2

Alternatives Including The Preferred Alternative

INTRODUCTION

This chapter describes five alternatives for access at the Brooks River area of Katmai National Park and Preserve. Alternative 1 (no-action alternative) presents a continuation of current management direction and is included as a baseline for comparing the consequences of implementing each alternative. Alternatives 2 through 5 (action alternatives) present different ways of providing access within the Brooks River area; the NPS preferred alternative (alternative 4) is also identified. Elements common to all action alternatives are also presented. Mitigation measures that would be used to reduce or avoid impacts are listed after the descriptions of the alternatives. The chapter also includes a brief description of alternatives and actions that were considered but dismissed from further analysis, a discussion of costs, and a discussion of the environmentally preferable alternative. Table 3 summarizes the components and attributes of each alternative. Table 4 summarizes the potential impacts of each alternative.

The alternatives were developed through an interdisciplinary team process that included tiering from earlier plans, including the 1996 *Brooks River Area Development Concept Plan / Environmental Impact Statement* and 1986 general management plan. Based on public scoping comments, input from NPS staff, and NPS mandates and policies, various concepts and project elements were considered. The National Park Service also considered potential environmental factors, visitor experience, visitor safety, operational efficiency, design, cost, and other factors in crafting the action alternatives. Different combinations of projects elements with regard to the bridge, boardwalk, and barge/landing area were integrated into the four action alternatives presented in this chapter.

The action alternatives describe the general locations and designs of the facilities being proposed. Specific details, such as railing designs, materials, and bridge supports, would be determined after the record of decision is signed for this document.

ALTERNATIVE 1 (NO ACTION)

This alternative represents a continuation of the existing situation (see map 3). This alternative requires active management of the area by park staff.

The no-action alternative would maintain seasonal use of the floating bridge, which is 8 ft wide and about 320 ft long; it floats on the surface of Brooks River. The bridge would be used by both pedestrians and light utility vehicles.

Visitors and staff (park and concession) would continue to access Brooks River via a trail through the vegetated area known as the "Corner" as they head south from the Brooks Camp area. After crossing the floating bridge, visitors and staff would proceed to the road and then walk south to the bus parking area for Valley of Ten Thousand Smokes and the trail to the Brooks Falls viewing platforms.

Park staff would continue to install and remove the bridge each spring and fall. The banks of Brooks River would continue to be stabilized to ensure that the floating bridge and access trail remain in place while in use. The access trail on the north side of the river would continue to be used and maintained. Riverbank stabilization measures involving the placement of fill, log revetments, and vegetation staking would continue.

The existing barge landing and associated road would remain on the south side of the river (see map 3). The barge landing ramp would be hardened with materials such as interlocking pavers, planks, or geoweb filled with gravel. Any hardening material would be neutral in color to blend with the shoreline.

NPS landing craft, barges, and some boats would continue to land at the site at the mouth of Brooks River. (Most boats land in front of Brooks Camp.)

Utility connections between the north side of Brooks River and the Valley Road Administrative Area would be considered at a later date as part of a separate action. Until the utility connections are completed, septic waste from Brooks Camp would be transported across Brooks River every spring via a hauling trailer. The floating bridge would not be used for this operation.

MAP 3.
ALTERNATIVE 1

ACTIONS COMMON TO ALL ACTION ALTERNATIVES

CONSTRUCTION SCHEDULE

The construction of the bridge and boardwalk would be anticipated to last approximately three years and would most likely start in August of year one and be completed by June of year three. Completion of the bridge and boardwalk would occur during the second winter/spring season, with demobilization occurring by August of the third season.

The construction of the barge landing, road, and parking area would most likely start in fall (September) and be completed prior to the visitor season the next year (May/June). The hardened barge landing would be constructed in the late winter / early spring when lake levels are lowest.

Much of the construction is scheduled for late fall and early spring to avoid periods of peak bear numbers (July and September) and park visitors. Any work that needs to occur during the summer season would be scheduled for the periods of lowest bear and visitor activity and would avoid bird migration and fish spawning seasons.

Mobilization and construction camp setup and gravel processing would occur during late summer or early fall (August to October) before freeze-up.

The construction contractor may occupy a temporary construction camp at the Valley Road Administrative Area. The contractor may need three structures to house up to 12 people. Alternatively, the construction crew may use the existing contractor camp about 0.5 miles southeast of the Valley Road Administrative Area. This camp, commonly referred to as "Squirrel Camp," was established for use by contractors for past and future major park developments.

USE OF EXISTING GRAVEL

Existing gravel sources about 5 miles southeast of Brooks River on Valley of Ten Thousand Smokes Road would be used (see map 2). This gravel pit contains sufficient material for future NPS development projects, including the construction of roads on the south side of Brooks River for the relocation of Brooks Camp (NPS 1997).

MONITORING

The National Park Service would monitor the impacts on park resources from the construction and continuing use of the bridge and boardwalk in all action alternatives.

- **Brown Bears:** Brown bear behavior would be monitored during construction activities as well as during the operation of the new bridge and boardwalks. Data obtained from monitoring activities would be considered in future bear management decisions, which may include developing and implementing proper bear viewing etiquette on the bridge/boardwalks.

- **Bald Eagles:** An active bald eagle nest has been observed near the proposed Beaver Pond barge access road. The National Park Service would monitor eagle nesting during road construction and use activities for a period of up to three years from the time construction activities are completed. The NPS staff would report monitoring data to U.S. Fish

and Wildlife Service (USFWS) on an annual basis.

- **Wetlands and Vegetation:** Wetlands and upland vegetation restoration activities would be monitored.

- **Visitor Use and Park Operations:** Combined use of the boardwalks and bridge would be monitored to determine visitor satisfaction and operational efficiency. Future management actions would be determined based on monitoring information.

VIEWING AREAS

Up to seven viewing areas (depending on the alternative) would be established on the north and south sides of Brooks River. These areas would be designed to accommodate about 20–25 people. The viewing areas also would be used to hold people for short periods of time if the bridge is closed and as pullout spots when vehicles are crossing the bridge.

BARGE LANDING RAMP

Under all of the action alternatives, a hardened ramp would be installed to better accommodate boat and barge operations. The new barge landing ramp would be hardened with materials such as interlocking pavers, planks, or geoweb filled with gravel. Any hardening material would be neutral in color to blend with the shoreline.

UTILITIES

Both electrical intertie and septic tank pump-out lines would use the bridge to cross Brooks River. An electrical intertie would be routed in conjunction with the pedestrian portions of the boardwalk systems while the septic tank pump-out line would follow the same routing as the vehicle ramps to ensure that connections on the south side of the river can be made to the sewage hauling trailer.

BEAR GATES

Gates would be installed at each end of the boardwalk where they meet existing grade to prevent bears from gaining access to the boardwalks and bridge. The gates would be similar to those on the boardwalks at Falls and Riffles viewing platforms.

EMERGENCY LADDERS/RAMPS

Emergency ladders would be included at the north end of the bridge for safety reasons. Fully accessible emergency access / egress ramps would be included where there are no ramps on the south side of Brooks River. A secondary purpose of these ramps would be to provide anglers and other visitors access to Brooks River.

HABITAT RESTORATION AREA

The construction of an elevated boardwalk and bridge would direct all human traffic away from the area known as the Corner. Currently, the Corner is a primary route for people traveling from Brooks Camp to the bridge and the south side of Brooks River. At peak times of the year, several hundred people can pass through this area each day; it is also the location where people cluster to observe bears along the river near the floating bridge. The Corner is also an important area for brown bears to rest, especially sows with cubs. In all the action alternatives, the Corner would be rehabilitated and restored and its use would be reserved primarily for bears (see map 3).

BOAT AND FLOATPLANE ACCESS TO BROOKS CAMP AREA

Under all action alternatives, floatplane access would continue to Lake Brooks and Naknek Lake, depending on the wind. On west wind days, Naknek Lake is favored, and on east wind days, Lake Brooks is favored.

Boat access to Brooks Camp from Lake Camp (near King Salmon) would continue on Naknek Lake. Visitors arriving by boat would temporarily moor ashore on Naknek Lake near Brooks Camp.

ALTERNATIVE 2

Both pedestrians and vehicles would use a boardwalk and bridge system between Brooks Lodge and the bus parking area for a total approximate length of 1,600 ft. The boardwalks would have separate access points for pedestrians and vehicles on the north and south sides of Brooks River. The barge landing would be relocated to an area approximately 2,000 ft south of the existing site and would require the construction of a new access road (see map 4).

NORTH BOARDWALK

On the north side of Brooks River, an extensive elevated boardwalk system would separate visitors from bears and would eliminate human use of the Corner. Pedestrians would enter the boardwalk system near Brooks Lodge. A 5-foot-wide pedestrian section would start near the lodge and continue at 10 ft above grade for approximately 335 ft. Vehicles would use a ramp that starts at the fish freezing station before merging with the pedestrian boardwalk along the wetlands about 225 ft south of the lodge. From the intersection of the two northern boardwalks to the start of the bridge (200 ft), the boardwalk would be 8 ft wide to accommodate both pedestrians and vehicles and continue at 10 ft above grade. The total length of the north boardwalk from the lodge to the start of the bridge would be approximately 535 ft.

