day season.
- The estimated maximum commercial use allocation of service days for all alternatives is displayed in Table 14.

Table 14. Estimated maximum Visitor Center Unit transportation permit service days to be authorized under each alternative

Alternative	Estimated maximum transportation service days	Additional service days compared to Alt 1
Alt 1	462,010	n/a
Alt 2	690,670	226,860
Alt 3	554,340	90,530
Alt 4	533,140	69,330

Adaptive Management Process to Increase Service Days for Transportation Services

- 1. At the start of the 2023 season, initiate or continue monitoring.**
 - A. Monitoring of visitor experience will include:
 - i. Crowding at Visitor Center unit facilities including bathrooms, exhibits, and parking areas
 - ii. Human encounters on trails
 - B. Monitoring of interactions with wildlife will include:
 - i. Bear/human conflicts including changes to bear behavior such as aggressive behavior, human habituation, or changes to habitat use and areas of use
 - ii. Visitor breaching of bird nesting barriers
 - C. Monitoring of demand for commercial services will include:
 - i. Actual used service days versus permitted service days
 - ii. Cruise ship arrivals during April and October
- 2. Following decision and before existing 5-year permit expiration (estimated 2025),** distribute additional service days following Forest Service special uses policy. Not all service days will be immediately available.
- 3. Issue new special use permits (estimated 2026).** Maintain unallocated service days in unallocated pool, continue monitoring.
 - A. Allow an increase of up to 30% of the additional service days if the following conditions and monitoring criteria are met. If permit holders exceed selection requirements and include more than 50% electric vehicles in the fleet, use existing electric shuttle systems, or meter use per day, allow an increase of up to 40% of the additional service days if the following conditions and monitoring criteria are met:
 - i. Conditions: Parking lot complete, additional restrooms available, and renovated exhibit space or improved trails provide opportunities for visitors to spread out; AND
 - ii. Monitoring: Visitor experience, wildlife, and demand for commercial services indicate desired conditions have been met or positive trends.
 - B. If conditions and monitoring are not met for A, then do not increase service days.
- 4. Upon completion of Welcome Center and Plaza construction:**
 - A. Amend priority use permits with an increase of up to 40% of additional service days if the following conditions and monitoring criteria are met. (If criteria under 3A met, then this equates to 70% of all additional service days.) If permit holders exceed selection requirements and include more than 50% electric vehicles in the fleet, utilize existing electric shuttle systems, or meter use per day, permit an increase of up to 50%

additional service days if the following conditions and monitoring criteria are met. (If same criteria under 3A already met, then this equates to 90% of all additional service days.)

- i. Conditions: Parking lot complete, welcome center and plaza complete, and renovated exhibit space or improved trails provide opportunities for visitors to spread out; AND
 - ii. Monitoring: Visitor experience, wildlife, and demand for commercial services indicate desired conditions have been met or positive trends.
- B. If conditions and monitoring are not met for A, then do not increase service days and do not reallocate any forfeited service days.

5. Upon next special use permit renewal (estimated 2036):

- A. Permit an increase of up to maximum estimated commercial use allocation if the following conditions and monitoring criteria are met.
 - i. Conditions: Parking lot complete, welcome center and plaza complete, improved trails or Remote Glacier Visitor Area provide opportunities for visitors to spread out; AND
 - ii. Monitoring: Visitor experience, wildlife, and demand for commercial services indicate desired conditions have been met or positive trends.

Trail Outfitting and Guiding Services

Baseline Information

- Special use permits are issued to authorize guiding services on trails in the Visitor Center and West Glacier units. Permitted guiding services are proposed for the Dredge Lakes unit.
- The Capacity Analysis is based on 214 days available for commercial use each year between April and October. Current (2021) service days are based on a 153-day season.
- Percentage of total use allocated to commercial use remains the same as current for most trails with the following exceptions: Steep Creek increase in percentage allocated to commercial use from 2% current to 10%; Aak’w Sit’ Trail from 15% to 20%; Moraine Ecology from 50% to 60%. Dredge Lakes Loop no commercial use (new trail) to 30%; Lakeshore Trail no commercial use (new trail) to 10% commercial use.
- The estimated maximum commercial allocations of service days for these trails are listed in Table 15.

