NATIONAL PARK SERVICE • U.S. DEPARTMENT OF THE INTERIOR

Lake Mead National Recreation Area

SUSTAINABLE LOW WATER ACCESS PLAN / ENVIRONMENTAL ASSESSMENT

JULY 2023

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CHAPTER 1:

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CHAPTER 1: PURPOSE AND NEED

PARK PURPOSE

The purpose of Lake Mead National Recreation Area (the park) is to provide diverse public recreation, benefit, and use on Lakes Mead and Mohave and surrounding lands in a manner that preserves the ecological, geological, cultural, historical, scenic, scientific, and wilderness resources of the park. America's first and largest national recreation area, the park encompasses Lake Mohave, Lake Mead, and the surrounding land for a total just under 1.5 million acres. Lake Mead was formed after the construction of the Hoover Dam on the Colorado River between Nevada and Arizona in 1935. Lake Mohave followed when Davis Dam was constructed in 1951, creating a narrow and shallow reservoir where the Colorado River once was. These two reservoirs provide power, water, tourism, and recreational activities to the gateway communities, including the cities of Las Vegas, Henderson, Boulder City, Overton, Meadview, and others.

Lake Mohave and Lake Mead have several locations that have provided public water access for boating. Over time, public water access points around the park have included Boulder Harbor, Echo Bay, Callville Bay, Hemenway Harbor, Temple Bar, and South Cove. The park hosts approximately 8 million visitors annually and contributes $374 million to the regional economy, supporting approximately 4,000 jobs. The park provides plentiful opportunities for water-based recreation, with millions of visitors coming to enjoy the area's fundamental values of boating, swimming, sailing, kayaking, fishing, and other activities.

BACKGROUND

The Upper Basin of the Colorado River has experienced exceptionally dry conditions since the early 2000s. Coupled with the ongoing effects of climate change, reduced snowpack, and low runoff conditions, the unprecedented challenges associated with managing recreational infrastructure and related access at NPS sites, including Lake Mead National Recreation Area, have accelerated faster than what the National Park Service had planned for based on previous water level projections by the Bureau of Reclamation (BOR). While the National Park Service manages recreation and access to the site, the Bureau of Reclamation oversees the water levels daily and manages water releases and retention.

In July 2000, the water levels of Lake Mead were at an elevation of 1,200 feet. In June 2005, the Lake Mead water level was recorded at 1,140.46 feet, a level that could support all six launch ramps and marinas for motorized boating access to the lake. In July 2022, water levels had dropped to 1,041 feet, a 159-foot drop over the last 22 years. During 2022, the water levels dropped another 20 vertical feet in three months, revealing 400 feet of new shoreline. At the current elevation, 1,054 feet in May 2023, the launch ramps with temporary modifications (at Callville Bay and Temple Bar) allow launching for water-based recreation at reduced volumes. In recent years, the water levels have continued to decline rapidly, approaching the elevation of 950 feet, requiring the park to focus on near-term planning. The Bureau of Reclamation estimates in their most probable 24-month study that water levels will rise an additional 20 feet to 1,067 feet by October 2023. With the existing infrastructure, associated temporary modifications at Callville Bay and Temple Bar, and most recent probable projections, park resources and recreation opportunities are more available and less constrained in the near term. Long term, it's anticipated

that park resources and recreation opportunities will continue to be affected by low water, and additional launch ramps could be closed.

SCOPE AND PROJECT AREA FOR THIS PLAN/EA

Project Area – Launch Ramps

The project area focuses on five Lake Mead sites: Callville Bay, Echo Bay, Hemenway Harbor, South Cove, and Temple Bar, where NPS visitor shoreline facilities are being impacted by lowering lake levels. The geographic scope of this plan is illustrated in the map below (figure 1).

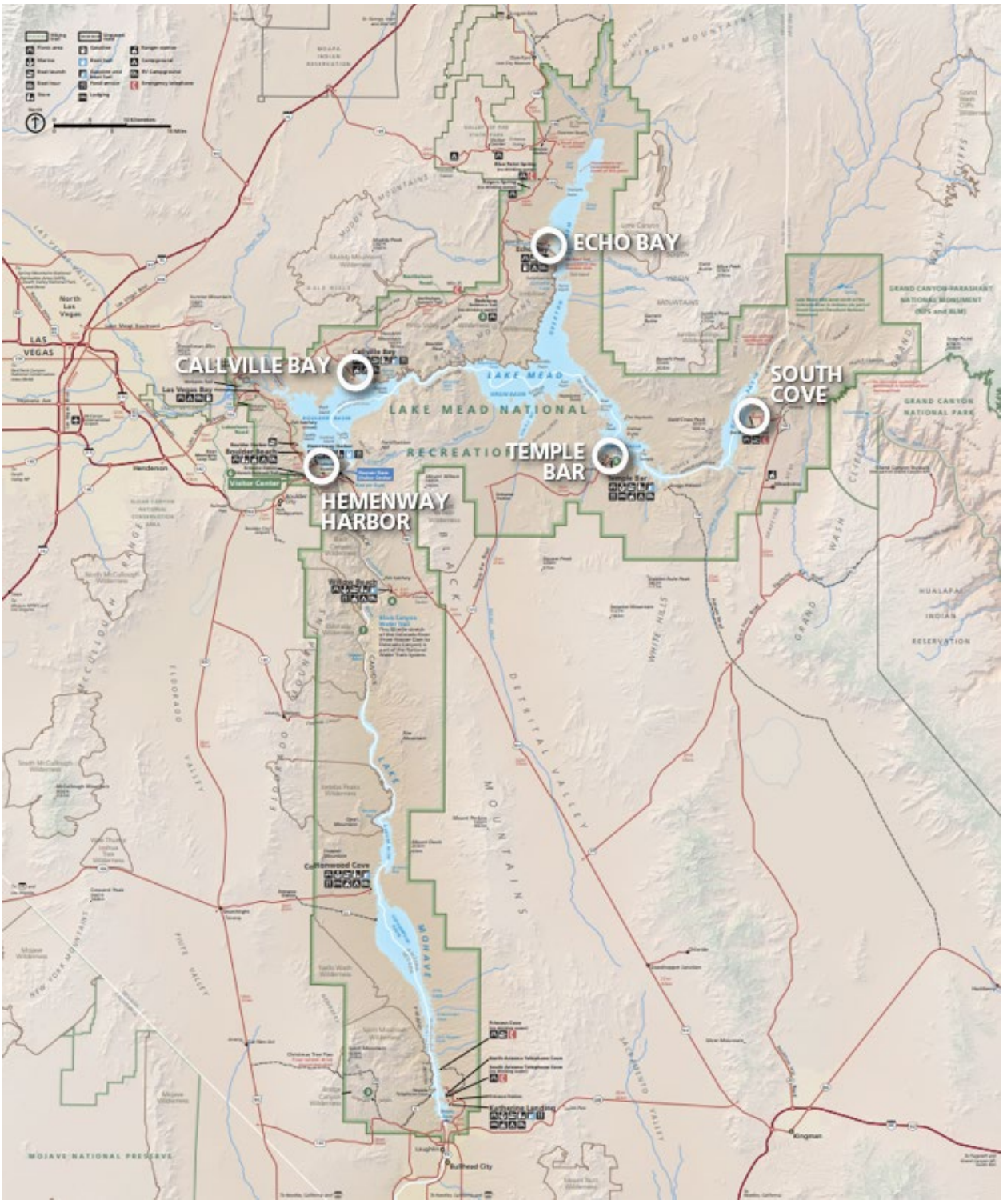


FIGURE 1. MAP OF LAKE MEAD NATIONAL RECREATION AREA SUSTAINABLE LOW WATER ACCESS PLAN/ENVIRONMENTAL ASSESSMENT PROJECT AREA

The Lake Mead National Recreation Area Draft Sustainable Low Water Access Plan and Environmental Assessment (plan/EA) integrates and further evaluates the rapid assessment and response (RAR) process and related prioritized actions (see below for a description of the RAR purpose and process; see appendix C). The plan/EA includes required implementation elements such as infrastructure removal; a targeted assessment of new water-related access and recreation opportunities that would be explored given changing water levels; and specific tools for managing use, facilities, and resources, given the changes in access. The plan/EA includes cost estimates for net construction costs, operational and maintenance costs, and possible abandonment of facilities. The plan/EA evaluates the sustainability of actions and opportunities to leverage available infrastructure funding. In addition, the feasibility of commercial operations is considered for future management to identify and support recreational opportunities that are sustainable and achievable. This plan/EA identifies other recreational opportunities beyond motorized boating access, including evaluating the feasibility of repurposing existing boat launches for kayakers and other nonmotorized uses.

The park also includes Lake Mohave, but this area is not within the scope of this project, which focuses on the five Lake Mead sites. This plan/EA does not extend to reenvisioning visitor use and experience for the park beyond the five sites. The scope of this plan/EA is focused on the assessment of water-related access, recreation opportunities, tools for managing facilities for managing access, and repurposing existing facilities to provide for nonmotorized launching at the key locations.

PURPOSE AND NEED FOR THE PLAN/EA

Purpose of the Plan/EA

The purpose of the sustainable low water access plan/EA is to develop an updated strategic direction for the future of motorized boat launching, related commercial services, facility and infrastructure needs, and related implementation actions at five priority locations.

Need for Action

The plan/EA is needed to:

- Fill an urgent and high-priority need to help make critical decisions to inform boating access.
- Provide updated direction for natural and cultural resource programs.
- Identify opportunities for nonmotorized water-based access.
- Evaluate potential site closures given lower water levels and the associated considerations for commercial operations.

The Lake Mead Sustainable Low Water Access Plan/Environmental Assessment is intended to evaluate lower cost and more feasible alternatives to the 2018 low water plan (NPS 2018) and subsequent 2019 finding of no significant impact (FONSI) (NPS 2019). The 2019 FONSI called for building boat ramp access in five locations to be serviceable to a lake elevation of 950 feet. The expectation at the time was that a lake level of 1,050 was more likely. A drop to 950 feet, if it ever happened, was expected to take many years, allowing funding to be spread over a long period. In

just the four years since that plan was developed, water levels have dropped about 50 feet, far faster than anticipated, leaving four out of five ramps unusable during the summers of 2020–2022. This plan/EA presents alternatives for prioritizing construction for boat ramp access depending on funding levels and the sustainability of the investments. The plan/EA focuses on five high-priority sites and will serve as a general management plan amendment and provide updated guidance to replace the 2018 low water plan and the associated 2019 FONSI.

Currently, the park does not have comprehensive plans or strategies to manage lake levels below the elevation of 950 feet. As a result, Lake Mead is faced with various management challenges resulting from water level uncertainty coupled with the increasing demand for motorized water access and the associated rising visitation.

The NPS planning team has identified six key issues facing the park that need to be resolved as a part of the plan/EA. These issues are expected to continue and are likely to intensify into the future if no action is taken. The sustainable low water access plan/EA addresses all these issues to ensure that the park has sustainable access to recreation, resources are protected, and opportunities are provided for a high-quality visitor experience.