The north boardwalk would consist of up to four viewing/pullout areas. Two would face west and overlook the wetland and Brooks River. Two would face east to provide upriver and downriver viewing opportunities.

BRIDGE

The bridge across Brooks River would follow the alignment of the floating bridge. This concept calls for a 3-span bridge about 360 ft in length. This bridge would have an 8-foot-wide wooden bridge deck with a steel truss on each side and would span 120 ft between steel pile foundations. Two sets of support piles (each with two piles) would be in the riverbed. This bridge walking surface would be at least 10 ft above the river.

SOUTH BOARDWALK

Connecting to the southern end of the bridge, an 8-foot-wide transition area that is about 20 ft long allows for pedestrians and vehicles to separate onto their own boardwalks. A pedestrian-only boardwalk would follow the edge of a wetland, and then cut east along an old road corridor before ending at the bus parking area. This elevated boardwalk would be 10 ft above grade and would ramp down to grade, ending about 100 ft east of the bus parking area. This section of boardwalk would be about 715 ft long. An 8-foot-wide vehicle ramp would separate from the boardwalk at the southern terminus of the bridge. This vehicle spur ramp would be approximately 215 ft in length and would ramp down to grade.

The south boardwalk would have up to three primary viewing/pullout areas. One would be placed on each side of the south end of the bridge to provide upriver and downriver viewing opportunities. One would face east and overlook the wetland. Because of the length of the south boardwalk, up to two additional smaller pullout areas may be installed to allow for

the safe passage of pedestrians and vehicles.

BARGE LANDING AND ACCESS ROAD

A barge landing would be located on the shore of Naknek Lake about 2,000 ft south of the existing barge landing (figure 3). The barge landing area (6,800 square feet (ft^2)) would include a permanent extended hardened boat launch ramp (24 ft to 30 ft wide and 170 ft to 240 ft long) to accommodate lake level fluctuations and a fenced storage/staging area (150 ft by 100 ft) for storage of the NPS barge on a 90-foot-long trailer and miscellaneous smaller boats/trailers. This secured area would be located behind the lakeshore vegetation. The storage area would be accessible from the access road via a gated entrance.

A new access road, approximately 1,500 ft long and 14 ft wide, would intersect the Valley Road and run to the north side of Beaver Pond and east to the new barge landing site on Naknek Lake. It is anticipated that a culvert would be required to facilitate a hydrological connection of adjacent wetlands.

The existing barge landing area (5,800 ft^2), boat storage/staging area (16,000 ft^2), and gravel access road (600 ft by 14 ft) on the south side of the river would be removed and the landscape would be restored to natural conditions.

MAP 4.
ALTERNATIVE 2

FIGURE 2. SIMULATION OF BRIDGE AND SOUTH BOARDWALK IN ALTERNATIVE 2

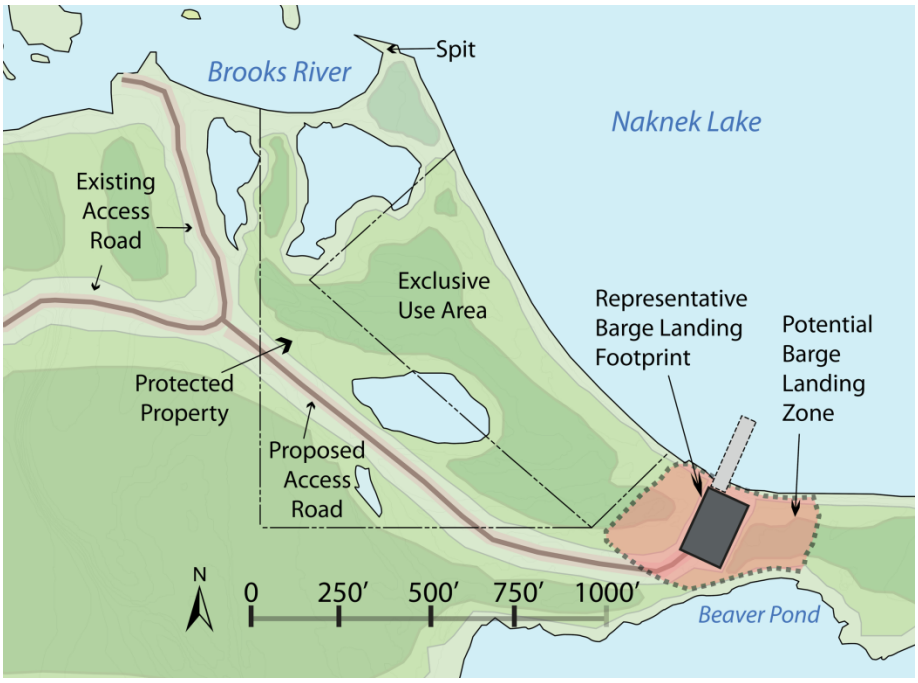


FIGURE 3. BARGE LANDING SITE FOR ALTERNATIVES 2, 4, AND 5

ALTERNATIVE 3

Both pedestrians and vehicles would use a single boardwalk and bridge system with single access points on the north and the south sides of Brooks River. The bridge and boardwalk system would have a total estimated length of 850 ft. The barge landing would be relocated to an area approximately 200 ft south of the existing site and would generally use the existing barge access road (see map 5).

NORTH BOARDWALK

An 8-foot-wide elevated boardwalk would start near the fish freezing station and ramp up to 10 ft above grade and extend to the north end of the bridge through the Corner following the existing trail alignment. This boardwalk would be about 330 ft long. Both people and vehicles would use the same boardwalk.

The north boardwalk would consist of up to two viewing/pullout areas, placed on each side of the north end of the bridge to provide upriver and downriver viewing opportunities. Due to the length of the north boardwalk, up to two additional smaller pullout areas may be installed to allow for the safe passage of pedestrians and vehicles.

BRIDGE

This bridge alternative would cross Brooks River at the Corner. This alternative would use a preengineered, medium-span bridge approximately 415 ft in length. The spans would measure approximately 50 ft and there would be six sets of support piles (each set with two piles) in the riverbed. This bridge walking surface would be a minimum of 10 ft above the river.

SOUTH BOARDWALK

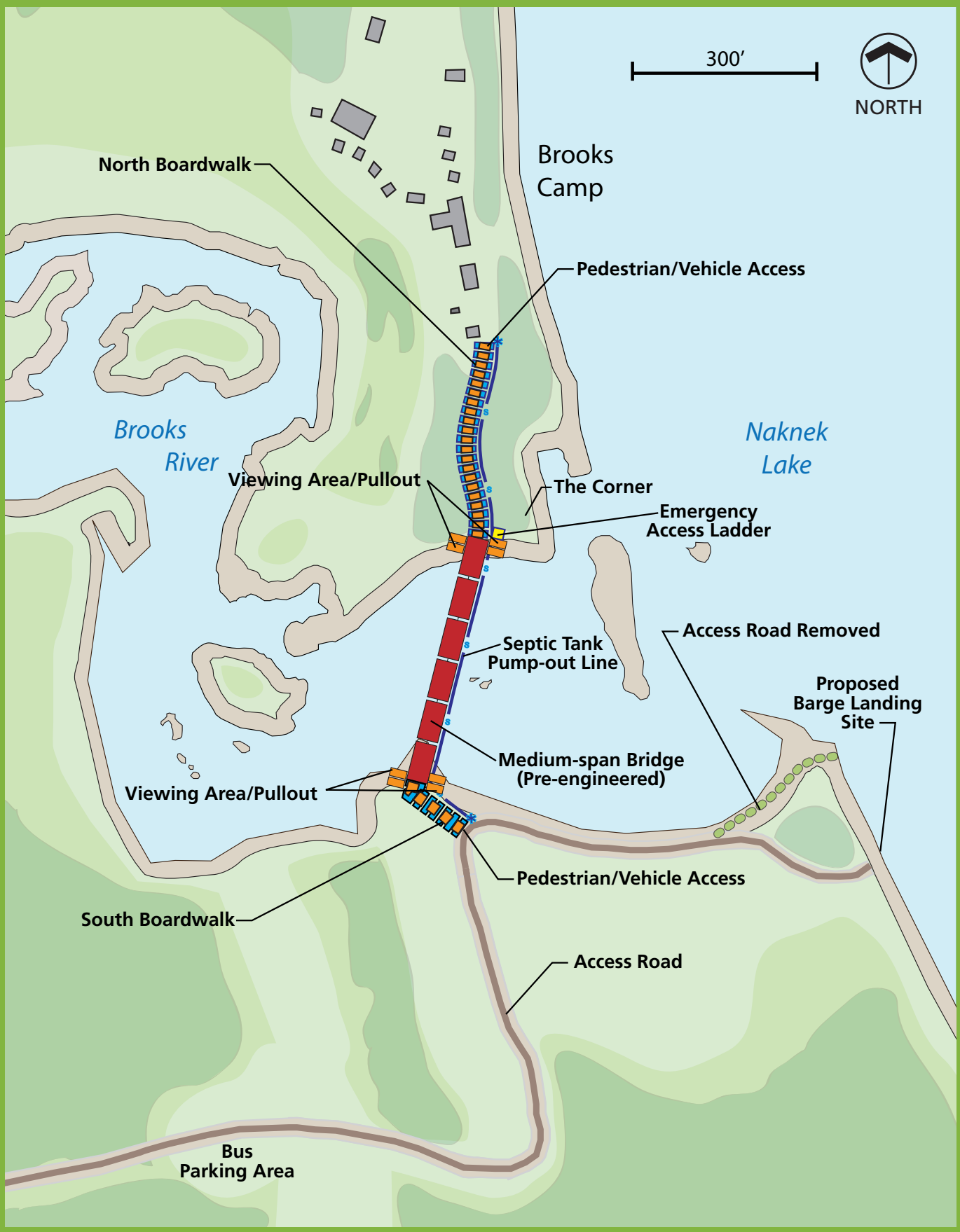
Starting at the southern end of the bridge, this boardwalk would ramp down until it reaches grade and connects to the existing road. This option is about 210 ft long and is designed to accommodate pedestrians and vehicles. One viewing area would likely be placed on each end of the south side of the bridge to provide upriver and downriver viewing opportunities.