Table 15. Estimated maximum allocations of service days for outfitter and guide use on trails.

Trail Name	Alt 1	Alt 2	Alt 3	Alt 4
East Glacier Trail	7,340	15,400	15,400	10,270
Powerline Trail	11,010	23,110	23,110	15,400
Nugget Falls Trail	3,060	6,420	6,420	6,420
Steep Creek Trail	3,060	32,100	26,750	21,400
Moraine Ecology Trail	18,360	46,220	46,220	30,810
Trail of Time	11,010	23,110	23,110	15,400
Lakeshore Trail (proposed)	n/a	32,100	26,750	21,400
West Glacier Trail	7,340	10,270	10,270	10,270
Tolch Rock Trail	3,670	5,130	5,130	5,130

Trail Name	Alt 1	Alt 2	Alt 3	Alt 4
Aak'w Sit' Trail	5,600	10,270	10,270	10,270
Dredge Lakes Outer Loop	n/a	23,110	23,110	n/a

Adaptive Management Process to Increase Service Days for Trail Outfitter and Guide Permits

1. At the start of the 2023 season, initiate or continue monitoring.

- A. Monitoring of visitor experience will include:
 - i. Crowding at Visitor Center, Dredge Lakes, and West Glacier unit facilities including bathrooms and parking
 - ii. Human encounters on trails
- B. Monitoring of interactions with wildlife will include:
 - i. Bear/human conflicts including changes to bear behavior such as aggressive behavior, human habituation, or changes to habitat use and areas of use
 - ii. Visitor breaching of bird nesting barriers, both at the Remote Glacier Visitor Area and near Photo Point
- C. Monitoring of demand for commercial services will include:
 - i. Actual used service days versus permitted service days
 - ii. Cruise ship arrivals during April and October

2. Following decision and before existing 5-year permit expiration (estimated 2025) distribute additional service days following Forest Service special uses policy. Not all days will be made immediately available.

3. Issue new special use permits (estimated 2026). Maintain unallocated commercial days in unallocated pool, continue monitoring.

- A. Permit an increase of up to 50% of the difference between 2021 permitted days and commercial allocation identified in selected alternative if the following conditions and monitoring criteria are met:
 - i. Conditions: Visitor center and trailhead parking lots complete, additional restrooms are available to visitors, and trail improvements (for permitted trails) are complete; AND
 - iii. Monitoring: Visitor experience, wildlife, and demand for commercial services indicate desired conditions have been met or positive trends.
- B. If conditions and monitoring are not met for A, then do not increase service days.

4. Upon completion of Welcome Center and plaza construction:

- A. Amend priority use permits with an increase of up to the maximum commercial allocation identified in selected alternative if the following conditions and monitoring criteria are met:
 - i. Conditions: Welcome center and plaza complete, visitor center and trailhead parking lots complete, additional restrooms are available to visitors, and trail improvements (for permitted trails) are complete; AND
 - ii. Monitoring: Visitor experience, wildlife, and demand for commercial services indicate desired conditions have been met or positive trends.
- B. If conditions and monitoring are not met for A, then do not increase service days and do not reallocate any forfeited service days.

Mendenhall Lake and River Non-Motorized (Kayak, Canoe, Raft) Outfitting and Guiding Services

Baseline information

- Special use permits are issued to authorize outfitter/guide services for paddle sports such as kayaking and rafting on Mendenhall Lake and Mendenhall River. These permittees access the lake via the West Glacier unit past Skater's Cabin.
- Capacity analysis assumes 214 days available for commercial visitors each year between April and October. Current (2021) service days are based on a 153-day season.
- The estimated maximum commercial allocation of service days for each alternative is listed in Table 16.