- **Diminished Quality of Visitor Experience –** Fluctuating water levels have led to uncertain access to visitor experiences for boaters. In times of extreme low water, the temporal closures at some locations have led to long wait times and uncertain opportunities to access the water extreme temperatures and minimal facilities.
- **Socioeconomics of Park Communities and Commercial Services –** Socioeconomic concerns at Lake Mead are related to gateway communities and commercial services operating in the park. Fluctuating water levels impact visitors' ability to access key opportunities, which impacts business operations for commercial services within the park and those outside the park in nearby communities. Commercial service operators are challenged with securing adequate utilities and infrastructure, including potable water needed to support commercial services.
- **Visitor-Caused Impacts on Natural Resources –** Increased visitor use in the park is impacting natural resources, specifically for terrestrial and aquatic vegetation, wildlife, and federally listed species.
- **Visitor-Caused Impacts on Cultural Resources –** Lands that were previously underwater are increasingly traversed by visitors seeking land-based recreation or attempting to launch watercraft in unauthorized areas along the shoreline. The National Park Service has increased pressure to protect and preserve archeological resources (submerged and terrestrial), historic structures, and cultural landscapes from impacts associated with shifts in marina locations.
- **Abandoned Facilities Management –** Past marina and asset relocation has left behind existing infrastructure, creating operational, financial, and safety constraints for park visitors and park management.

Desired Conditions

Defining desired conditions provides long-term direction for resource conditions, visitor experiences and opportunities, and facilities and services that the National Park Service strives to

achieve and maintain at Lake Mead National Recreation Area. Desired conditions help park managers answer the question, "what are we trying to achieve?" Desired conditions also articulate what kinds of experiences and opportunities should be provided for specific areas of the park. By identifying desired conditions and taking actions to achieve and maintain those conditions, the National Park Service can meet the purpose and need of the plan/environmental assessment. The National Park Service used previous planning and compliance documents to develop desired conditions. This plan/EA includes desired conditions that apply to all locations, as well as site specific conditions. The site-specific desired conditions are in addition to the conditions common for all. For all locations, the term "primitive" applies to both motorized and nonmotorized vessel use and indicates that launching may occur from natural surfaces at visitors' own risk, with minimal NPS maintenance compared to other locations.

Desired Conditions Common for All Locations (Hemenway Harbor, Echo Bay, Callville Bay, South Cove, Temple Bar)

Visitors will:

- have opportunities for water-based recreational experiences that are safe and enjoyable
- have access to consistent, clear, and effective messaging to understand the "why" and "how" of NPS decision making, and can manage expectations to make proactive and effective trip-planning decisions
- have access to up-to-date trip-planning information that describes services and opportunities that are available

Natural resources will:

- be enhanced from changes in infrastructure to preserve water quality and aquatic habitats that support aquatic ecosystems
- be protected and preserved through management of recreation, including the landscape around the shorelines

Cultural resources will be:

- protected and preserved while balancing and sustaining recreational enjoyment and exploration, including the landscape around the shoreline
- evaluated for preservation and potential rehabilitation to accommodate a compatible contemporary use, including structures in historic districts that can tell the stories of the park's history and desert landscapes

Facilities and infrastructure will:

- provide a variety of reliable services at key locations to benefit visitors as well as park operations and support the NPS mission
- support expanded shoreline access, providing access for water-based activities in a sustainable manner
- be sustainably designed, managed, and sized to address visitor needs and be feasibly maintained

- be improved efficiently—for example, if boat launches are consolidated, facilities will be simultaneously restored and maintained

Site-Specific Desired Conditions

In addition to the common for all desired conditions, these site-specific desired conditions apply to the following locations.

Echo Bay

Natural resources will:

have opportunities for resource protection to support aquatic habitats, with special concern for the federally listed endangered razorback sucker *(Xyrauchen texanus)*Visitors will:

- have an opportunity to experience the natural resources of the area such as the native wildlife, the dark night sky, and high-quality natural sounds
- have primitive experience opportunities to enjoy the area and water-based activities in locations that are minimally maintained by the National Park Service

Callville Bay

Natural resources will:

- have opportunities for resource restoration to support desert ecosystems and habitats, with special concern for the state listed, critically endangered three-corner milkvetch (*Astragalus geyeri*) population found at Sandy Cove

South Cove

Visitors will:

- continue to have primitive experience opportunities to enjoy the area where the Colorado River meets Lake Mead and embrace the desert in these far stretches

Natural resources will:

- be maintained to provide a natural habitat for native species and functional ecosystems and provide visitors with scenic viewsheds

Temple Bar

Natural resources will:

- be maintained to provide a natural habitat for native species and functional ecosystems and provide visitors with scenic viewsheds

IMPACT TOPICS IDENTIFIED FOR DETAILED ANALYSIS

The impact topics listed below are resources within the project area that may be affected either beneficially or adversely by the range of alternatives analyzed in this document. Topics were dismissed from further analysis if the National Park Service determined that (1) the potential environmental impacts on resources or values would not be substantial, (2) the impacts were not

central to the decision, or (3) a detailed analysis of these impacts was not necessary to make a reasoned choice between alternatives. The National Park Service identified the following impact topics, and they are carried forward for analysis in chapter 3.

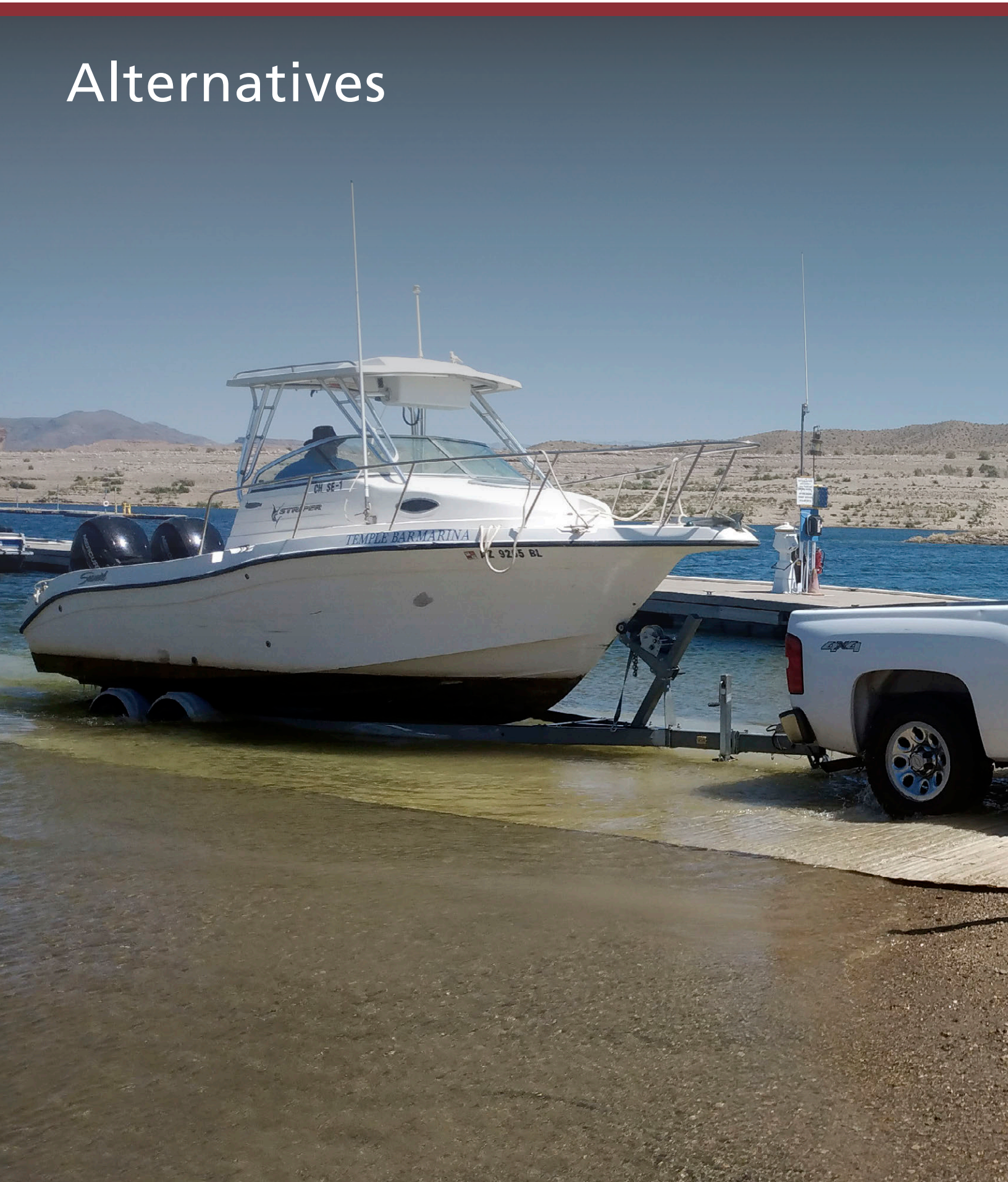
- Socioeconomics for park communities and commercial services
- Visitor use and experience for water-based recreational access and opportunities and the quality of visitor experience
- Natural resources
- Cultural resources
- Facilities

IMPACT TOPICS CONSIDERED BUT DISMISSED

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" requires federal agencies to incorporate environmental justice into their missions by identifying and addressing adverse human health or environmental effects of their actions on minorities and low-income populations and communities. None of the actions in any of the alternatives would result in adverse human health or environmental effects on minority or low-income populations. Therefore, this topic was dismissed from further analysis.

CHAPTER 2:

Alternatives



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CHAPTER 2: ALTERNATIVES

INTRODUCTION

This chapter presents the range of management alternatives, including two management alternatives and a no-action alternative, with associated actions and strategies for each location. All the action alternatives considered are consistent with and contribute to fulfilling the purpose and need for the plan/EA, management intent, and enabling legislation of Lake Mead National Recreation Area. The action alternatives (i.e., alternatives 1 and 2) present different approaches to achieve and maintain desired conditions and meet the purpose and need of the plan/EA. The no-action alternative (i.e., alternative 3) would carry forward the selected action from the 2019 finding of no significant impact and is different than current management (alternative 1). The no-action and current management alternatives are different because rapidly changing water levels, which have been significantly impacted by climate-induced drought, have forced NPS staff to adapt to provide visitors with motorized and nonmotorized recreational opportunities while also protecting resources. It should be noted that all water levels included in this chapter, presented as feet above mean sea level, are approximate, and the National Park Service acknowledges that water levels will fluctuate seasonally and annually.

A concept statement for each alternative is presented and followed by strategies that would guide NPS management of Hemenway Harbor, Echo Bay, Callville Bay, South Cove, and Temple Bar. The strategies are presented via the following three categories:

- Launch ramp and marina operations
- Facilities and services (including concession services)
- Potable water

The National Park Service generally maintains launch ramps, which allow visitors to launch their motorized vessel into the water and then park their vehicle in a nearby parking lot. Marinas are based in the water, accessed by walking along the floating docks, and are managed by concessioners. Under some scenarios, launch ramps may close temporarily or permanently, while marinas can stay open, depending on the concessioner. Alternatively, the closure of a marina does not automatically mean that a launch ramp in the same location would be closed.

This chapter also describes the general actions that are common to alternative 1 and 2 but would not be implemented under alternative 3. Alternatives considered but dismissed from further consideration with associated rationale are also presented in this chapter.