BARGE LANDING AND ACCESS ROAD

A new barge landing site would be located approximately 200 ft south of the mouth of Brooks River (figure 5). The barge landing area (6,800 ft^2) would include a permanent extended hardened boat launch ramp (24 ft to 30 ft wide and 270 ft to 340 ft long) to accommodate lake level fluctuations and a fenced area for storage of the NPS barge on a 90-foot-long trailer.

A new road segment (about 100 ft by 14 ft) would be constructed from the existing access road and extend to a new Naknek Lake barge landing site.

The existing barge landing area (5,800 ft^2), boat storage / staging area (16,000 ft^2), and about 300 ft of the gravel access road on the south side of the river would be removed and restored to natural conditions.



MAP 5. ALTERNATIVE 3

FIGURE 4. SIMULATION OF BRIDGE IN ALTERNATIVE 3

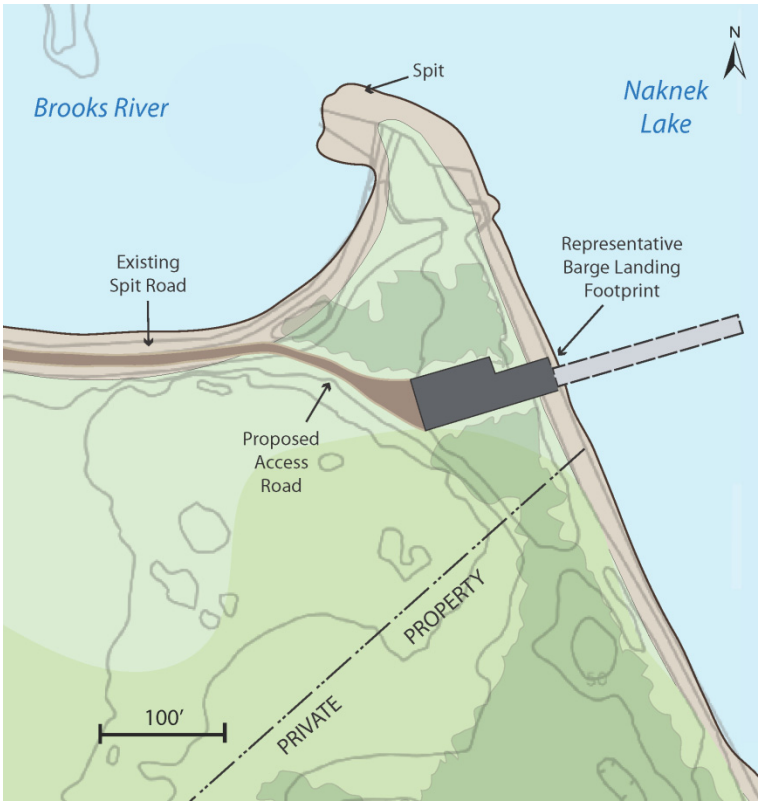


FIGURE 5. BARGE LANDING SITE FOR ALTERNATIVE 3

ALTERNATIVE 4 (NPS PREFERRED ALTERNATIVE)

Both pedestrians and vehicles would use a single boardwalk and bridge system with single access points on the north and south sides of Brooks River. The bridge and boardwalk system would have a total estimated length of 1,550 ft. The barge landing would be relocated to an area about 2,000 ft south of the existing site and would require the construction of a new access road (see map 6).

NORTH BOARDWALK

The boardwalk would start adjacent to the lodge, and then would continue south over the wetlands for approximately 560 ft. The elevated boardwalk would be at least 10 ft above grade once it clears the area around the lodge. This boardwalk would be 8 ft wide and designed to accommodate both pedestrians and vehicles simultaneously.

The north boardwalk would have up to four viewing/pullout areas. Two would face west and overlook the wetland and Brooks River and two would be on each side of the north end of the bridge to provide upriver and downriver viewing opportunities.

BRIDGE

The wooden short-span bridge, approximately 350 ft in length with a minimum distance of 24 ft between piles, would follow the alignment of the floating bridge. There would be up to 14 sets of support piles (each set with two piles) in the riverbed. The bridge would be built using techniques similar to the boardwalk system. This bridge walking surface would be a minimum of 10 ft above the river.

SOUTH BOARDWALK

An 8-foot-wide pedestrian-vehicle boardwalk would cross a wetland south of the southern bridge terminus and then cut west through a wooded area. The boardwalk would follow the edge of the western wetland before ending about 100 ft from the bus parking area. This elevated boardwalk would be 10 ft above grade and would ramp down to grade as it approaches the bus parking area. This section of boardwalk would have an estimated length of 630 ft.

The south boardwalk would have up to three primary viewing/pullout areas. One would be placed on each side of the south end of the bridge to provide upriver and downriver viewing opportunities. One would face east and overlook the wetland. Because of the length of the south boardwalk, one to two additional smaller pullout areas may be installed to allow for the safe passage of pedestrians and vehicles.

BARGE LANDING AND ACCESS ROAD

A barge landing would be located on the shore of Naknek Lake approximately 2,000 ft south of the existing barge landing (figure 3). The barge landing area (6,800 ft^2) would include a permanent extended hardened boat launch ramp (24 ft to 30 ft wide and 170 ft to 240 ft long) to accommodate lake level fluctuations and a fenced storage/staging area (150 ft by 100 ft) for storage of the NPS barge on a 90-foot-long trailer and miscellaneous smaller boats/trailers. This secured area would be located behind the lakeshore vegetation. The storage area would be accessible from the access road via a gated entrance.

A new access road, approximately 1,500 ft long and 14 ft wide, would intersect Valley Road and run to the north side of Beaver Pond and east to the new barge landing site on Naknek Lake. It is anticipated that a culvert would be required to facilitate a hydrological connection of adjacent wetlands.

The existing barge landing area (5,800 ft^2), boat storage/staging area (16,000 ft^2), and the gravel access road (about 1,200 ft by 14 ft) on the south side of the river would be removed and the landscape would be restored to natural conditions.

MAP 6.
ALTERNATIVE 4

FIGURE 6. SIMULATION OF BRIDGE AND SOUTH BOARDWALK IN ALTERNATIVE 4

ALTERNATIVE 5

Both pedestrians and vehicles would use a single boardwalk and bridge system with single access points on the north and the south sides of Brooks River. The bridge and boardwalk system would have a total estimated length of 1,100 ft. The barge landing would be relocated to an area approximately 2,000 ft south of the existing site and would require the construction of a new access road 'rdd l `o lj(.

NORTH BOARDWALK

The boardwalk would start adjacent to the lodge, and then would continue south through the wetlands for about 560 ft. The elevated boardwalk would be at least 10 ft above grade once it clears the area around the lodge. This boardwalk would be 8 ft wide and accommodate both pedestrians and vehicles.

The north boardwalk would consist of up to four viewing/pullout areas. Two would face west and overlook the wetlands and Brooks River. Two would be on each side of the north end of the bridge to provide upriver and downriver viewing opportunities.

BRIDGE

The bridge, which would follow the alignment of the floating bridge, would be a wooden short-span bridge, about 350 ft in length with a minimum distance of 24 ft between piles. There would be up to 14 sets of support piles (each set with two piles) in the riverbed. It would be built using techniques similar to the boardwalk system, and the bridge's walking surface would be a minimum of 10 ft above the river.