Table 16. Estimated maximum service days for non-motorized lake or river use by alternative

Lake or River Use	Alt 1	Alt 2	Alt 3	Alt 4
Mendenhall Lake Non-motorized (Canoes/Kayaks)	16,240	32,100	32,100	32,100
Mendenhall River (Rafts)	15,000	32,100	32,100	32,100

Adaptive Management Process to Increase Service Days for Non-motorized Outfitter/Guide Services on Mendenhall Lake:

- At the start of the 2023 season, initiate monitoring.**
 - Visitor experience monitoring will include monitoring of:
 - Crowding at West Glacier facilities including bathrooms and parking
 - Human/boat encounters on lake
 - Monitoring of interactions with wildlife will include:
 - Bear/human conflicts
 - Visitor breaching of bird nesting barriers or established boat distances
 - Monitoring of demand for commercial services will include:
 - Actual used service days versus permitted service days
 - Cruise ship arrivals during April and October
- Following decision and before existing 5-year permit expiration (estimated 2025), distribute additional service days following Forest Service special uses policy.** Not all days will be made immediately available.
- Issue new special use permits (estimated 2026).** Maintain unallocated commercial days in unallocated pool, continue monitoring.
 - Permit an increase of up to 5,000 service days (total 21,240) if the monitoring criteria are met:
 - Monitoring: Visitor experience, wildlife, and commercial use monitoring data indicate desired conditions or positive trends.
 - If monitoring not met for A, then do not increase service days.
- Upon special use permit renewal (estimated 2031):**
 - Permit an increase of up to 5,000 service days (total 26,240) if the monitoring criteria are met:

- i. Monitoring: Visitor experience, wildlife, and commercial use monitoring data indicate desired conditions or positive trends.
 - B. If monitoring criteria are not met for A, then do not increase service days and do not reallocate any forfeited service days.
- 5. Upon special use permit renewal (estimated 2036):**
- A. Permit an increase of up to the maximum service days (32,100) if the monitoring criteria are met:
 - i. Monitoring: Visitor experience, wildlife, and commercial use monitoring data indicate desired conditions or positive trends.
 - B. If monitoring criteria are not met for A, then do not increase service days and do not reallocate any forfeited service days.

Mendenhall Lake Motorized (Boating) Outfitting and Guiding Services

Baseline information

- Alternatives 2 and 3: Special use permits would be issued to authorize outfitter/guide services to guide visitors in motorized boats across Mendenhall Lake to view the Mendenhall Glacier from the boat or from the Remote Glacier Visitor Area. These services are not currently offered.
- Capacity analysis assumes 214 days available for commercial visitors each year between April and October.
- The estimated maximum allocation of service days for Alternative 2 is 214,000 and for Alternative 3 is 100,000. Motorized use on Mendenhall Lake is not proposed in Alternative 4 (Table 17).
- The estimated maximum commercial allocation of service days for each alternative is listed in Table 17.

Table 17. Estimated maximum service days for motorized lake use by alternative

Motorized Lake Use	Alt 1	Alt 2	Alt 3	Alt 4
Mendenhall Lake Motorized (Proposed)	n/a	214,000	100,000	N/A

Adaptive Management Process to Offer Service Days for Motorized Outfitter/Guide (Boating) Services on Mendenhall Lake:

- 1. At the start of the 2023 season, initiate monitoring.**
 - A. Visitor experience monitoring will include monitoring of:
 - Crowding at Visitor Center and Remote Glacier Visitor Area facilities including bathrooms, exhibits, and parking (monitoring at Remote Glacier Visitor Area will not be initiated until infrastructure exists).
 - Facility conditions
 - B. Monitoring of interactions with wildlife will include:
 - Bear/human conflicts
 - Visitor breaching of bird nesting barriers or established boat distances.
 - C. Monitoring of demand for commercial services will include:
 - Actual used service days per season versus permitted service days per season.