SUMMARY OF ALTERNATIVES

The concept summary statement for each alternative is as follows:

- Alternative 1 is the preferred alternative, which describes the current management of the marinas and launch ramps within the project area and proposed actions. The National Park Service would continue to provide a mixture of recreational opportunities, including motorized and nonmotorized lake access, to the degree financially feasible and cost-effective. National Park Service staff would maintain concessioner-operated marinas and

improved launching access at Hemenway Harbor, Callville Bay, and Temple Bar. At Echo Bay and South Cove, NPS staff would maintain primitive visitor access to the extent feasible.

- Alternative 2 is the alternative in which the National Park Service would cease to continue extending launch ramps, resulting in closures of associated marinas and their facilities and a termination of concession contracts. Alternative 2 evaluates a scenario in which the National Park Service would not receive sufficient appropriations to implement alternatives 1 or 3. These actions would be taken immediately, unless otherwise noted by a water level scenario. The National Park Service would provide a limited range of recreation opportunities, including nonmotorized water access and overnight use.
- Alternative 3 is the no-action alternative (40 CFR Parts 1500–1508, 1987). Most of the actions within this alternative are from the 2019 finding of no significant impact (FONSI). Where the 2019 FONSI did not provide management direction (i.e., management of potable water), the no-action alternative includes ongoing management actions.

All actions presented in the following chapter are subject to the National Park Service's ability to secure financial resources and the financial viability, constructability, safety and operational assessments, and technological capabilities at Lake Mead National Recreation Area. Given the uncertainty of funding availability, the plan/EA identifies potential strategies that NPS staff would implement if the National Park Service could not secure the financial resources needed. While the National Park Service manages recreation and access to the site, the Bureau of Reclamation oversees the water levels daily and decides when to release or retain water. Consequently, the alternatives provide a series of actions for potential scenarios based on funding availability and water level projections that the National Park Service can implement, assuming funding aligns with the time line of BOR projections and water levels. The scenario planning includes water levels for each location that trigger subsequent actions, as described in the alternatives below. The water levels that trigger additional actions vary not only across the concepts but also by location, as they are typically influenced by shoreline topography and bathymetry. For instance, shoreline topography can impact the ability to open a launch ramp if the grade is too gentle (e.g., an optimal grade for a launch ramp is 12%–15%); bathymetry refers to the shape and topography of the lakebed (underwater terrain), which can influence actions taken at surface level and can impact the park's ability to build infrastructure underwater.

ALTERNATIVE 1: NPS PREFERRED ALTERNATIVE

The preferred alternative describes current management of the marinas and launch ramps within the project area. This alternative also includes actions that have not yet been implemented but provide future management direction. The National Park Service would provide a mixture of recreational opportunities, including motorized and nonmotorized lake access, at targeted sites to the degree financially feasible and cost-effective. National Park Service staff would maintain concessioner operated marinas and improved launching access at Hemenway Harbor, Callville Bay, and Temple Bar. At Echo Bay and South Cove, NPS staff would maintain primitive visitor access to the extent feasible. This alternative would prioritize investments that ensure continued diversity of access and opportunities, including providing a range of experiences.

Hemenway Harbor

Launch Ramp and Marina Operations

Under the preferred alternative, the National Park Service would extend the launch ramp in its existing location to a water level of approximately 1,000 feet and would maintain marina operations. Ongoing berm extensions would continue to promote visitor safety and improve traffic flow. When water levels are below approximately 1,000 feet, the National Park Service would relocate the launch ramp and marina(s) closer to Hemenway Wall. Above approximately 1,000 feet, evaluate existing launch ramp location for reopening. To maintain these services, NPS staff would evaluate the feasibility of transferring the construction and operation rights of the launch ramp to the concessioner.

If the launch ramp and marinas are relocated and water levels fluctuate or consistently rise above approximately 1,000 feet, NPS staff would open the launch ramp in its original location after an evaluation for operational, financial feasibility and safety for motorized use. Access would be allowed for motorized and nonmotorized watercraft use and fishing within the Hemenway Harbor area.

Facilities and Services

Concession operations and utility corridors would continue to be maintained to provide ongoing visitor services (e.g., marina operations and services, extended utility corridors) aligned with Architectural Barriers Act Accessibility Standards. Park operations would continue to support concessioner operations of the marina, such as moving underwater anchors for courtesy dock(s), buoys, and navigation systems away from shorelines to adjust to changing marina locations.

The National Park Service would maintain visitor and operational safety services and responses such as launch ramp, docks, and fuel. The National Park Service would stop maintaining structures that are unsafe and no longer needed. National Park Service staff would evaluate abandoned infrastructure for operational, financial feasibility and safety and remove where appropriate. Natural conditions in the upper area of the harbor would be preserved to enhance the visitor experience and viewshed.

Potable Water

Boulder City would continue to provide potable water.

Echo Bay

Launch Ramp and Marina Operations

The National Park Service would maintain the closure of the existing launch ramp and provide motorized and nonmotorized limited access down to 1,000 feet via a primary access road and primitive launch ramp area. National Park Service staff would maintain the primitive launching area, meaning launches on a natural surface at visitors' own risk with minimal NPS maintenance compared to other locations. The concessioner would continue to operate the trailer village and RV sites, land-based fuel, and limited retail.

Due to topographic and bathymetric constrains of the lake bottom, primitive launch ramp operations would be closed below 1,000 feet. If water levels rise above 1,000 feet, the launch ramp would be opened at the existing location after evaluating for operational and financial feasibility

and safety for motorized use. Access to the launch ramp would be allowed for motorized and nonmotorized watercraft use and fishing.

Facilities and Services

The National Park Service would maintain the concession contract to operate land-based fuel, retail, and the trailer village and RV sites with no on-water operations. Restroom services would be maintained. Land-based fuel availability would be maintained. The site would continue to provide camping, nonmotorized boater access, and shoreline access. National Park Service staff would evaluate historic structures for removal that are unsafe and no longer needed, noting that some structures contribute to the significance of the Echo Bay Developed Area Historic District. Future compliance may be needed once the National Park Service decides on the future of these structures.

Once potable water could no longer be provided (see below), the National Park Service would discontinue concession services, and close the trailer village and RV sites, the concession-managed comfort station, and the related wastewater treatment facility. Buildings in this area are not viable for repurposing, and Echo Bay would provide primitive services only to visitors. National Park Service staff would evaluate campground options with no water, electricity, fuel, and other amenities.

If the water levels rise above 980 feet, opportunities for commercial services would be considered and evaluated.

Potable Water

The National Park Service would continue to provide potable water with current infrastructure until water levels reach 980 feet. If the National Park Service is unable to provide potable water, a time line and plan would be developed to allow time for trailer village occupants to relocate themselves and their personal property outside of the park.

Callville Bay

Launch Ramp and Marina Operations

Under current management, the concrete launch ramp at Callville Bay would continue to be closed when water levels are at 1,065 feet or below. All other facilities would continue to operate, including the launch ramp, which would continue to provide access to the marina, and the concessioner, which would continue to maintain a portable launch ramp. The National Park Service would extend the launch ramp and marina operations further into the lake to the extent feasible. A new accessible courtesy dock would be provided with the launch ramp. National Park Service staff would complete the design of all supporting infrastructure (e.g., roads, parking lot, utilities) associated with launch ramp extension and access of the marina.

Facilities and Services

The National Park Service would maintain the concessions contract to manage the trailer village, restaurant, boat shop, comfort stations, and other concession infrastructure.

Below 950 feet, out-of-water launch facilities (i.e., infrastructure that no longer reaches or provides access to the water) would be evaluated and removed if identified to be unsafe or operationally infeasible for motorized use. National Park Service staff would evaluate abandoned

infrastructure for operational and financial feasibility and safety and remove where appropriate. Employee housing and any services relying on potable water would be removed once existing infrastructure no longer provides potable water. Buildings in this area are not viable for repurposing. National Park Service staff would evaluate campground options with no water, electricity, fuel, and other amenities.

If water levels rise above approximately 1,065 feet, the National Park Service would open the concrete launch ramp at its current location within Callville Bay. Opportunities for commercial services would be considered and evaluated.

Potable Water

The National Park Service would provide potable water with current infrastructure until water levels reach 950 feet. If the National Park Service is unable to provide water, a time line and plan would be developed to allow time for trailer village and RV site occupants to relocate themselves and their personal property outside of the park.

South Cove

Launch Ramp and Marina Operations

As topography allows within this area and between 1,035 and 1,070 feet, the National Park Service would continue to support primitive launch access from the end of an NPS-approved road (i.e., South Point). The road is approximately 0.5 miles south of the existing concrete launch ramp. Below approximately 1,035 feet, no new primitive launch access would be constructed. Above approximately 1,070 feet, the National Park Service would open the concrete launch ramp for visitor use.

Facilities and Services

The National Park Service would continue to support motorized and nonmotorized launching, and no amenities or services would be provided to maintain a primitive experience. The National Park Service would consider providing opportunities for overnight use in a primitive setting (e.g., campground) for visitors. National Park Service staff would evaluate abandoned infrastructure for operational and financial feasibility and safety and remove where appropriate.

Potable Water

Current management would continue and potable water would not be provided at South Cove.

Temple Bar

Launch Ramp and Marina Operations

Under current management, NPS staff would maintain the closure of the existing NPS launch ramp when water levels are approximately 1,070 feet or below. The marina would continue to be operated and maintained by the concessioner. The concessioner would continue to maintain a portable launch ramp. The National Park Service would forgo the construction of a new launch ramp in favor of a limited launching facility to be operated by the concessioner. If needed, the concessioner could relocate the marina and portable launch ramp to provide access to 950 feet.

If the National Park Service is unable to secure financial resources, then NPS staff would terminate the concession contract and close the marina. The National Park Service would continue to provide administrative access to park boats for emergency services, research, and monitoring activities.

Facilities and Services

National Park Service staff would maintain concession contract and services, including land and water fuel stations, hotel, limited retail, restaurant and the trailer village and RV sites, and would maintain current NPS campground operations.

If the National Park Service is unable to secure financial resources to maintain the concession contract and services, it will terminate the concession contract unless the concessioner expressed interest in operating land-based facilities only. The concessioner could continue operation of the trailer village and associated infrastructure.

National Park Service staff would evaluate campground options with no water, fuel, and other amenities. The National Park Service would manage fuel for administrative use. National Park Service staff would evaluate abandoned infrastructure for operational and financial feasibility and safety and remove where appropriate. National Park Service staff would evaluate historic structures for removal that are unsafe and no longer needed, noting that some structures contribute to the significance of the Temple Bar Developed Area Historic District. Future compliance may be needed once the National Park Service decides on the future of these structures.

Potable Water

Potable water would remain available as funding and topography allows. If the National Park Service is unable to provide water, a time line and plan would be developed to allow time for trailer village occupants to relocate themselves and their personal property outside of the park.

ALTERNATIVE 2

Under this alternative, the National Park Service would cease to continue extending launch ramps, close associated marinas and their facilities, and terminate concession contracts. Alternative 3 evaluates a scenario in which the National Park Service would not receive appropriations to implement alternative 1 or 2. Due to a lack of funding to maintain operations, facilities, and services and to remove remaining infrastructure, the majority of abandoned infrastructure would remain in place.