SOUTH BOARDWALK

An 8-foot-wide pedestrian and vehicle boardwalk would connect to the south end of the bridge and ramp down to meet the access road about 215 ft south of Brooks River. At least one viewing/pullout area would be placed on each side of the south end of the bridge to provide upriver and downriver viewing opportunities.

BARGE LANDING AND ACCESS ROAD

A barge landing would be located on the shore of Naknek Lake approximately 2,000 ft south of the existing barge landing (map 7). The barge landing area (6,800 ft^2) would include a permanent extended hardened boat launch ramp (24 ft to 30 ft wide and 170 ft to 240 ft long) to accommodate lake level fluctuations and a fenced storage/staging area (150 ft by 100 ft) for storage of the NPS barge on a 90-foot-long trailer and miscellaneous smaller boats/trailers. This secured area would be located behind the lakeshore vegetation. The storage area would be accessible from the access road via a gated entrance.

A new access road, approximately 1,500 ft long and 14 ft wide, would intersect Valley Road and run to the north side of Beaver Pond and east to the new barge landing site on Naknek Lake. It is anticipated that a culvert would be required to facilitate a hydrological connection of adjacent wetlands.

The existing barge landing area (5,800 ft^2), boat storage/staging area (16,000 $ft^{2,}$) and gravel access road (600 ft by 14 ft) on the south side of the river would be removed and the landscape would be restored to natural conditions.

MAP 7. ALTERNATIVE 5

MITIGATIVE MEASURES

BROWN BEARS

To reduce possible negative impacts on brown bears and other wildlife within the Brooks River area, mobilization, construction, and demobilization activities would be coordinated between the project contractor, Brooks Camp manager, and park divisions responsible for protecting wildlife and visitors and managing commercial services. Bear response techniques identified in the park's *Bear-Human Conflict Management Plan* (NPS 2006b) would be used to manage human-bear interactions associated with this plan. Construction-specific mitigations would include the following:

- the NPS project manager or bear manager will be on-site when materials are being loaded or unloaded to monitor operations.
- use of the Naknek Lake barge landing and access road would be limited to the loading and unloading of equipment, materials, and supplies for immediate transport to the park-approved staging area(s) and/or construction camp.
- equipment, materials, and supplies in the staging area(s) and contractor camp would be secured by hard-sided storage containers and/or an electric perimeter fence.
- food would be stored in bear-resistant containers and garbage would be regularly transported to an approved solid waste facility outside the park.
- work would be temporarily halted when bears approach within 50 yards of an unfenced work area. Workers would allow the bear(s) to pass through the work area, unless the area (elevated bridge or boardwalk) is vertically separated, before starting or resuming mobilization, construction, or demobilization activities.

MIGRATORY BIRDS

No trees and shrubs would be cut or removed between April 10 and July 15 to protect migratory nesting birds, particularly those birds that are considered species of special concern that may nest within the area, including the olive-sided flycatcher (*Contopus borealis*), blackpoll warbler (*Dendroica straita*), and gray-cheeked thrush (*Catharus minimus*).

SALMON AND OTHER FISH

To protect fish populations and habitat, the following mitigations would be followed in the projects areas:

- fuel, lubricants, or other hazardous substances would not be stored below the ordinary high water (OHW) of Brooks River, Naknek Lake, or Lake Brooks.
- equipment servicing and refueling would not be conducted below the OHW level of Brooks River or Naknek Lake.
- equipment leaking fuel, oil, hydraulic fluid, or other pollutants would not be operated or moved below the OHW level of Brooks River or Naknek Lake.
- work below the ordinary high water within Brooks River and the shoreline of Naknek Lake would occur during winter and spring

when water levels are low and spawning fish are less likely to be impacted.

- riverbed and lakebed materials displaced by bridge and barge ramp construction that are important for fish spawning habitat would be redistributed to adjacent areas within Brooks River and Naknek Lake. Materials would not be completely removed from the project areas.
- areas below the OHW level would be graded to closely match preconstruction slopes and contours after cessation of construction activities.
- riprap and nonvegetation bank stabilization methods would be avoided or greatly minimized. Riverbanks would be rehabilitated using native vegetation and natural materials, such as coir logs, willow stakes, and downed trees for stabilization.

WETLANDS AND VEGETATION

Construction activities within wetlands would be limited to the minimum area needed to install the boardwalk and bridge supports.

Equipment servicing and refueling would not be conducted within wetlands. Equipment leaking fuel, oil, hydraulic fluid, or other pollutants would not be operated within or immediately adjacent to wetlands.

Local native plants would be used to rehabilitate construction sites, former trails, and roads.

NONNATIVE PLANT SPECIES

The following guidelines would be followed to prevent the introduction and spread of invasive plant species within the park:

- All heavy equipment and vehicles (including, but not limited to, tankers, trucks, ATVs, trailers, and excavation equipment) would be thoroughly cleaned (preferably by pressure washing) and free of soil, dirt, mud, or gravel before being transported into the park.
- NPS staff would inspect all heavy equipment and other vehicles at or near the park boundary to ensure they are free of invasive seed sources. Improperly cleaned vehicles and equipment would not be allowed into the park.

CULTURAL RESOURCES

To ensure that the proposed project complies with Section 106 of the National Historic Preservation Act, the following mitigation measures would be followed:

- The National Park Service would continue to consult with the Alaska state historic preservation office (SHPO), the Council of Katmai Descendants, the heirs of Palakia Melgenak, and others with cultural ties to the Brooks River area.
- Archeological monitoring and additional surveys (if needed) would precede and/or accompany construction-related ground disturbance to ensure that significant archeological resources are avoided and protected to the greatest extent possible. If previously unknown resources are discovered, all work in the immediate vicinity of the discovery would cease until the resources are

assessed, documented and protected in consultation with the state historic preservation office, traditionally associated peoples, and others as appropriate. A mitigation strategy would be developed in further consultation if resources could not be avoided.

- All known significant cultural resources in the project area (e.g., archeological and ethnographic resources, historic buildings, cultural landscape features) would be clearly identified for avoidance during construction.
- In the event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered, Katmai National Park and Preserve would comply with the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (25 USC 3001) following the procedures set forth in a memorandum of agreement among the park and traditional associated federally recognized tribes and interested parties signed on July 19, 2011.

IDENTIFICATION OF THE NPS PREFERRED ALTERNATIVE

Alternative 4 is the NPS preferred alternative because it best meets the purpose and need for the plan. Alternative 4 includes the longest elevated bridge/boardwalk configuration of any of the alternatives. The bridge/boardwalk extends from Brooks Camp (north side of river) to the bus parking area on the south side of river. The system would provide dependable access for the phased relocation of facilities and improve visitor and employee safety by providing a 10-foot vertical separation between humans and bears, substantially reducing human-bear interactions. Alternative 4 would decrease adverse effects on brown bears due to elimination of the floating bridge, restoration of an open travel route from the lower Brooks River to Naknek River via the river's north bank and the Corner, and the vertical separation of bears and humans throughout the project area. The elevated bridge and boardwalk would also reduce impacts to archaeological resources and improve viewing alternatives for visitors.

The removal of the floating bridge and existing barge landing / access road at the mouth of Brooks River would protect key resources and reduce human-bear interactions. Removal of barge activity in this area would improve visitor experience because it would not be subject to operational activities that disturb wildlife and create noise and activities that may degrade the park experience.

ENVIRONMENTALLY PREFERABLE ALTERNATIVE

In accordance with Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2001), the National Park Service is required to identify the environmentally preferable alternative in all environmental documents, including environmental impact statements. The environmentally preferable alternative is "the alternative that causes the least damage to the biological and physical environment; it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources."

Alternative 4 (NPS preferred alternative) is the environmentally preferable alternative. Alternatives 4 and 5 would improve resources and values at the mouth of Brooks River with removal of the existing floating bridge and construction of an elevated boardwalk and bridge system to separate people and bears. The elevated bridge and boardwalk system would direct all human traffic away from the Corner. Alternatives 4 and 5 would also remove the existing barge landing site and access road from the south bank of Brooks River, eliminating facilities impacts on sensitive resources and park visitors. However, alternative 4 would remove an additional segment of access road that would be retained under alternative 5.

While alternatives 2 and 3 incorporate elevated boardwalk and bridge systems, they would not remove as much infrastructure from the sensitive resources area at the mouth of Brooks River.

COSTS OF THE ALTERNATIVES

Table 2 provides cost estimates for development of the various facility components of alternatives 1 through 5. (For alternative 1, the only cost shown is for hardening the beach at the existing landing site.) The cost estimates are NPS Class C estimates, which are based on the average cost of similar facilities constructed in Alaska through federal government contracts. Actual costs may be higher or lower depending on the final design and site conditions. These estimates are intended primarily to assist in comparing the relative cost of implementing the alternatives.