- Cruise ship arrivals during April and October.
- 2. **Following decision, initiate process to distribute service days following Forest Service special uses policy (estimated 2023): 216,000 (Alt 2) or 100,000 (Alt 3).** Not all days will be made immediately available.
- 3. **Upon completion of Welcome Center and plaza construction:**
 - A. Permit up to approximately 50% of service days when the following conditions are met (Alt 2: 100,000 service days; Alt 3: 50,000 service days):
 - i. Conditions: Welcome center and plaza constructed, visitor center parking lot complete, and docks included in permits or constructed for use.
- 4. **Upon special use permit renewal (estimated 2031):**
 - A. If no Remote Glacier Visitor Area constructed, maintain permit allocations and monitor.
 - B. If Remote Glacier Visitor Area constructed, increase commercial allocation by up to maximum if the following conditions and monitoring criteria are met:
 - ii. Conditions: Remote Glacier Visitor Area complete, Welcome Center and plaza complete, visitor center parking lot complete, and docks constructed for use.
 - iii. Monitoring: Visitor experience, wildlife, and commercial use monitoring data indicate desired conditions are met or positive trends.
 - C. If conditions and monitoring are not met for A or B, then do not increase service days.

MENDENHALL GLACIER VISITOR FACILITY IMPROVEMENTS PROJECT

DRAFT ENVIRONMENTAL IMPACT STATEMENT | APPENDIX C –
VISUAL IMPACTS

VIEWSHEDS | ALTERNATIVES 2, 3, AND 4

Full View from Porch

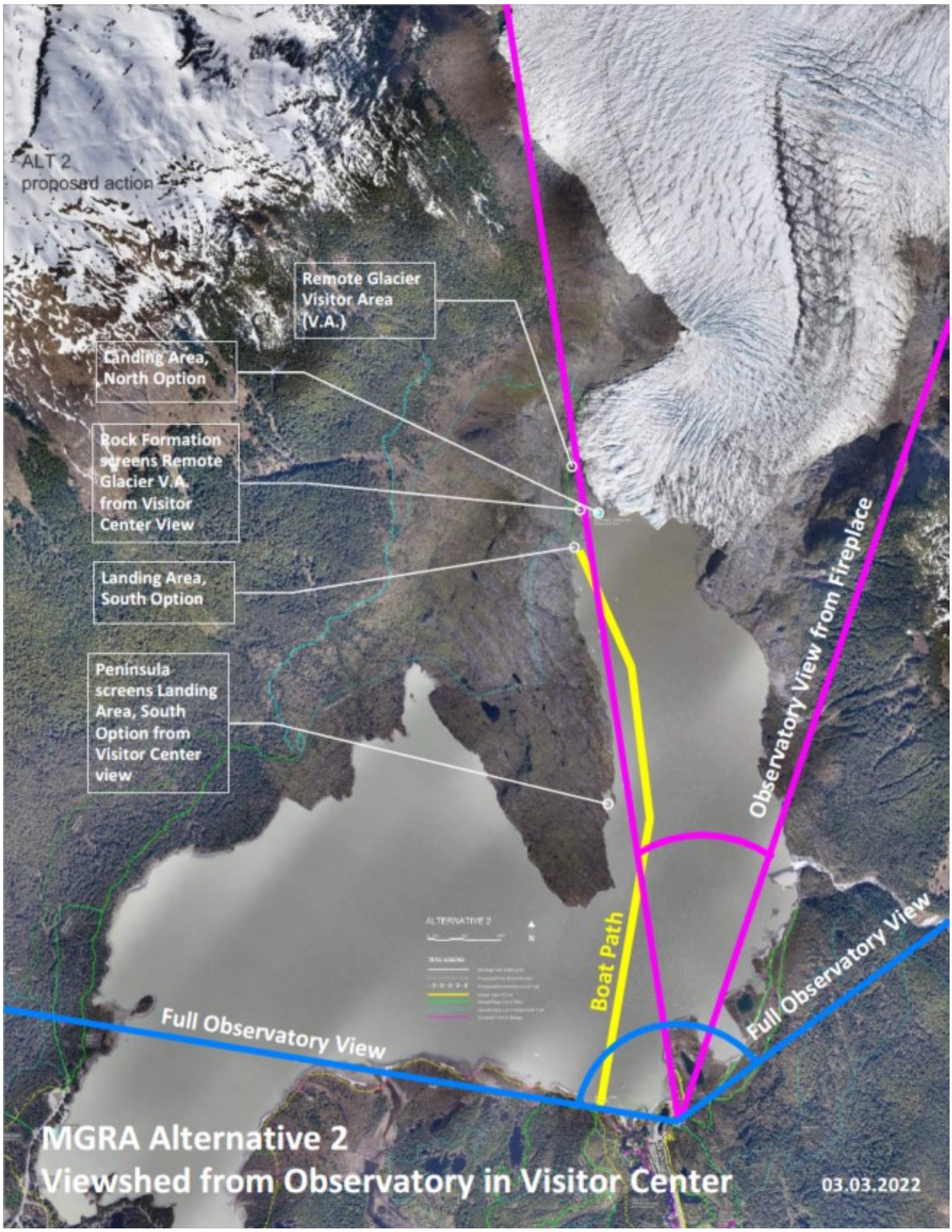
popular View of Cabin with Glacier in Background