The National Park Service would provide a limited range of recreation opportunities, including nonmotorized water access and overnight use. National Park Service staff would provide minimal, primitive, and rudimentary access to the water using the park's base funding without relying on funding from external sources. Under this alternative across all locations, the National Park Service would allow for natural conditions to enhance the visitor experience and viewshed.

Hemenway Harbor

Launch Ramp and Marina Operations

Under this alternative, the National Park Service would not extend or relocate launch ramps or marinas to provide recreational motorized boating access. Motorized vessel access would be evaluated and identified for safety and operational feasibility. National Park Service staff would maintain visitor and operational safety services as deemed necessary.

Facilities and Services

All concession services at Hemenway Harbor would be closed in conjunction with all related facilities and infrastructure related to the marina. Any associated infrastructure would remain in place until funding becomes available for removal. There would be no commercial services, but NPS visitor services, such as restrooms and trash removal, would continue. The National Park Service would allow for natural conditions to enhance the visitor experience and viewshed at Hemenway Harbor.

Potable Water

Actions would be the same as described in alternative 1.

Echo Bay

Launch Ramp and Marina Operations

Under this alternative, the National Park Service would not extend or relocate the launch ramp to provide recreational motorized access.

Facilities and Services

The National Park Service would terminate the concession contract and associated services. Concessions related infrastructure would remain in place until funding becomes available for removal. National Park Service staff would evaluate opportunities for overnight use backcountry permits for visitors.

Potable Water

Actions would be the same as described in alternative 1.

Callville Bay

Launch Ramp and Marina Operations

Under this alternative, the National Park Service would not extend or relocate the launch ramp or marina to provide recreational motorized access.

Facilities and Services

The National Park Service would terminate the concession contract and associated services and close all related facilities and infrastructure related to the marina and land-based concession facilities. This infrastructure would remain in place until funding becomes available for removal. National Park Service staff would reevaluate the longevity of overnight use, given the lack of potable water.

Potable Water

Actions would be the same as described in alternative 1.

South Cove

Launch Ramp and Marina Operations

The National Park Service would not extend or relocate primitive launching areas to provide recreational motorized access.

Facilities and Services

Actions would be the same as described in alternative 1.

Potable Water

Actions would be the same as described in alternative 1.

Temple Bar

Launch Ramp and Marina Operations

The National Park Service would not extend or relocate the launch ramp or marina to provide recreational motorized access.

Facilities and Services

The National Park Service would terminate the concession contract and associated services and close all related facilities and infrastructure related to the marina and land-based concession facilities. This infrastructure would remain in place until funding becomes available for removal. National Park Service staff would install a pipe gate for permanent closure, as needed.

Potable Water

Actions would be the same as described in alternative 1.

ACTIONS COMMON TO ALTERNATIVES 1 AND 2

The National Park Service identified strategies and actions that would be implemented parkwide and across all action alternatives (alternatives 1 and 2). The National Park Service identified management strategies and progressions that could be implemented if monitoring suggests that desired conditions are not being met. These strategies and actions are in addition to the actions in the alternatives and those mitigation measures found in appendix D. These actions encourage visitor education, engineering solutions, and/or enforcement and are as follows.

- Evaluate the financial viability of concessioners managing launch ramps and operations with 22 × 75-foot boat size limits, as identified in the Superintendent's Compendium.
- If the water is rising, consider using a portable and accessible launching surface built of flexible materials in support of recreation and motorized access.
- Support new and existing land- and water-based sustainable recreational opportunities such as kayaking, paddleboarding, biking, hiking, swimming, and camping.

- Communicate with the public and stakeholders regarding available services and any operational changes.
- Evaluate and develop reservation options for launching and retrieving boats. Combine vessel permits with timed entry options if necessary.

Mitigation Measures and Best Management Practices

Planning efforts with compliance promote efforts to prevent or eliminate environmental harm. Mitigation measures and best management practices have a central role in implementing planning actions and are designed to prevent or minimize adverse impacts or to contain impacts within acceptable limits during and after the implementation of a federal action. As a result, the National Park Service routinely evaluates resources and implements mitigation measures and best management practices whenever conditions are present that could adversely affect the sustainability of national park system resources.

The Council on Environmental Quality describes mitigation measures as the following (1508.20):

- avoidance of an impact through not taking an action or parts of an action
- minimizing impacts through limiting the degree or magnitude of an action
- rectifying impacts by repairing, rehabilitating, or restoring the affected environment
- reduction or elimination of impacts by preservation and maintenance operations during the life of the action; and
- compensation for the impact by replacing or providing substitute resources or environments.

The National Park Service has generated a list of mitigation measures, as well as general best management practices, for key topic areas related to this plan. Refer to Appendix D: Mitigation Measures and Best Management Practices for a complete list.

Indicators, Thresholds, and Visitor Capacities

This plan/EA establishes indicators and thresholds and identifies visitor capacities using best practices developed by the Interagency Visitor Use Management Council and guidance from the Visitor Use Management Framework (IVUMC 2016). The selected indicators measure conditions or attributes related to visitor experiences, natural resources, and cultural resources. Thresholds have been identified that represent the minimally acceptable condition associated with each indicator. Monitoring ensures that strategies and actions implemented within this planning effort achieve and maintain desired conditions. The iterative process of monitoring, implementing potential management strategies, and then continuing to monitor the effectiveness of strategies allows park managers to ensure that desired conditions for resources and visitor experiences are being maintained within the dynamic landscape of Lake Mead National Recreation Area. The selected indicators for this plan are as follows:

- number and types of incidents that require law enforcement response

- number of new visitor-created access points/routes/roads and evaluation of disturbance to natural and cultural resources
- percentage of staffed hours on weekend days that Willow Beach entrance station is closed
- number of financial increases in dollars spent on current operations and maintenance of facilities and infrastructure

Visitor capacity is the maximum amounts and types of use that an area can accommodate while maintaining desired conditions and the associated management strategies to manage to capacity. By identifying visitor capacities, the National Park Service can help ensure that resources are protected and visitors have the opportunity for a range of quality experiences. Across alternatives 1 and 2, the National Park Service identified strategies and actions across the five locations to improve experiences, protect resources, and manage to the identified visitor capacities. While some of these actions are a component of the alternatives, other potential management strategies may only be taken as thresholds are approached or capacities are exceeded. These potential strategies further support the actions within alternatives 1 and 2 and are summarized in the list below. Depending on the alternative and the location, identified visitor capacities may vary by alternative; however, the implementation of the monitoring effort and visitor capacities are considered part of the alternatives and are common to all action alternatives (unless otherwise noted). A detailed analysis of the indicators, thresholds, visitor capacity, and associated management strategies is in appendix B.

The following are potential management strategies NPS staff would consider if thresholds are approached or capacities are exceeded:

- Consider the area for commercial use.
- Increase the law enforcement presence.
- Communicate and promote visitor opportunities to embrace the desert landscape.
- Add interpretive signs, fencing, and wayfinding. Provide educational opportunities and signage that focus on permitted and safe recreational use.
- Add Federal Aids to Navigation (ATON) on the lake to help direct visitors and reduce confusion.
- Consider and evaluate options for backcountry use permits.

ALTERNATIVE 3

The no-action alternative would implement the selected action from the 2019 FONSI. Where the 2019 FONSI did not provide management direction, the no-action alternative includes ongoing actions, such as the management of potable water.

Hemenway Harbor

Launch Ramp and Marina Operations

Under the no-action alternative, actions from the 2019 FONSI would be implemented, and park operations would provide access to the launch ramp, depending on release or retainment of water by the Bureau of Reclamation. The selected action from the 2019 FONSI stated that marina operations and launch ramps would be extended to a water level of 950 feet. This aspect of the no-action alternative is not selectable because NPS staff determined that it is infeasible due to bathymetric and spatial constraints that would not provide sufficient water depth for operations. Consequently, the National Park Service would not extend the current launch ramp to 950 feet. At water levels below 1,000 feet, the launch ramp and marina would be relocated to deeper water.

Facilities and Services

For information about the management of facilities and services, see launch ramp and marina operations.

Potable Water

Actions would be the same as described in alternative 1.

Echo Bay

Launch Ramp and Marina Operations

The selected action from the 2019 FONSI stated that NPS staff would evaluate reestablishing full-service marina operations based on public safety, utilities, and commercial interest. If reestablished, the launch ramp and marina would extend to a water level of 1,000 feet. At water levels below 1,050 feet, the launch ramp and marina operations (if reestablished) would be relocated north to Pumphouse Bay with associated roads and parking. This aspect of the no-action alternative is not selectable because NPS staff determined that it is infeasible to reestablish full-service marina operations or relocate the launch ramp north to Pumphouse Bay due to topography and spatial constraints of this area.

Facilities and Services

For more information about the management of facilities and services, see launch ramp and marina.

Potable Water

Actions would be the same as described in alternative 1.

Callville Bay

Launch Ramp and Marina Operations

The no-action alternative would implement the 2019 FONSI selected action to sustain marina operations and launch ramps by extending to a water level of 950 feet. At water levels below 1,065 feet, the launch ramp and marina facilities would be extended farther into the lake or relocated to Swallow Bay. A new accessible courtesy dock would be provided with the launch ramp. Below 950 feet, all launching operations would be closed. The National Park Service has determined that it

would be infeasible to relocate the launch ramp and marina to Swallow Bay and to develop associated roads and utilities at this location due to topographical constraints and potential impacts on resources.

Facilities and Services

For information about the management of facilities and services, see launch ramp and marina operations.

Potable Water

Actions would be the same as described in alternative 1.

South Cove

Launch Ramp and Marina Operations

The no-action alternative would implement the selected action from the 2019 FONSI, which would continue to authorize launching from the end of a park-approved road.

Facilities and Services

For information about the management of facilities and services, see launch ramp and marina operations.

Potable Water

Actions would be the same as described in alternative 1.

Temple Bar

Launch Ramp and Marina Operations

The no-action alternative would extend the launch ramp and marina operations to 950 feet and, at 1,050 feet, NPS staff would relocate the launch ramp and marina farther into the lake to the northeast with associated roads, parking, and utilities. The relocation of the launch ramp and the marina, as described in the 2019 FONSI selected action, is no longer implementable because NPS staff determined that it is infeasible to move these facilities to the northeast and to develop associated roads and utilities at this location due to topographical constraints and potential impacts to resources.

Facilities and Services

For information about the management of facilities and services, see launch ramp and marina operations.

Potable Water

Actions would be the same as described in alternative 1.

SUMMARY OF ALTERNATIVES BY LOCATION

Tables 1 through 5 present an overall summary of the alternatives by location. While these tables serve as an overview, they present the information under the categories of launch ramp and marina operations, facilities and services (including concession services), and potable water. These tables are meant to complement the detailed narrative description of the alternatives as described above. Numbers in the tables refer to the water levels of Lake Mead, presented in approximate feet. Actions under alternative 3 are presented as selected in the 2019 FONSI; however, some actions are infeasible as described above.