TABLE 2. CONCEPTUAL (CLASS C) CONSTRUCTION COST ESTIMATES (DOLLARS) FOR ALTERNATIVES 1 THROUGH 5[1]

Facility	Alternatives				
	1	2	3	4	5
Boardwalk[2]	NA	$2,126,000	$910,000	$2,286,000	$1,527,000
Bridge[2]	NA	3,187,000	2,814,000	1,600,000	1,600,000
Power Connection[2]	NA	249,000	279,000	236,000	229,000
Septic Pump-out and Power[2]	NA	199,000	197,000	227,000	218,000
Barge Landing and Access Road	$1,542,000	2,165,000	1,768,000	2,165,000	2,165,000
Camp Construction[2]	NA	895,000	895,000	895,000	895,000
Construction Cost Estimate by Alternative	1,542,000	8,821,000	6,863,000	7,409,000	6,634,000
Construction Costs[3]					
Low Estimate	$1,079,400	$6,174,000	$4,804,100	$5,186,300	$4,643,800
High Estimate	$2,313,000	$13,231,500	$10,294,500	$11,113,500	$9,951,000

NA = Not Applicable

1. Compliance, design, construction contingency, and construction administration are not included in estimates.
2. Estimates derived from June 17, 2010, KPB Architects' estimate prepared for schematic design alternatives; the estimates assume all of the viewing/pullout areas would be built in each alternative. Costs are adjusted to 2014 dollars.
3. Estimates from Coffman Engineers 2012; estimates for alternatives 2, 4, and 5 include barge landing area, new access road, and a fenced storage/staging area; estimate also includes removal and rehabilitation of existing barge landing, boat ramp launch and bulkhead dock, gravel access road, and boat storage area. Costs are adjusted to 2013 dollars.
3. Based on the accepted industry accuracy range of Class C estimates, which is –30 percent to +50 percent.

Geotechnical investigation in the area of the bridge and boardwalk has revealed *soft* soils, which in general have poor structural properties, particularly when subject to seismic activity. The geotechnical report suggests that in the event of an earthquake, the soils have a high potential for liquefaction and resulting settlement and/or displacement. This settlement or lateral displacement of soils supporting the foundations of the structures has the potential for varying degrees of damage to the bridge and boardwalk depending on the severity of the seismic event. A risk assessment (Coffman Engineers 2012) has been performed to evaluate different scenarios projecting the probability and severity of a seismic event and the potential for damage. The scenarios are described as *event return periods*, which consider the likelihood and severity of seismic activity. A 36-year return period corresponds to 50 percent probability of exceedance in 25 years; a 108-year return has a 50 percent probability of exceedance in 75 years; a 475-year return period has a 10 percent probability of exceedance in 50 years; and a 975-year return period a 5 percent probability of exceedance in 50 years. The short-term scenarios (36-year return and 108-year return) indicate that there will be no risk to life/safety and minimal damage to the bridge and boardwalks. The assessment of risk in the long-term scenarios (475-year return period and 975-year return period) indicate there is some potential for collapse of bridge spans, resulting in risk to life safety and significant property damage. The risk assessment and projections of damage have been considered and further engineering solutions will be evaluated in an effort to mitigate and/or reduce the potential for damage to the bridge and boardwalk structures. These potential engineering seismic enhancements would not be expected to significantly affect the projected cost estimate ranges.

ALTERNATIVES AND ACTIONS CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

MORE INTENSIVE BEAR/ VISITOR MANAGEMENT

This option would focus on management of bears and people to address safety concerns rather than building a new bridge and boardwalk system. More emphasis would be placed on actively managing bears to prevent bear problems, including hazing and aversive conditioning, and blocking bear movements in areas where traffic jams and delays frequently occur. Increased monitoring of bears would occur and more staff would be on hand. Better education of visitors and staff regarding the 50-yard rule and increased enforcement of violations of park rules would also occur.

More intensive bear and visitor management was dismissed because it is not certain such management would effectively and efficiently increase human safety. Intensive management would not necessarily reduce visitor delays and access issues or improve visitor experience, and it would not provide dependable access during the phased relocation of facilities and park concession operations when facilities are separated on the north and south sides of the river. Further, this option would be inconsistent with the current bear management plan, which provides for free movement of bears and allows natural patterns of feeding and habitat use to occur.

SINGLE-SPAN BRIDGE ALTERNATIVE

This bridge option would use a single-span suspension type bridge to cross Brooks River. It would have a total length of 345 ft. The single-span bridge design would require a superstructure at least 50 ft above the riverbed (suspension cable towers) to support the single span. This bridge would require anchor supports coming off the ends of the bridge for a distance up to 100 ft on each side (see figure 7).

Based on the NPS value analysis (NPS 2010d) it was determined that a single-span bridge would not be appropriate for the Brooks Camp area. Although the bridge would have successfully crossed Brooks River without the use of piles within the riverbed, the bridge structure would have been too far out of scale compared to the rest of the developed facilities at Brooks Camp. It would have compromised the sense of place of the rustic Alaska fishing camp and have had substantial negative impacts on the visual resources of the park. High construction cost was another reason to dismiss this alternative.

FIGURE 7. SIMULATION OF SUSPENSION BRIDGE FROM SOUTH BANK LOOKING WEST

TABLE 3. SUMMARY OF ALTERNATIVES

Section	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
North Boardwalk	None; gravel path at grade through the Corner would remain	5-foot-wide pedestrian boardwalk (335 ft) starting at the lodge 8-foot-wide vehicle ramp (225 ft) (starting at the fish freezing building) 8-foot-wide combined (200 ft) pedestrian/vehicle boardwalk from the intersection of the two northern boardwalks to the bridge Would be routed west of the Corner area	8-foot-wide combined pedestrian and vehicle boardwalk (330 ft long) (starting at the fish freezing station) Would be routed through the Corner area	8-foot-wide combined pedestrian and vehicle boardwalk (560 ft long) (starting near the lodge Would be routed west of the Corner area	8-foot-wide combined pedestrian and vehicle boardwalk (560 ft long) (starting near the lodge) Would be routed from the lodge, west of the Corner area
Bridge	Floating bridge would be installed and removed each season	Three spans (120 ft each); total length 360 ft 8-foot- wide deck with a steel truss on each side and steel piles Would follow the alignment of the floating bridge	8-foot-wide combined pedestrian and vehicle bridge (415 ft long) Preengineered wood truss construction with 50-foot spans Would cross Brooks River at the Corner (east of the floating bridge alignment)	8-foot-wide combined pedestrian and vehicle wood and steel bridge (350 ft long) Built with wood piles at least 24 ft apart Would follow the alignment of the floating bridge	8-foot-wide combined pedestrian and vehicle wood and steel bridge (350 ft long). Built with wood piles at least 24 ft apart Would follow the alignment of the floating bridge
South Boardwalk	None	8-foot-wide combined boardwalk (for 20 ft) 5-foot-wide pedestrian boardwalk (715 ft long) that would end 100 ft from the bus parking area 8-foot-wide vehicle ramp (210 ft long) that would end at the existing access road	8-foot-wide combined pedestrian and vehicle ramp (200 ft long). Would end at the existing access road	8-foot-wide combined pedestrian and vehicle ramp (630 ft long) Would cross a section of forest on its northern end Would end 100 ft from the bus parking area	8-foot-wide combined pedestrian and vehicle ramp (200 ft long) Would end at the existing access road
Barge Landing / Access Road	Would remain on the south side of the mouth of Brooks River Hardened ramp (24 ft to 30 ft wide and 270 ft to 340 ft long) would be installed on the existing landing site	A new barge landing would be constructed on the shore of Naknek Lake about 2,000 ft south of the existing barge landing; a hardened ramp (24 ft to 30 ft wide and 270 ft to 340 ft long) would be installed on the site A 1,500-foot road would be constructed to access the barge landing The existing barge landing area, boat storage / staging area and gravel access road (600 ft) on the south side of the river would be removed and restored to natural conditions	A new barge landing would be constructed on the shore of Naknek Lake about 200 ft south of the existing barge landing; a hardened ramp (24 ft to 30 ft wide and 270 ft to 340 ft long) would be installed on the site A 100-foot road would be constructed to access the barge landing. Most of the road along the south shore of Brooks River would continue to be used The existing barge landing area, boat storage / staging area, and about 300 ft of the gravel access road on the south side of the river would be removed and restored to natural conditions	A new barge landing would be constructed on the shore of Naknek Lake about 2,000 ft south of the existing barge landing; a hardened ramp (24 ft to 30 ft wide and 270 ft to 340 ft long) would be installed on the site A 1,500-foot road would be constructed to access the barge landing The existing barge landing area, boat storage / staging area, and gravel access road (600 ft) on the south side of the river would be removed and restored to natural conditions	A new barge landing would be constructed on the shore of Naknek Lake about 2,000 ft south of the existing barge landing; a hardened ramp (24 ft to 30 ft wide and 270 ft to 340 ft long) would be installed on the site A 1,500-foot road would be constructed to access the barge landing The existing barge landing area, boat storage / staging area, and gravel access road (600 ft) on the south side of the river would be removed and restored to natural conditions
Viewing/Pullout Areas	Viewing platform on the south side of Brooks River would remain	Up to seven viewing areas / pullouts along the boardwalks and at the bridge termini —four on the north side of Brooks River and three on the south side of the river	Up to four viewing areas / pullouts —two on the north side of Brooks River and two on the south side of Brooks River	Up to seven viewing areas / pullouts along the boardwalks and at the bridge termini —four on the north side of Brooks River and three on the south side of the river	Up to six viewing areas / pullouts along the boardwalk and at the bridge termini—four on the north side of Brooks River and two on the south side of the river