Boat Path

Primary View from Cabin Front Door

MGRA Alternative 2
Viewshed from
Skater's Cabin

03.03.2022



ALT 2
proposed action

Remote Glacier
Visitor Area
(V.A.)

Landing Area,
North Option

Rock Formation
screens Remote
Glacier V.A.
from Visitor
Center View

Landing Area,
South Option

Peninsula
screens Landing
Area, South
Option from
Visitor Center
view

ALTERNATIVE 2

Boat Path
Proposed Fire Road
Proposed Access Road
Road Right-of-Way
Road Right-of-Way
Road Right-of-Way

Observatory View from Fireplace

Boat Path

Full Observatory View

Full Observatory View

MGRA Alternative 2
Viewshed from Observatory in Visitor Center

03.03.2022

MGRA Alternative 2
Viewshed from
Observatory in
Visitor Center

Boat Path

Observatory View from Fireplace

Nugget
Falls Trail

Photo
Point

Full Observatory View

Full Observatory View

Trail
of Time

03.03.2022

Welcome Center
Boat Dock

Moraine
Ecology Trail



Full View from Porch

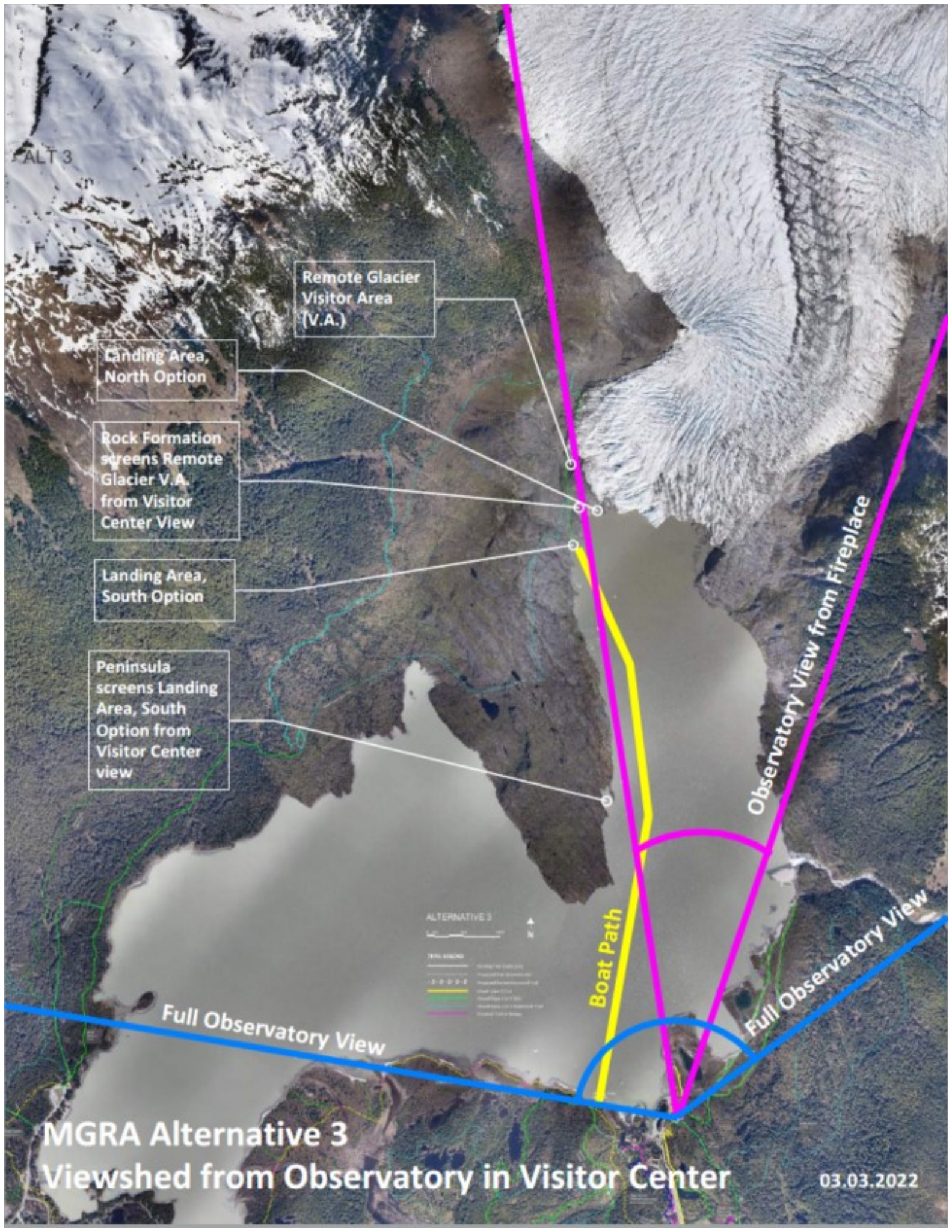
Popular View of Cabin with Glacier in Background

Boat Path

Primary View from Cabin Front Door

MGRA Alternative 3
Viewshed from
Skater's Cabin

03.03.2022



MGRA Alternative 3
Viewshed from Observatory in Visitor Center

MGRA Alternative 3 Viewshed from Observatory in Visitor Center

Boat Path

Observatory View from Fireplace