Table 1. Summary of Alternatives at Hemenway Harbor

Category	Alternative 1	Alternative 2	Alternative 3
Launch ramp and marina operations	The NPS preferred alternative would extend the launch ramp in its existing location to an elevation of approximately 1,000 feet and relocate the launch ramp and marina(s) when water levels are below approximately 1,000 feet. Above approximately 1,000 feet, evaluate existing launch ramp location for reopening.	No future concrete launch ramp extensions or relocations of launch ramps or marinas; primitive motorized vessel access would be evaluated for safe and operational feasibility.	The launch ramp would be extended to 950 feet in its existing location* or, when water levels are below 1,000, feet relocated closer to Hemenway Wall.
Facilities and services	Maintain concession services, associated parking lots, and continue to support facilities and infrastructure associated with the marina(s). Evaluate any abandoned infrastructure for operational and financial feasibility and safety and remove where appropriate. Stop maintaining structures that are unsafe and no longer necessary.	No services available; close all related facilities and infrastructure associated with the marina(s). Infrastructure would remain until funding is available for removal.	See actions under launch ramp and marina operations. Current marina capacity would be maintained.
Potable water	Boulder City would continue to supply potable water.	Same as alternative 1.	Same as alternative 1.

* The action is no longer feasible.

Table 2. Summary of Alternatives at Echo Bay

Category	Alternative 1	Alternative 2	Alternative 3
Launch ramp and marina operations	Maintain launch ramp closure. Designate and construct a primary access road and primitive launch ramp area for continued limited access down to 1,000 feet.	No future launch ramp extensions or relocations.	The launch ramp and marina (if reestablished) would extend to an elevation of 1,000 feet*. Below 1,050 feet, the launch ramp and marina operations (if reestablished) would be relocated north to Pumphouse Bay with associated new roads and utilities*.

Category	Alternative 1	Alternative 2	Alternative 3
Facilities and services	Maintain the concession contract to provide land-based services, including fuel, retail, and trailer village and RV sites with no on-water operations. The National Park Service would not repurpose buildings in this location. Below water levels of 980 feet, the National Park Service would evaluate primitive campground options, including RV sites without potable water. Evaluate abandoned infrastructure for operational and financial feasibility and safety and remove where appropriate. Evaluate historic structures that are unsafe and no longer needed.	No amenities or services provided. Infrastructure would remain until funding is available for removal.	See actions under launch ramp and marina operations.
Potable water	Provide potable water until approximately 980 feet. Once potable water cannot be provided below approximately 980 feet, develop a transition plan to allow trailer village occupants time to relocate themselves and their property outside the park.	Same as alternative 1.	Same as alternative 1.

* The action is no longer feasible.

Table 3. Summary of Alternatives at Callville Bay

Category	Alternative 1	Alternative 2	Alternative 3
Launch ramp and marina operations	Maintain the closure of the existing launch ramp when water levels are at or below approximately 1,065 feet; the concessioner would continue to maintain and operate a portable launch ramp. The National Park Service would extend the launch ramp and marina facilities further into the lake.	No future launch ramp extensions or relocations.	Marina operations would extend to an elevation of 950 feet. Below 1,065 feet, the launch ramp and marina facilities would be extended farther into the lake or relocated to Swallow Bay with associated new roads and utilities*.

Category	Alternative 1	Alternative 2	Alternative 3
Facilities and services	Maintain full concession services and complete the design of all supporting infrastructure. Opportunities for commercial services would be considered and evaluated above approximately 1,065 feet. Once potable water is no longer able to be maintained (below 950 feet), remove concessioner infrastructure, employee housing and other NPS facilities. Reevaluate the longevity of overnight use, given the lack of potable water. Evaluate abandoned infrastructure for operational and financial feasibility and safety and remove where appropriate.	No amenities or services provided. Infrastructure remains until funding is available for removal. Below 950 feet, reevaluate the longevity of overnight use, given the lack of potable water.	See actions under launch ramp and marina operations.
Potable water	Provide potable water until 950 feet. Once potable water cannot be provided below 950 feet, develop a transition plan to allow trailer village occupants time to relocate outside of the park.	Same as alternative 1.	Same as alternative 1.

* The action is no longer feasible.

Table 4. Summary of Alternatives at South Cove

Category	Alternative 1	Alternative 2	Alternative 3
Launch ramp and marina operations	Provide operational support for primitive launch access on natural slopes as topography allows. Below approximately 1,035 feet, no new primitive launch ramps or access roads constructed. Above 1,070 feet, open the concrete ramp.	No future launch ramp extensions or relocations.	The National Park Service would authorize launching at the end of a park-approved road.
Facilities and services	No amenities or services provided. No new roads constructed. Evaluate abandoned infrastructure for operational and financial feasibility and safety and remove where appropriate.	Same as alternative 1.	See actions under launch ramp and marina operations.
Potable water	No potable water provided.	Same as alternative 1.	Same as alternative 1.

Table 5. Summary of Alternatives at Temple Bar

Category	Alternative 1	Alternative 2	Alternative 3
Launch ramp and marina operations	Maintain the closure of the original NPS launch ramp while the concessioner continues to operate and maintain a portable launch ramp. Fund the concessioner to sustain marina operations. If needed, the concessioner could relocate the marina and portable launch ramp to provide access to 950 feet. If unable to secure financial resources, the National Park Service would close the marina and launch ramp.	No future launch ramp extensions or relocations.	The National Park Service would extend marina operations and the launch ramp to an elevation of 950 feet. Below 1,050 feet, the launch ramp would be relocated farther into the lake to the northeast with associated new roads and utilities*.
Facilities and services	Maintain current concession services and NPS campground operations. Continue to maintain facilities and infrastructure to support concessioner operations. If the National Park Service is unable to secure financial resources to sustain operations, the concessioner could continue operations of the trailer village and RV sites. Evaluate abandoned infrastructure for operational and financial feasibility and safety and remove where appropriate. Evaluate historic structures that are unsafe and no longer needed.	No amenities or services provided. Infrastructure would remain until funding is available for removal.	See actions under launch ramp and marina operations.
Potable water	Potable water would remain available, as funding and topography allows. If the National Park Service is unable to provide water, a time line and plan would be developed to allow time for trailer village occupants to relocate themselves and their personal property outside of the park.	Same as alternative 1.	Same as alternative 1.

* The action is no longer feasible.

ESTIMATED CLASS C NET CONSTRUCTION COSTS SUMMARY

As part of this planning process the National Park Service developed cost estimates for actions within each alternative. This estimate was created using historical project data estimates, RS Means, US national average cost databases, and Nevada Department of Transportation historical bid costs. All costs were escalated to 2023. These general estimates include the cost of constructing, moving, and ultimately demolishing facilities and are solely intended for comparing the alternatives. The actual costs to the National Park Service would vary depending on contributions through partnerships. Table 6 below illustrates the associated costs of each alternative and includes an estimate of possessory interest—defined in the Concessions Policy Act of 1965 as a right to compensation to park concessions for improvements to facilities they acquired or constructed on park lands for use in their business—associated with each location. Possessory interest would only be covered in alternatives 1 and 3 but not alternative 2, as all concession contracts would be terminated under that alternative.

Full implementation of any of the action alternatives depends on future water levels and are all subject to available funding.

Table 6. Summary of Class C Construction Costs by Location and Alternatives, Including Common to All Actions and Possessory Interest to the Concessioner

Alternative	Hemenway Harbor	Echo Bay	Callville Bay	South Cove	Temple Bar	Total by Alternative*
Alternative 1 (NPS Preferred)	$46,000,000	$12,000,000	$35,000,000	$300,000	$20,000,000	$114,300,000
Alternative 2	$324,450	$84,570	$84,570	$149,900	$109,570	$590,850
Alternative 3	$46,000,000	$6,000,000	$3,000,000	$200,000	$20,000,000	$75,200,000

* The "Total by Alternative" column includes the total anticipated funding need, inclusive of common to all alternative actions and possessory interest.

ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

Included in the range of alternatives are those alternatives, or alternative elements, considered during the planning process but dismissed from detailed analysis. The full description of these alternatives, or elements, are presented below.

Above Water Levels Addressed in This Plan (Approximately 1,065 feet)

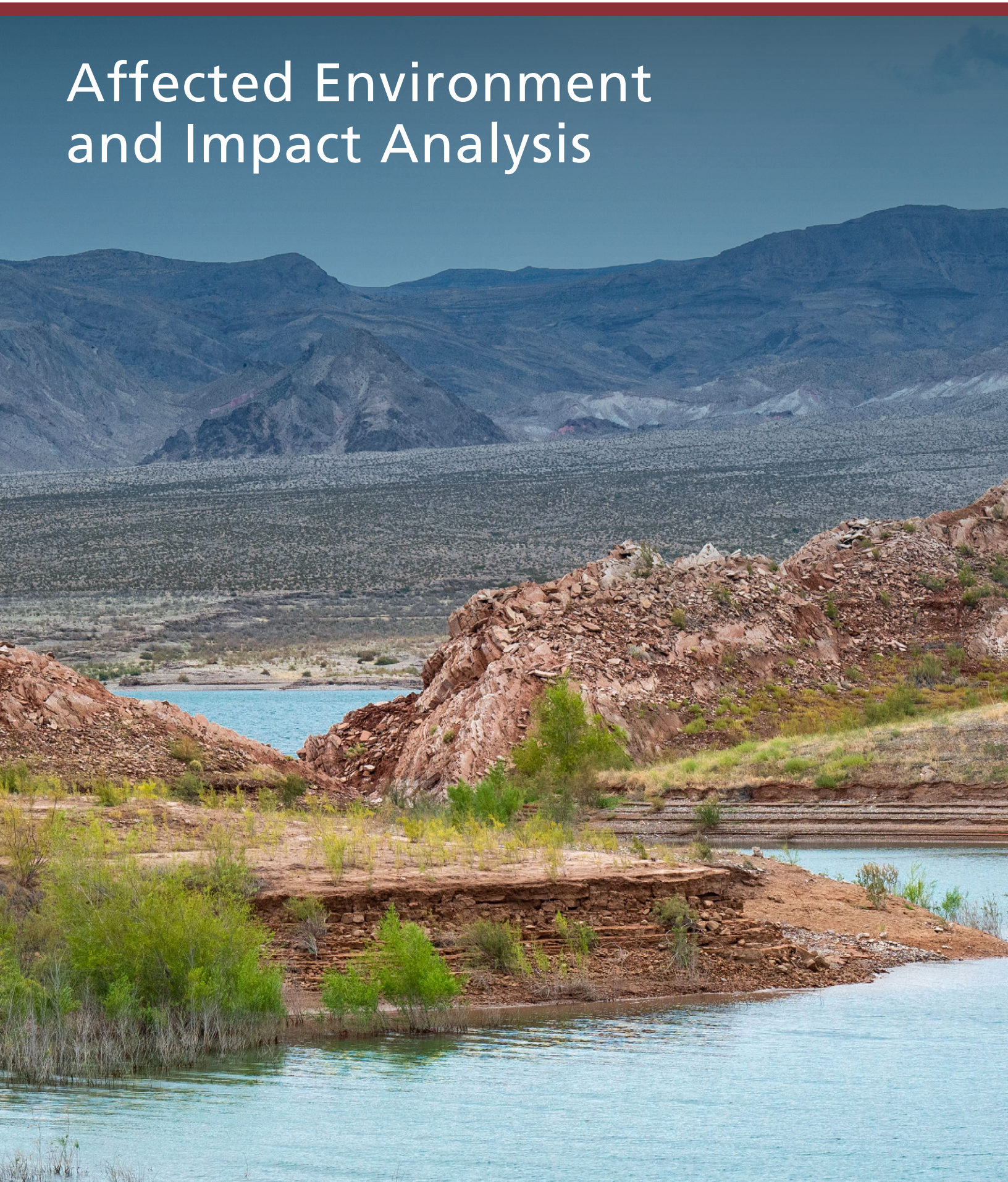
The NPS planning team staff discussed the potential for water levels at Lake Mead to rise exponentially beyond current conditions. However, scientific data collected across federal agencies, including the National Park Service and the Bureau of Reclamation, indicate that this scenario is unlikely due to the changing climate. The aridification of soils in the desert southwest suggest that even with high levels of snowfall in the western United States and Canada, runoff from the mountains is less likely to reach the lake and instead be absorbed by soils. Previous planning efforts, such as the 2005 general management plan (GMP) amendment, included alternatives and associated NEPA compliance for actions when water levels are above 1,065 feet (NPS 2005). If this scenario does occur, NPS staff may implement actions from the GMP amendment and/or engage in new planning.