TABLE 4. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Brown Bears	Alternative 1 would result in continuing long-term, moderate, adverse, and localized impacts on the brown bear. Adverse parkwide effects would occur if habituated bears from Brooks Camp move into other areas in the region. These adverse effects would primarily result from continuing ground level human-bear interactions between Brooks Camp and the bus parking area on the south side of Brooks River. The interactions would continue to result from the physical overlap of human high use areas at ground level (visitors and staff) and brown bear high use areas (along the river, near the mouth, and along Naknek Lake). Occasional unsafe human-bear interactions would be expected to continue as well as the resulting human habituation of bears, with the potential for bears being injured or killed.	Alternative 2 would result in short- and long-term, moderate, adverse, and primarily localized impacts on brown bears due to human disturbances to bears and their habitat. There still would be potential for human habituation of bears and some potential for occasional unsafe human-bear interactions and bears being injured or killed. These adverse effects would mainly result from the notable distance of overhead human activity above bears and bear habitat in the area (pedestrians and vehicles); a decrease in the horizontal separation between bears and humans (i.e., people on the elevated structures); an increase in the visual and audio exposure of human activities; and a disturbance to the bear habitat in the project area with construction-related activities and noises. However, when compared to alternative 1, brown bears would benefit from the removal of the floating bridge, a reduced potential for ground level human-bear interactions along the Brooks River corridor, an undisturbed and buffered area for bear resting or movement near the river mouth (i.e., the Corner area), and the relocation of the barge landing site approximately 2,000 ft to the south along the Naknek Lake shoreline.	Alternative 3 would result in short- and long-term, moderate, adverse, and primarily localized impacts on brown bears. There still would be potential for human habituation of bears and some potential for occasional unsafe human-bear interactions and for bears being injured or killed. These adverse effects would mainly result from the proposed overhead human activity above bears and bear habitat in the area (pedestrians, staff, and vehicles); a decrease in the horizontal separation between bears and humans (i.e., people on the elevated structures); an increase in the visual and audio exposure of human activities on the boardwalks and bridge; a disturbance to the bear habitat in the project area with construction-related activities and noises; and continued ground level interactions between bears and humans (primarily on the south side of the river where elevated boardwalks terminate). However, when compared to alternative 1, brown bears would benefit from the elimination of the floating bridge and a reduced potential for ground level human-bear interactions on the north side of the river.	Alternative 4 would result in a long-term, moderate, adverse, and primarily localized impact on brown bears. There still would be potential for human habituation of bears and some potential for occasional unsafe human-bear interactions and for bears being injured or killed. These adverse effects would mainly result from the notable distance of overhead human activity above bears and bear habitat in the area (pedestrians, staff, and vehicles); a decrease in the horizontal separation between bears and humans (i.e., people on the elevated structures); an increase in the visual and audio exposure of human activities; and a disturbance to the bear habitat in the project area with construction-related activities and noises. However, when compared to alternative 1, brown bears would benefit from the removal of the floating bridge, a reduced potential for ground level human-bear interactions along the Brooks River corridor, an undisturbed and buffered area for bear resting or movement near the river mouth (i.e., the Corner area), and the relocation of the barge landing approximately 2,000 ft to the south along the Naknek Lake shoreline.	Alternative 5 would result in a long-term, moderate, adverse, and primarily localized impact on brown bears. There still would be the potential for human habituation of bears and some potential for occasional unsafe human-bear interactions and for bears being injured or killed. These adverse effects would mainly result from the notable distance of overhead human activity above bears and bear habitat in the area (pedestrians, staff, and vehicles); a decrease in the horizontal separation between bears and humans (i.e., people on the elevated structures); an increase in the visual and audio exposure of human activities; and a disturbance to the bear habitat in the project area with construction-related activities and noises. However, when compared to alternative 1, brown bears would benefit from the removal of the floating bridge, a reduced potential for ground level human-bear interactions along the Brooks River corridor, an undisturbed and buffered area for bear resting or movement near the river mouth (i.e., the Corner area), and the relocation of the barge landing approximately 2,000 ft to the south along the Naknek Lake shoreline.
Salmon, Rainbow Trout, and Arctic Grayling	Alternative 1 would result in continuing short- to long-term, minor, adverse, and localized impacts on salmon, rainbow trout, and arctic grayling in Brooks River. These effects would result from the continued annual use of the floating bridge across Brooks River. The bridge would continue to be an impediment to fish migration in the upper portions of the water column, but fish could still migrate up and downriver. The presence of the bridge and the annual bridge installation would alter spawning habitat by disturbing the riverbed, and could result in some arctic grayling spawning being adversely affected.	Alternative 2 would result in short- to long-term, minor, adverse, and localized impacts on salmon, rainbow trout, and arctic grayling in Brooks River. These effects would result from the addition of two permanent flow obstructions to the channel (i.e., two bridge pile systems spaced at 120 ft) and the associated construction disturbances in the channel. The support piles and river debris that catches on them could obstruct fish passage and alter flow hydraulics, which may result in scouring and sediment deposition in the river. However, salmon, rainbow trout, and arctic grayling would benefit from the elimination of the temporary floating bridge and its associated negative effects on fish passage and spawning habitat.	Alternative 3 would result in short- to long-term, minor, adverse, and localized impacts on salmon, rainbow trout, and arctic grayling in Brooks River. These effects would result from the addition of six permanent flow obstructions to the channel (i.e., six bridge pile systems spaced 50 ft apart) and the associated construction disturbances in the channel. The support piles, and river debris that catches on them, could obstruct fish passage and alter flow hydraulics, which may result in scouring and sediment deposition in the river. However, salmon, rainbow trout, and arctic grayling would benefit from alternative 3 due to the elimination of the temporary floating bridge and its associated negative effects on fish passage and spawning habitat.	Alternative 4 would result in short- to long-term, moderate, adverse, and localized impacts on salmon, rainbow trout, and arctic grayling in Brooks River. These effects would result from the addition of up to 14 permanent flow obstructions in the channel (i.e., 14 bridge pile systems spaced at 24 ft) and the associated construction disturbances in the channel. The support piles, and river debris that catches on them, could obstruct fish passage and alter flow hydraulics, which may result in scouring and sediment deposition in the river. However, salmon, rainbow trout, and arctic grayling would benefit from alternative 4 due to the elimination of the temporary floating bridge and its associated negative effects on fish passage and spawning habitat.	Alternative 5 would result in short- to long-term, moderate, adverse, and localized impacts on salmon, rainbow trout, and arctic grayling in Brooks River. These effects would result from the addition of up to 14 permanent flow obstructions to the channel (i.e., 14 bridge pile systems spaced at 24 ft) and the associated construction disturbances in the channel. The support piles, and river debris that catches on them, could obstruct fish passage and alter flow hydraulics, which may result in scouring and sediment deposition in the river. However, salmon, rainbow trout, and arctic grayling would benefit from alternative 5 due to the elimination of the temporary floating bridge and its associated negative effects on fish passage and spawning habitat.