Nugget Falls Trail

Photo Point

Welcome Center
Boat Dock

Full Observatory View

Full Observatory View

Trail of Time

Moraine
Ecology Tr

03.03.2022

Full View from Porch

Popular View of Cabin with Glacier in Background

Primary View from Cabin Front Door

MGRA Alternative 4
Viewshed from
Skater's Cabin

03.03.2022

MGRA Alternative 4

Viewshed from Observatory in Visitor Center

03.03.2022

ALT 4

Observatory View from Fireplace

Full Observatory View

Full Observatory View

MGRA Alternative 4
Viewshed from Observatory in Visitor Center

03.03.2022

[illegible]

ALT 4

Observatory View from Fireplace

Full Observatory View

Full Observatory View

MGRA Alternative 4
Viewshed from Observatory in Visitor Center

03.03.2022

MGR Alternative 4

Viewshed from Observatory in Visitor Center

03.03.2022

ALT 4

Observatory View from Fireplace

Full Observatory View

Full Observatory View

MGRA Alternative 4
Viewshed from Observatory in Visitor Center

03.03.2022

MGRA Alternative 4 Viewshed from Observatory in Visitor Center

Observatory View from Fireplace

Nugget
Falls Trail

Photo
Point

Full Observatory View

Full Observatory View

Trail
of Time

Moraine
Ecology Tr

03.03.2022

VISUAL IMPACTS MATRIX | ALTERNATIVES 2, 3, AND 4

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