New Launching Locations in Arizona or Nevada

An evaluation of potential launching locations at other areas in Arizona or Nevada was considered in previous planning such as the 1986 general management plan and related development concept plans. Evaluating additional launch locations does not address the purpose and need of this plan/EA to develop an updated strategic direction for the future of motorized boat launching at five priority locations. As noted earlier in this chapter, many of the relocation actions described in the 2019 FONSI selected action are no longer feasible. Furthermore, this alternative would not achieve the desired conditions for facilities and infrastructure, such as to provide feasibly maintained facilities and infrastructure, as described in chapter 1. Due to the cost of extending and relocating launch ramps within the project area and the current cost of maintenance for existing infrastructure, building a new launch ramp at an additional location is not aligned with NPS initiatives and sustainable infrastructure needs. Therefore, evaluating potential locations for new launch ramps was outside the scope of this planning effort and dismissed as an alternative.

CHAPTER 3:

Affected Environment and Impact Analysis



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CHAPTER 3: AFFECTED ENVIRONMENT AND IMPACT ANALYSIS

INTRODUCTION

This chapter provides an overview of the affected environment and analyzes the environmental impacts of implementing alternative 1 (NPS preferred alternative), alternative 2, and alternative 3 on socioeconomics, visitor use and experience, natural resources, cultural resources, and facilities and infrastructure. The topics relate to the purpose and need and key issues, which could inform the NPS decisions at the five locations within the plan/EA. These resource descriptions provide the reader with baseline conditions for which the potential effects of the proposed actions can be compared. In addition to these analysis impact topics, it is helpful to note that the dynamic nature of Lake Mead's water levels will continue to also affect park operations and maintenance. Maintenance efforts would continue to increase to accommodate any proposed modifications to facilities and operational processes. The relocation of facilities creates operational conflicts, requiring additional time, money, and personnel. High concentrations of visitor use strains operations, and more staff are needed. Additionally, increased law enforcement presence is required to monitor closed/decommissioned facilities prone to vandalism and theft.

This chapter also considers cumulative impacts, which result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions, regardless of who undertakes such other actions. Cumulative impacts can result from individually minor, but collectively important, actions taking place over time. Cumulative impacts are addressed by impact topic and are considered for each alternative.

VISITOR USE AND EXPERIENCE

Affected Environment

This section describes the affected environment of visitor use and experience at the park. The description of these elements is based on the best professional judgement of NPS staff, existing data, monitoring reports, research and studies, and anecdotal observations from NPS staff and concessioners. Sources are noted for published references only.

The following visitor use and experience elements are discussed:

- water-based recreational access and opportunities
- quality of visitor experience

Lake Mead National Recreation Area is a startling contrast of desert and water, mountains and canyons, primitive backcountry, and human innovation. The combination of large water bodies amidst vast terrestrial expanses appeals to diverse recreational opportunities.

Lake Mead National Recreation Area is one of the most-visited units of the national park system. Annual visitation was 8 million in 2020, and visitation ranked within the top 5 of most-visited national parks in 2021, with approximately 7.6 million visitors, and within the top 10 of most-visited national parks, with approximately 5.6 million visitors in 2022. Visitation in recent years has been affected by launch closures on Lake Mead due to constraints from low water levels and a

variety of other factors, such as the pandemic and high gas prices. Future visitation trends are expected to continue at a similar level as 2022.

While visitation is relatively consistent throughout the year, the summer months (from May to September) experience higher visitation and recreational use than the winter months. Though visitation averaged nearly 575,000 visitors per month from May to September in 2022, visitation remained high from October through April, averaging around 386,000 visitors per month. This seasonal trend has been consistent since 2005, when visitation averaged around 810,000 visitors per month from May to September and nearly 520,000 per month from October through April.

Lake Mead National Recreation Area is considered one of the premier water-based recreation areas in the nation, and NPS staff have reported that the number of motorized and nonmotorized vessels accessing the lake, including boats, canoes, and kayaks, has increased. Many of the 7 to 8 million yearly visitors are involved in water-based recreational activities, including, but not limited to, recreational motorized and nonmotorized boating, houseboating, sailing, canoeing, kayaking, rafting, waterskiing, wakeboarding, use of personal watercraft, and boat touring.

Water levels have varied historically at Lake Mead, affecting the use of launch ramps, but an unprecedented 20-year, climate-induced drought has led to a drastically lower water level. In June 2005, the Lake Mead water level was recorded at 1140.46 feet. At present, the water level has dropped to 1,054 feet (May 2023), a loss of 86.18 feet (BOR 2023). Actual water levels will be influenced by the current supplemental environmental impact statement process and decisions managed by the Bureau of Reclamation.

Water-based recreational activities, both motorized and nonmotorized, were previously supported by 10 launch ramps with 50 lanes for launching on Lake Mead. Due to the combination of low water levels and topographical and bathymetric constraints, only one concrete NPS launch area with 2 launch lanes at Hemenway Harbor remain open on Lake Mead (site-specific details on recreational access, opportunities, and associated impacts on visitor experiences follow).

Except for efforts at Hemenway Harbor and temporary launch ramps at Callville Bay and Temple Bar, declining water levels on Lake Mead and the constraints of moving or altering shoreline facilities have resulted in visitors having fewer and frequently changing options to safely access the lake for recreational motorized boating opportunities. Declining water levels at Lake Mead in recent years have exposed mudflats along several areas of the shoreline, creating dangerous conditions where visitors have periodically become stuck in the wet, muddy deposits while attempting to launch vessels from the shoreline. Some visitors are displaced and/or inconvenienced by changes in the location of access to facilities, resulting in altered visitor use patterns, including a high concentration of water-based recreational motorized boating at Lake Mohave and at the limited launching locations on Lake Mead. Changes in visitor facilities and circulation patterns, along with lowering water levels, could increase congestion in some areas that remain accessible. Conflicts may occur between boaters and shoreline users and between motorized and nonmotorized boaters, depending on changes to marinas and launch facilities.

As opportunities for motorized access on Lake Mead continue to be limited due to low water levels, combined with the launching limitations due to the topography of the land and bathymetry of the lake, there are fewer and more frequently changing opportunities for motorized water-based recreational opportunities. With the NPS-operated launch ramps at South Cove and Temple Bar closing in the summer of 2021 and launch ramps at Echo Bay and Callville Bay closing

in the spring of 2022, annual recreation visits reflect a decrease in recreational visits to Lake Mead overall, suggesting a correlation with decreased motorized access opportunities. Since the 2022 closures, the temporary launch ramps at Callville Bay and Temple Bar have created new motorized access opportunities, and recreation visits for 2023 are yet to be identified. The affected environment for visitor use and experience is described by location below since visitor patterns, use levels, and opportunities vary in each area.

Hemenway Harbor

Hemenway Harbor has a formalized launch ramp and concessions operations supporting visitor services and water-based recreational opportunities. Although previous planning efforts state that the marina operations and the launch ramp would extend to a water level of 950 feet and would be relocated to deeper water closer to Hemenway Wall at water levels below 1,000 feet, low water levels have prevented NPS staff from implementing these actions. Instead, NPS staff have been forced to adapt use and operations on site in response to low water levels and bathymetric constraints.

At present, NPS staff and contractors relocate/extend the launch ramp multiple times per week, sometimes daily, to accommodate motorized boating access with changing water levels. NPS staff and contractors coordinate to move all associated launch ramp components, including pipe mats, utilities, and at times storage tanks, to provide continued access for launching motorized vessels. Extending the launch ramp in its existing location to a water level of approximately 1,000 feet provides opportunities for motorized launching and a range of water-based recreation for visitors. With each launch ramp extension, the availability of launch ramp lanes and traffic flow patterns change, sometimes daily, depending on water levels and the need for extension, leading to a level of uncertainty associated with the constant change and possible visitor displacement or avoidance of the area. With each launch extension, one launch lane is closed for launching while the other is extended; the constant state of change diminishes the quality of visitor experience by creating uncertainty and/or deterring visitors from using Hemenway Harbor. The quality of visitor experience is also compromised with frequent changes to circulation. Furthermore, minimal facilities, such as portable restrooms, are available for visitors to use while waiting in line at the launch ramp.

The quality of visitor experience is also compromised with frequent changes to circulation and traffic patterns at Hemenway Harbor. Traffic patterns in the launch ramp area and parking lots associated with the marina change with each launch ramp extension, creating an inconsistent experience for visitors trying to navigate to the launch and marina. NPS staff continue to maintain access to the parking lot and store by bringing in fill (annually) to maintain Americans with Disabilities Act (ADA) to provide accessibility to launch ramp operations and services. Changes in conditions are communicated to partners and the public daily in an effort to proactively inform visitors about available services and manage visitor expectations. Additionally, each time the water recedes, the navigational systems in the water, including marking hazards and no wake zones, are relocated in collaboration with the US Coast Guard.

Visitors are displaced and/or inconvenienced by the lack of consistency and constant change in traffic flow and parking areas on land and change in navigational systems on the water. If this pattern of constant change to traffic patterns and parking lots associated with launch ramp extensions continues, as seen under low water conditions in 2022 and 2021, it's likely to

exacerbate visitor confusion from circulation challenges, creating an undesirable visitor experience.

As the launch ramp continues to move further into the lake to accommodate motorized vessel launching under low water conditions, the grade, or slope, of the launch ramp increases, following the bathymetry of the lake. The flat grade of the ramp creates launching challenges for visitors; as trucks become submerged, vehicle brakes lock up, vehicle cabins flood, inexperienced boaters struggle to safely launch, and the pipe mat can be displaced, all creating safety concerns at the launch. These challenges related to launching under low water conditions increase the time it takes to launch, which further increases the wait time and exacerbates the diminished quality of visitor experience.