TABLE 4. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Bald Eagle	Alternative 1 would result in a continuing long-term, minor, adverse, and localized impact on the bald eagles in the Brooks River area. These adverse effects would primarily result from the continuance of seasonal human activity throughout the project area. However, the disturbances resulting from alternative 1 would not be expected to affect bald eagle nesting in the area.	Alternative 2 would result in short- and long-term, moderate, adverse, localized impacts on the bald eagles in the Brooks River area. These adverse effects would primarily result from the construction and future use of a new barge landing area and access road near an eagle nest and Beaver Pond foraging and roosting areas. These activities could adversely affect bald eagle nesting in the Beaver Pond area.	Alternative 3 would result in short- to long-term, minor, adverse, and localized impacts on the bald eagles in the Brooks River area. These effects would result from general human activity in the Brooks River area, including continued use of the barge landing site and access road.	Alternative 4 would result in short- and long-term, moderate, adverse, localized impacts on the bald eagles in the Brooks River area. These adverse effects would primarily result from the construction and future use of a new barge landing area and access road near an eagle nest and Beaver Pond foraging and roosting areas. These activities could adversely affect bald eagle nesting in the Beaver Pond area.	Alternative 5 would result in short- and long-term, moderate, adverse, and localized impacts on the bald eagles in the Brooks River area. These adverse effects would primarily result from the construction and future use of a new barge landing area and access road near an eagle nest and Beaver Pond foraging and roosting areas. These activities could adversely affect bald eagle nesting in the Beaver Pond area.
Wetlands and Upland Vegetation	Alternative 1 would result in the continuation of long-term, minor, adverse, and localized impacts on wetlands and vegetation. These adverse effects would result from continued vegetation trampling and social trails from ground level pedestrian and vehicle use in the Corner area on the north side of the river and between the floating bridge and the bus parking area on the south side of the river. The continued hydrological disturbances to wetlands E, F, and G adjacent to the access roads along the south bank and between the bridge and the bus parking area would also contribute to this adverse effect.	Alternative 2 would result in short- to long-term, moderate, adverse, and localized impacts on wetlands and vegetation. The adverse effects would primarily result from displaced and altered vegetation along the alignment of the proposed boardwalks, disturbances to wetlands H and I (to the west of Brooks Camp) and wetlands E and F (between the bridge and the bus parking area), vegetation and wetland impacts from the proposed access road to the new barge landing area (wetlands A, B, C, D, and J), and possible impacts from site construction activities (e.g., sedimentation, fugitive dust deposition, and propagation of nonnative invasive plant species). However, wetlands and vegetation would also benefit from the reduced potential for vegetation trampling and social trails on both sides of the river and the restored wetland hydrology of wetland G along the restored barge landing access road area.	Alternative 3 would result in a short- to long-term, minor, adverse, and localized impact on wetlands and vegetation. The adverse effects would primarily result from displaced and altered vegetation along the alignment of the proposed boardwalk and possible impacts from site construction activities (e.g., sedimentation, fugitive dust deposition, and propagation of nonnative invasive plant species). However, the proposed boardwalks, ramps, and accesses are primarily aligned in already disturbed areas, so the adverse effects would be minimal. The wetland and upland vegetation would also benefit from the reduced potential for vegetation trampling and social trails on the north side of the river.	Alternative 4 would result in a short- to long-term, moderate, adverse, and localized impact on wetlands and vegetation. The adverse effects would primarily result from displaced and altered vegetation along the alignment of the proposed boardwalks; disturbances to wetlands H and I (west of Brooks Camp) and wetlands E and F (between the bridge and the bus parking area); vegetation and wetland impacts from the new access road to the new barge landing area (wetlands A, B, C, D, and J); and possible impacts from site construction activities (e.g., sedimentation, fugitive dust deposition, and propagation of nonnative invasive plant species). However, wetlands and vegetation would also benefit from the reduced potential for vegetation trampling and social trails on both sides of the river, restored vegetation along the access road between the bridge and bus parking area, and the restored wetland hydrology of wetland G along the restored barge landing access road area.	Alternative 5 would result in short- to long-term, moderate, adverse, and localized impacts on wetlands and vegetation. The adverse effects would primarily result from displaced and altered vegetation along the alignment of the proposed boardwalks; disturbances to wetlands H and I (west of Brooks Camp); vegetation and wetland impacts from the proposed access road to the new barge landing area (wetlands A, B, C, D, and J); and possible impacts from site construction activities (e.g., sedimentation, fugitive dust deposition, and propagation of nonnative invasive plant species). However, wetlands and vegetation would benefit from the reduced potential for vegetation trampling and social trails on the north side of the river and the restored wetland hydrology of wetland G along the restored barge landing access road area.
Hydrology and Floodplains	Alternative 1 would continue to have a long-term, moderate, adverse, and localized effect on hydrology and floodplains. These adverse effects would primarily result from the continued use of the floating bridge across Brooks River. The bridge would continue to alter river flow hydraulics and geomorphology (because of blocking upper levels of water column), as well as contribute to bank erosion in areas near the bridge anchor points.	Alternative 2 would have short- to long-term, minor, adverse, and localized impacts on hydrology and floodplains, primarily from the addition of two permanent flow obstructions to the channel (two bridge pile systems spaced at 120 ft) and the associated construction disturbances in the channel. The support piles, and river debris that catches on them, would alter flow hydraulics, which could also result in riverbed scouring and sandbar development. However, the hydrology and floodplains would benefit from the removal of the floating bridge (that alters river flow hydraulics and flooding and contributes to bank erosion near its anchors) and the restoration of surface and subsurface flows between wetland G and the river (along the existing barge landing access road).	Alternative 3 would have short- to long-term, minor, adverse, and localized impacts on hydrology and floodplains, primarily from the addition of six permanent flow obstructions to the channel (i.e., six sets of bridge pile systems spaced at 50 ft) and the associated construction disturbances in the channel. The support piles, and river debris that catches on them, would alter flow hydraulics, which could also result in riverbed scouring and sandbar development. However, the hydrology would benefit from the removal of the floating bridge (that alters river flow hydraulics and flooding, and contributes to bank erosion near its anchors).	Alternative 4 would have short- to long-term, moderate, adverse, and localized impacts on hydrology and floodplains, primarily from the addition of up to 14 permanent flow obstructions to the channel (14 bridge pile systems spaced at 24 ft) and the associated construction disturbances in the channel. The support piles, and river debris that catches on them, would alter flow hydraulics, which could also result in scouring and sandbar development. However, the hydrology would benefit from the removal of the floating bridge (that alters river flow hydraulics and flooding, and contributes to bank erosion near its anchors) and the restoration of surface and subsurface flows between wetland G and the river (along the existing barge landing access road).	Alternative 5 would have short- to long-term, moderate, adverse, and localized impacts on hydrology and floodplains, primarily from the addition of up to 14 permanent flow obstructions to the channel (14 bridge pile systems spaced at 24 ft) and the associated construction disturbances in the channel. The support piles, and river debris that catches on them, would alter flow hydraulics, which could also result in scouring and sandbar development. However, the hydrology would benefit from the removal of the floating bridge (that alters river flow hydraulics and flooding, and contributes to bank erosion near its anchors) and the restoration of surface and subsurface flows between wetland G and the river (along the existing barge landing access road).

TABLE 4. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Soundscape	The effect of alternative 1 on the natural soundscape in the project area would continue to be long-term, minor, adverse, and localized. These adverse effects would primarily result from the continued noise generation from human activities associated with Brooks Camp (e.g., visitors and staff, motorized vehicles, and generator noises from NPS/concessioner operations). The noise disturbances would primarily originate at ground level, occur in the summer, and would extend out from Brooks Camp, the campground, the Lake Brooks area, and along the roads and trails that connect these sites.	Alternative 2 would have short- and long-term, moderate, adverse, and localized impacts on the natural soundscape. Adverse impacts would primarily result from construction-related noise, increasing the audio exposure of human activities on the boardwalks/bridge, and introducing park operations noises to a new access corridor and barge landing area to the south. The removal/relocation of two notable noise sources along open, exposed areas of the Brooks River corridor (barge landing and access road) would benefit the soundscape along Brooks River, but introduce noise sources to a relatively undisturbed area to the south.	Alternative 3 would have short- and long-term, moderate, adverse, and localized impacts on the natural soundscape. Adverse impacts would primarily result from construction-related noise, increasing the audio exposure of human activities on the boardwalks/bridge. The slight relocation of the barge landing away from the mouth of Brooks River could benefit the soundscape. There would likely be a 2-year duration of noise impacts due to the longer construction period for this bridge design.	Alternative 4 would have short- and long-term, moderate, adverse, and localized impacts on the natural soundscape. Adverse impacts would primarily result from construction-related noise, increasing the audio exposure of human activities on the boardwalks/bridge, and introducing park operations noises to a new access corridor and barge landing area to the south. The removal/relocation of two notable noise sources along open, exposed areas of the Brooks River corridor (barge landing and access road) would benefit the soundscape along Brooks River, but would introduce noise sources to a relatively undisturbed area to the south.	Alternative 5 would have short- and long-term, moderate, adverse, and localized impacts on the natural soundscape. Adverse impacts would primarily result from construction-related noise, increasing the audio exposure of human activities on the boardwalks/bridge, and introducing park operations noises to a new access corridor and barge landing area to the south. The removal/relocation of two notable noise sources along open, exposed areas of the Brooks River corridor (barge landing and access road) would benefit the soundscape along Brooks River, but would introduce noise sources to a relatively undisturbed area to the south.
Archeological Resources	The no-action alternative would have long-term, minor, adverse impacts on archeological resources contributing to the eligibility of Brooks River Archeological District National Historic Landmark.	Alternative 2 would have long-term, localized, minor, adverse impacts on archeological resources contributing to the eligibility of Brooks River Archeological District National Historic Landmark. **Section 106 Summary.** After applying Advisory Council on Historic Preservation (ACHP) criteria of adverse effect (36 CFR Part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that alternative 2 would result in *no adverse effect* on archeological resources.	Alternative 3 would have long-term, localized, minor, adverse impacts on archeological resources contributing to the eligibility of Brooks River Archeological District National Historic Landmark. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 3 would result in *no adverse effect* on archeological resources.	Alternative 4 would have long-term, localized, minor, adverse impacts on archeological resources contributing to the eligibility of Brooks River Archeological District National Historic Landmark. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 4 would result in *no adverse effect* on archeological resources.	Alternative 5 would have long-term, localized, minor adverse impacts on archeological resources contributing to the eligibility of the Brooks River Archeological District National Historic Landmark. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 5 would result in *no adverse effect* on archeological resources.
Historic Structures and Cultural Landscapes	The no-action alternative would have long-term, localized, minor, adverse impacts on historic structures and cultural landscape features contributing to the significance of the Brooks Camp historic district.	Alternative 2 would have long-term, localized, moderate, adverse impacts on historic structures and cultural landscape features contributing to the significance of the Brooks Camp historic district. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 2 would result in an *adverse effect* on the Brooks Camp cultural landscape because of the bridge and boardwalk construction.	Alternative 3 would have long-term, localized, moderate, adverse impacts on historic structures and cultural landscape features contributing to the significance of the Brooks Camp historic district. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 3 would result in an *adverse effect* on the Brooks Camp cultural landscape because of the bridge and boardwalk construction.	Alternative 4 would have long-term, localized, moderate, adverse impacts on historic structures and cultural landscape features contributing to the significance of the Brooks Camp historic district. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 4 would result in an *adverse effect* on the Brooks Camp cultural landscape because of the bridge and boardwalk construction.	Alternative 5 would have long-term, localized, moderate, adverse impacts on historic structures and cultural landscape features contributing to the significance of the Brooks Camp historic district. **Section 106 Summary**. After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 5 would result in an *adverse effect* on the Brooks Camp cultural landscape because of the bridge and boardwalk construction.
Ethnographic Resources	The no-action alternative would have long-term, localized, minor impacts on ethnographic resources in the vicinity of Brooks River Archeological District National Historic Landmark.	Alternative 2 would have long-term, localized, minor, adverse impacts on ethnographic resources in the vicinity of Brooks River Archeological District National Historic Landmark. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 2 would result in *no adverse effect* on ethnographic resources.	Alternative 3 would have long-term, localized, minor, adverse impacts on ethnographic resources in the vicinity of Brooks River Archeological District National Historic Landmark. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 3 would result in *no adverse effect* on ethnographic resources.	Alternative 4 would have long-term, localized, minor, adverse impacts on ethnographic resources in the vicinity of Brooks River Archeological District National Historic Landmark. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 4 would result in *no adverse effect* on ethnographic resources.	Alternative 5 would have long-term, localized, minor, adverse impacts on ethnographic resources in the vicinity of Brooks River Archeological District National Historic Landmark. **Section 106 Summary.** After applying ACHP criteria of adverse effect (36 CFR Part 800.5), the National Park Service concludes that alternative 5 would result in *no adverse effect* on ethnographic resources.