The average boat launch (not including wait time to access the ramp) takes approximately 15 minutes. For an average 12-hour launch day in the summer, Hemenway Harbor can accommodate about 50 motorized boat launches. It was not uncommon for motorized boaters to wait up to 4 hours to launch their vessel at Hemenway Harbor in the 2021 and 2022 summer months given launching challenges resulting from low water levels as described above. Wait time literature has found that an increase in actual or perceived wait time generally leads to a decrease in satisfaction among visitors (Davis and Vomann 1990; Davis and Heineke 1998; Katz et al. 1991; Pruyn and Smidts 1998). Unexplained or unexpected wait times and queue lengths can also cause uncertainty and anxiety that could make the wait time seem longer (Findley et al. 2018). Current wait time to launch is estimated at 30 minutes given the higher water levels in summer 2023 compared to levels in 2021 and 2022. If water levels decline in the future similar to 2022 and 2021 levels and use increases at Hemenway Harbor, it can be anticipated that congestion and wait times and visitor conflicts will again contribute to a diminished quality of visitor experience and further compromise visitor and employee safety and wellbeing.

The diminished quality of visitor experience due to the concentrated use, congestion, longer wait times, extreme temperatures, and lack of facilities available while waiting to launch motorized vessels leads to an increase in visitor conflicts and compromises visitor and employee safety and wellbeing. From June 21, 2021, to July 21, 2022, under low water conditions, there were 96 law enforcement incidents at the Hemenway Harbor launch ramp, including 22 calls for traffic conflicts and 4 calls for visitor fights. The concentrated use and more vehicles in line waiting to launch correlates with the length of time visitors need to wait for water access.

In addition to providing lake access for motorized vessels, NPS staff and partners are maintaining concession operations and utility corridors to provide ongoing visitor services that provide water-based recreational opportunities at Hemenway Harbor and the marina. A newly constructed fishing pier provides fishing opportunities for visitors at Hemenway Harbor as well.

Maintaining concession operations and utility corridors to provide ongoing visitor services, including marina operations and services, and extending utility corridors continues to provide a range of visitor services and opportunities.

Lake Mead Marina and Las Vegas Boat Harbor operations are owned and operated by Las Vegas Boat Harbor, Inc. and currently provide visitors with most of the water-based opportunities on Lake Mead. Both marinas provide opportunities for visitors to lease slips and rent small boats, pontoons, personal watercraft, water sport equipment, kayaks, and paddleboards.

Park operations continue to support concessioner operations of the marina, such as moving underwater anchors for courtesy dock(s), buoys, and navigation systems away from shorelines to adjust to changing marina locations, providing opportunities and experiences that rely on concessioner marina operations.

Maintaining visitor and operational safety services and responses, such as launch ramp, docks, and fuel for administrative use ensures that administrative and safety responses are available to visitors in a timely manner when needed. Visitor access, including ADA accessibility, also continues to be maintained.

At Hemenway Harbor, potable water to support the above visitor services is provided by Boulder City.

Echo Bay

Echo Bay previously had two NPS launch ramps that provided water access for visitors. The original launch ramp, formally located at the end of the bay, closed in 2014. Visitor services provided by a concessioner include a convenience store for snacks and drinks and a courtesy dock on-site for launching watercraft.

The NPS launch ramp had been repeatedly extended down to a water level of 1,050 feet. Low water levels have required NPS staff to adapt use and operations on-site in response. As a result, opportunity for launching at Echo Bay has been reduced to a primitive launching experience for water access, which allows for some motorized launching opportunities under low water conditions. The primitive launching experience includes a designated primary access road and a launch on a natural surface with minimal NPS maintenance, requiring visitors to launch at their own risk and therefore putting limitations on visitors' ability to launch from this location. This is a diversion from the 2019 FONSI actions due to low water levels coupled with bathymetric constraints, which make former operations and relocating the launch and marina infeasible. Maintaining the closure of the existing concrete launch ramp to motorized vessel access below a water level of 1,000 feet results in limited motorized water-based recreational opportunities at Echo Bay, diminishing the quality of visitor experience.

Many of the visitors to this formally operational launch ramp were from Utah, as this location is most convenient to access geographically. Echo Bay was also a popular destination for "snowbirds" from northern states such as Idaho, who visited the campground and used other services at Echo Bay year after year during the winter months when the NPS concrete launch ramp was operational.

The closure of the concrete launch ramp has limited recreational access and motorized opportunities on the water for all visitors, and NPS staff report an increase in traffic on the road to Hemenway Harbor, with increased use by visitors who formally launched motorized vessels at Echo Bay.

Day use, which accounts for approximately 80%–90% of current recreational use at this location, includes a range of opportunities, including fishing, swimming, and paddlecraft use via nonmotorized launching. Weekends see higher use levels than weekdays, with some runover visitation from Valley of Fire State Park during the winter months.

In addition to providing lake access for nonmotorized vessels, NPS staff and partners are maintaining the concession contract to operate land fuel, retail, and the trailer village and RV

sites, with no on-water operations, to provide these ongoing visitor services. Restroom services also continue to be maintained. Providing these restroom facilities rather than requiring visitors to travel out of the area to find restrooms reduces the likelihood of human waste on the landscape, contributing to the quality of visitor experience at Echo Bay.

The Echo Bay water intake barge provides potable drinking water production to a water level of 980 feet for NPS staff and visitors, in addition to providing fire protection capacity. Potable water allows for the continuation of all other visitor services that rely on potable water to operate, providing a range of available visitor services at Echo Bay.

Providing camping opportunities, an area for fishing, shoreline access, and maintaining the concessions-operated land-based fuel, retail, and the trailer village and RV sites (with no on-water operations) continues to provide these visitor service opportunities that contribute to a range of visitor experiences, including providing nonmotorized access to Lake Mead and a range of water-based nonmotorized recreation opportunities. This also contributes to the desired condition that visitors would have opportunities for nonmotorized water-based recreational experiences that are safe and enjoyable.

Callville Bay

Callville Bay previously had two NPS launch ramps that provided water access for visitors. The upper launch ramp, formally located at the west end of the bay, closed in 2014. At present, visitor services are provided by the Callville Bay Marina concessioner, both on land and at the marina.

The current closure of the existing launch ramp, and when water levels are at or below 1,065 feet, reduces motorized access to Lake Mead and limits the range of water-based recreational opportunities requiring a motorized vessel at Callville Bay.

A concessioner-maintained and -operated portable launch ramp (e.g., Mobi-Mat) is providing access to Lake Mead for motorized boat launching at Callville Bay and has successfully launched 60-foot and larger vessels. The operation of this portable launch ramp provides access to Lake Mead for motorized boat launching and opportunities for a range of water-based motorized and nonmotorized recreation at Callville Bay. The combined closure of the concrete launch ramp and the use of a portable launch ramp that can accommodate smaller vessels than permitted at formally operational concrete launches has limited recreational access and launching opportunities on Lake Mead from Callville Bay overall.

The concrete launch ramp, though closed to launching opportunities when water levels are at or below 1,065 feet, provides pedestrian access to the marina and a range of visitor services and opportunities. Visitor experience opportunities include leasing slips and renting houseboats, small boats, pontoons, and personal watercraft, in addition to sightseeing and educational boat tours, and a retail store. In addition to marina services, maintaining full operation of concession-required services provides food and beverage services, the trailer village, the boat shop, and water- and land-based fuel that contribute to the range of available visitor services and recreation opportunities at Callville Bay.

With the nexus of opportunities and support services for visitors, Callville Bay has remained one of the most popular developed areas at Lake Mead. In 2005, traffic counters recorded a total of 82,635 vehicles on Callville Bay Road from May through September, with a monthly average of 16,527 vehicles. In 2021, traffic counters recorded a total of 80,309 vehicles on Callville Bay Road from May through September, with a monthly average of 16,061 vehicles. Visitation has stayed

consistent at Callville Bay; however, the quality of visitor experience has degraded with loss of launching opportunities at the concrete launch ramp. Potable water is being provided to support visitor services and opportunities, including the NPS campground, employee housing, ranger station, maintenance shop, picnic area, and concessions for the trailer village and RV sites, the warehouse, fuel, the restaurant, and the retail store until a water level of 950 feet.

South Cove

South Cove previously had one concrete launch ramp that provided water access for visitors, with no additional visitor services.

The primitive launch access will continue to be supported as topography allows, between approximately 1,070 feet and 1,035 feet, to provide motorized access to Lake Mead and an opportunity for a range of water-based recreation at South Cove. Maintaining launch access from the end of a primitive NPS-approved road that often requires four-wheel drive and is at the visitor's own risk puts limitations on visitors' ability to launch from this location.

Additionally, law enforcement can no longer launch motorized vessels at South Cove and now must launch at Temple Bar, exacerbating response times for visitor incidents on the lake. With the formally operational concrete launch ramp closed and with no other visitor services available, the site is experiencing an increase in illegal activities, including but not limited to, the illegal creation of launch ramps that disturb the shoreline resources, create safety concerns, and diminish the quality of visitor experience.

The indefinite closure of the concrete launch ramp since June 2021 has constrained recreational access and opportunities on the water and changed the types of uses that occur at South Cove. Current visitor use at South Cove include opportunities for picnicking, fishing, hiking, and nonmotorized water-based recreation, including kayaking, canoeing, and swimming. Located where the Colorado River exits the Grand Canyon and starts to form Lake Mead, South Cove offers scenic viewsheds, which are ideal for wildlife observation, and photography.

Potable water would continue to not be provided at South Cove, requiring visitors to bring their own water.

Temple Bar

Temple Bar previously had one launch ramp that provided lake access for visitors. The launch ramp had been repeatedly extended down to a water level of 1,080 feet to provide motorized launching access to Lake Mead. The low water levels have required NPS staff to adapt use and operations on-site. In response to low water challenges, the concrete launch ramp is under an indefinite closure, beginning July 7, 2021, and is not in use. The opportunity for launching at Temple Bar has been reduced because of the low water levels and consequential launching constraints.

A concessioner-maintained and -operated portable launch ramp (e.g., Mobi-Mat) is providing access to Lake Mead for motorized boat launching at Temple Bar and has successfully launched 60-foot and larger vessels. The operation of this portable launch ramp provides access to Lake Mead for motorized boat launching and opportunities for a range of water-based motorized and nonmotorized recreation at Temple Bar. The combined closure of the concrete launch ramp and use of a portable launch ramp that can accommodate smaller vessels than permitted at formally

operational concrete launches, has overall limited recreational access and launching opportunities on Lake Mead from Temple Bar.

Visitor services provided by a concessioner, including leased slip and powerboat, fishing boat, and personal watercraft rentals, are being maintained, providing visitors access to those recreational opportunities. Additional concession-managed visitor opportunities and services include camping, land and water fuel stations, a hotel, store, restaurant, and the trailer village and RV sites. NPS staff have access to park boats for emergency services to ensure that administrative and safety response remain available for visitors in a timely manner when needed.

Little-to-no nonmotorized recreational use occurs at Temple Bar, such as paddleboarding, swimming, or fishing. Though a picnic area and campground are available for visitors to use, the picnic area is rarely used, and the campground has not had any reservations since switching to rec.gov.

Potable water remains available by an existing shallow well, as topography allows for its functionality, to provide restroom services and other visitor services that reply on potable water to operate. Providing nearby facilities, rather than requiring visitors to travel out of the area to find restrooms, reduces the likelihood of human waste on the landscape, enhancing the quality of visitor experience at Temple Bar.