TABLE 4. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Visitor Experience	The no-action alternative would have localized, moderate, long-term, beneficial impacts on visitor experience because of the sense of adventure associated with viewing bears in close proximity. Despite substantial efforts to educate visitors and monitor human-bear interactions, the no-action alternative would also perpetuate visitor safety concerns because of frequent unwanted human-bear interactions. Combined with the continued use of the floating bridge by both pedestrians and vehicles, alternative 1 would have localized, major, long-term, adverse impacts on visitor safety.	In general, alternative 2 would have localized, moderate, long-term, beneficial impacts on the visitor experience associated with creating a travel corridor that would avoid interruptions from bear conflicts while at the same time providing new bear viewing areas along the bridge and boardwalks. Localized, moderate, short-term, adverse impacts would only be associated with temporary construction activities. Alternative 2 would also greatly improve visitor safety by providing a safe travel corridor that avoids human-bear interactions—a localized, moderate, long-term, beneficial impact. This result includes the consideration of localized, minor, long-term, adverse impacts that would also occur because of the potential risk from pedestrian-vehicle conflicts on the extensive bridge and boardwalk system and the relocation of the barge landing and storage of emergency boats further away.	Alternative 3 would have an overall localized, moderate, long-term, beneficial impact on the visitor experience by improving access and providing for additional bear watching opportunities. Localized, moderate, short-term, adverse impacts would be associated with noise and intrusions from construction activities during project implementation but could easily be mitigated. The new bridge and boardwalk additions proposed in this alternative would have localized, moderate, long-term, beneficial impacts on visitor and employee safety by providing a safe travel corridor. This result includes the consideration of some level of risk associated with the potential for pedestrian-vehicle conflicts on the corridor, which would continue and result in localized, minor, long-term, adverse impacts.	Alternative 4 would have localized, major, long-term, beneficial impacts on the visitor experience by improving access and providing for additional bear-watching opportunities, and by providing a ramp to access the south bank of the river. Localized, moderate, short-term, adverse impacts would be associated with noise and visual intrusions from construction activities. Alternative 4 would also result in localized, moderate, long-term, beneficial impacts on visitor safety by providing an extensive elevated travel corridor directly connecting Brooks Camp to the bus parking area and viewing platforms on the south side. Emergency design features, such as a ladder on the north side and ramp on either end of the bridge, would contribute to mitigating risks in the event of an incident or a need to access/evacuate the elevated boardwalk and bridge because of an unexpected bear encounter. This result includes the consideration of localized, minor, long-term, adverse impacts on visitor safety would result from risks associated with use of the bridge and extensive boardwalk system by pedestrians and vehicles and the delays in emergency response time associated with the storage of emergency boat access further from the camp area.	Alternative 5 would have localized, moderate, long-term, beneficial impacts on the visitor experience by providing new viewing areas and an elevated travel corridor. However, localized, minor, short-term, adverse impacts on the visitor experience would occur from construction activities. This alternative would also greatly improve visitor safety by providing an elevated travel corridor with emergency access ladder, having localized, moderate, long-term, beneficial impacts. This includes the consideration of localized, minor, long-term, adverse impacts would be associated with potential pedestrian-vehicle conflicts and delays in emergency response time associated with the storage of emergency boat access further from the camp area.
Visual/Scenic Resources	Though easily identifiable from foreground views along the immediate shorelines of Brooks River, the view of the floating bridge is low in the overall landscape. Similarly, the barge landing, access roads, and trails would continue to be noticeable within the viewshed. Overall, the no-action alternative would continue to have local, moderate, long-term, adverse impacts on visual resources and scenery.	Alternative 2 would have the largest development of infrastructure among the action alternatives, resulting in localized, moderate, long-term, adverse impacts on the visual resources from the perspective of a visitor looking at the bridge or new barge landing site, but would result in localized, moderate, long-term, beneficial visual impacts for visitors while on the bridge or boardwalks because of the removal of the trail through the Corner and the access road to the barge landing along the south bank.	Alternative 3 proposes a more consolidated bridge and boardwalk design with a smaller development footprint than alternative 2, but these features would still be easily visible to all visitors in foreground and middle ground views. Overall, these actions would result in localized, moderate, long-term, adverse impacts on visual resources and scenery.	Alternative 4 proposes a major increase in the development footprint, adding extensive boardwalks on either side of the bridge. The bridge design itself would produce a highly visible profile against the riparian landscape. The construction of a new access road would create an easily identifiable impact on the natural scenery in that area, but the viewshed on the riverbank would be greatly improved. Overall, this alternative would result in localized, moderate, long-term, adverse impacts on the visual resources from the perspective of a visitor looking at the bridge or new barge landing site, but would result in localized, moderate, long-term, beneficial visual impacts for visitors on the bridge or boardwalks.	Overall, alternative 5 would produce localized, moderate, long-term, adverse impacts on the visual resources from the perspective of a visitor looking at the bridge or new barge landing site because of these developments would not blend into the landscape, but the alternative would result in localized, moderate, long-term, beneficial visual impacts for visitors on the bridge or boardwalks because the trail through the Corner and the access road along the south bank would be removed.

TABLE 4. SUMMARY OF IMPACTS OF THE ALTERNATIVES

Impact Topic	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Socioeconomic Environment	Alternative 1 would have minor, long-term, beneficial effects to the regional economy. These effects would be primarily tied to federal and visitor spending, as well as the provision of commercial and guide services in the park.	Alternative 2 would result in short- and long-term, minor, beneficial impacts on the regional economy. These effects would primarily result from construction of the bridge/boardwalk, hardening of the barge landing site, and some additional commercial activity.	Alternative 3 would result in short- and long-term, minor, beneficial impacts on the regional economy. These effects would primarily result from construction of the bridge/boardwalk, hardening of the barge landing site, and some additional commercial activity.	Alternative 4 would result in short- and long-term, minor, beneficial impacts on the regional economy. These effects would primarily result from construction of the bridge/boardwalk, hardening of the barge landing site, and some additional commercial activity.	Alternative 5 would result in short- and long-term, minor, beneficial impacts on the regional economy. These effects would primarily result from construction of the bridge/boardwalk, hardening of the barge landing site, and some additional commercial activity.