Environmental Trends

Visitation patterns at the park are affected by climate change trends and persistent drought. Where, when, and how many people visit annually is likely to change with the continued climate-induced drought. Though high levels of visitation have remained consistent since 2005, the unprecedented 20-year climate-induced drought has led to a drastically lower water level which, when coupled with the topography of the land and bathymetry of the lake, has constrained the operation of launch ramps used for both motorized and nonmotorized vessels, thereby reducing the opportunity for water-based recreation on Lake Mead. Annual recreation visits reflect a decrease in recreational visits to Lake Mead overall, suggesting a correlation with decreased motorized access opportunities due to the reduction of launch ramps and launch lanes since 2005.

The overall trend of continuous decline in water levels at the park suggests that operational challenges to maintain launch ramp operations, and therefore opportunities for water-based recreation, would continue to be exacerbated, limited, and potentially not possible due to the topography of the land and bathymetry of the lake when water levels are low. The park experiences challenges to maintain consistent and reliable access to water-based recreation. As a result, current actions to accommodate motorized launching under low water conditions, coupled with the constraints from the topography of the land and bathymetry of the lake (location dependent, as described in the alternatives) cause access challenges for visitors, thereby limiting water-based recreation opportunities. The existing trend, identified anecdotally by NPS staff and concessioners, that the number of motorized and nonmotorized vessels accessing the lake has continuously increased would likely shift based on the change in opportunities for motorized recreation due to launching constraints and vessel size limits.

If current management continues in response to low water levels, Lake Mead would continue to have to adapt operations to meet uncertain water levels. Current management actions would continue to provide motorized and nonmotorized recreational access and opportunities that provide a range of water-based experiences.

Impact Analysis

Alternative 1 (NPS Preferred)

Hemenway Harbor – Under alternative 1, current management would continue with new actions, such as relocating the marina. As a result, impacts on visitor use and experience would be similar to what is described above in the affected environment section, which describes the current and expected future conditions, in addition to impacts associated with new actions described below.

The relocation of the launch ramp and marina facilities below approximately 1,000 feet and reopening actions above 1,000ft would benefit the visitor experience by continuing to provide motorized access that contributes to a range of water-based recreation opportunities. These opportunities include both motorized and nonmotorized watercraft use, as well as fishing opportunities within the Hemenway Harbor area. National Park Service staff would stop maintaining structures that are unsafe and no longer needed and would evaluate infrastructure and remove where appropriate, resulting in temporary adverse and long-term beneficial impacts on the visitor experience. The discontinued maintenance of structures could adversely impact the visitor experience, as these structures would negatively impact the viewscape until removal. The removal of abandoned infrastructure and allowing natural conditions in the upper area of the harbor would benefit the visitor experience by enhancing the viewshed of the area and reducing safety risks associated with abandoned infrastructure.

Echo Bay – In addition to what is described in the affected environment section, under the preferred alternative, current management would continue and new actions, such as removing historic structures, would occur. As a result, impacts on visitor use and experience would be like what is described above in the affected environment section, which describes the current and expected future conditions, in addition to impacts associated with new actions described below.

Opening the concrete launch ramp in its existing location when water levels are above 1,000 feet would benefit the visitor experience by continuing to provide motorized access that contributes to a range of water-based recreation opportunities. These opportunities include both motorized and nonmotorized watercraft use, as well as fishing opportunities at Echo Bay.

Closing launch ramp operations below a 1,000-foot water level would limit the opportunity for motorized launching at Echo Bay and therefore limit the range of water-based recreation opportunities.

The removal of historic structures after evaluation would benefit the visitor experience by enhancing the viewscape and reducing safety risks associated with abandoned infrastructure. The removal of abandoned structures would contribute to the desired condition that visitors will have an opportunity to experience the natural resources of the area such as native wildlife, the dark night sky, and high-quality natural sounds, providing beneficial impacts on the quality of visitor experience.

Below a 980 feet water level, the National Park Service could no longer provide potable water with current infrastructure, and Echo Bay would become a primitive location, adversely impacting visitor experience by discontinuing visitor services that rely on potable water. The discontinuation of services that rely on potable water, adversely impacting the visitor experience by limiting the available services and recreation opportunities at Echo Bay. The loss of restroom facilities due to the discontinuation of potable water would require visitors to travel out of the

area to find restrooms and increase the likelihood of human waste on the landscape, resulting in adverse impacts on the quality of visitor experience. With the loss of potable water, visitors would be required to bring their own water to the site, adversely impacting the quality of visitor experience due to loss of water services on-site.

Callville Bay – Under alternative 1, current management would continue with new actions, such as extending the launch ramp and removing infrastructure. As a result, impacts on visitor use and experience would be similar to what is described above in the affected environment section, which describes the current and expected future conditions, in addition to impacts associated with new actions described below.

Extending the launch ramp and marina operations further into the lake, benefits the visitor experience by providing motorized launching access and marina services that contribute to a range of water-based recreation opportunities. These opportunities include both motorized and nonmotorized watercraft use, as well as a new accessible courtesy dock, providing beneficial impacts on the quality of visitor experience at Callville Bay.

Similarly, opening the concrete launch ramp at its current location within Callville Bay if water levels rise above approximately 1,065 feet would benefit the visitor experience by providing additional opportunities for motorized launching access, which contributes to a range of water-based recreation opportunities at Callville Bay.

Below 950 feet water level, out-of-water launch facilities would be evaluated and removed if identified to be unsafe or operational infeasible, resulting in temporary adverse impacts on the visitor experience and long-term benefits to the quality of visitor experience. The discontinued maintenance of structures would adversely affect the visitor experience, as these structures would negatively impact the viewscape until removal. The removal of abandoned infrastructure would benefit the visitor experience by enhancing the viewshed of the area and reducing safety risks associated with abandoned infrastructure.

Below a 980 feet water level, the National Park Service would no longer maintain potable water, and a time line and plan would be developed to allow time for trailer village occupants to relocate themselves and their personal property outside of the park, adversely impacting the visitor experience by limiting the types of opportunities and range of experiences at Callville Bay. Impacts on the visitor experience from the loss of potable water to existing infrastructure are similar to what is described for Echo Bay. The National Park Service would evaluate campground options with no water, electricity, fuel, and other amenities, which would benefit the visitor experience by contributing to a range of visitor experience opportunities at Callville Bay if the evaluation deems these campground options feasible and actions are implemented.

South Cove – Under alternative 1, current management would continue with new actions, such as considering opportunities for overnight use and evaluating infrastructure for removal. As a result, impacts on visitor use and experience would be similar to what is described above in the affected environment section, which describes the current and expected future conditions, in addition to impacts associated with new actions described below.

Opening the concrete launch ramp for visitor use above a water level of approximately 1,070 feet would benefit the visitor experience by providing additional opportunities for motorized launching access that contributes to a range of water-based recreation opportunities at South Cove.

Abandoned infrastructure would be evaluated for operational and financial feasibility and safety and removed where appropriate, resulting in temporary adverse impacts on the visitor experience and long-term benefits to the quality of visitor experience. The discontinued maintenance of structures would adversely affect the visitor experience, as these structures would negatively impact the viewscape until removal. The removal of abandoned infrastructure would benefit the visitor experience by enhancing the viewshed of the area and reducing safety risks associated with abandoned infrastructure.

The National Park Service would consider providing visitor opportunities for overnight use in a primitive setting, which would benefit the visitor experience by contributing to a range of visitor experience opportunities at South Cove, if evaluation deems these opportunities feasible and actions are implemented.

Temple Bar – Under alternative 1, current management would continue with new actions, such as considering opportunities for relocating the concessioner-operated marina and portable launch ramp. As a result, impacts on visitor use and experience would be similar to what is described above in the affected environment section, which describes the current and expected future conditions, in addition to impacts associated with new actions described below.

The National Park Service would forgo the construction of a new launch ramp in favor of a limited launching facility to be operated by the concessioner, and, if needed, the concessioner would relocate the marina and portable launch ramp to provide access to a water level of 950 feet. This action would benefit the visitor experience by providing opportunities for motorized launching access and marina services that contribute to a range of water-based recreation opportunities at Temple Bar.

If the National Park Service is unable to secure financial resources, and unless the concessioner expressed interest in operating land-based facilities only, then NPS staff would terminate the concession contract and close the marina, adversely impacting the visitor experience by limiting the range of available visitor services and opportunities at Temple Bar. Discontinued visitor services and experiences would include opportunities to lease slips and powerboat, fishing boat, and personal watercraft rentals, camping, land and water fuel stations, a hotel, store, restaurant, and the trailer village and RV sites. If the concessioner expressed interest in operating land-based facilities only, the concessioner could continue operation of the trailer village and associated infrastructure, benefiting the visitor experience by continuing to provide these land-based services and opportunities.

Abandoned infrastructure would be evaluated for operational and financial feasibility and safety and removed where appropriate, resulting in temporary adverse impacts on the visitor experience and long-term benefits to the quality of visitor experience. The discontinued maintenance of structures would adversely affect the visitor experience, as these structures would negatively impact the viewscape until removal. The removal of abandoned infrastructure would benefit the visitor experience by enhancing the viewshed of the area and reducing safety risks associated with abandoned infrastructure.

Impacts from the loss of potable water are similar to those described for Callville Bay.

Cumulative Impacts – In addition to what's described in the affected environment section, under the preferred alternative, current management would continue. When combined with past,

present, and reasonably foreseeable actions, impacts from alternative 1 would result in beneficial and adverse impacts on visitor use and experience.

Future impacts associated with drought and lower annual water level averages should be considered when making decisions on the sustainable, long-term operation of launch ramps. Under a range of water level estimates made in January 2023 for a five-year probabilistic projection, the Bureau of Reclamation predicts that Lake Mead has a 50% chance of reaching a water level less than 1,020 feet by 2027 (BOR 2023). In response to low water levels, ongoing and future actions on Lake Mead would continue to reduce access for motorized launching if water levels continue to decline, adversely impacting the visitor experience by reducing motorized recreational opportunities. If water levels continue to decline, operational challenges to maintain launch ramp operations would continue to be exacerbated, limited, and potentially not possible due to the topography of the land and the bathymetry of the lake when water levels are low. With operational challenges come challenges to maintain consistent and reliable access to water-based recreation. Overtime, with water level decline and under low water conditions, Lake Mead could see decreased motorized use because of limited-to-no launch opportunities in response to launching constraints.

Alternative 2

Under this alternative, actions and associated impacts for potable water would be the same as described in alternative 1 across all the sites except Hemenway Harbor.

Hemenway Harbor – No future concrete launch ramp extensions or relocations for recreational motorized access would adversely impact the visitor experience, as visitors are displaced and/or inconvenienced by changes in the location and availability of launching access, resulting in altered visitor use patterns, uncertainty, and reduced motorized launching opportunities. Motorized vessel access would be evaluated and identified for safety and operational feasibility, causing potential adverse impacts on the visitor experience if opportunities to launch motorized vessels are removed, or potential beneficial impacts on the visitor experience if motorized launching opportunities are feasible and provided.

Terminating concession services and closing all related facilities and infrastructure related to the marina would cause adverse impacts on visitor use and experience because no services would be available, limiting the range of available visitor experience opportunities at Hemenway Harbor. This action would remove all associated visitor services, adversely impacting the visitor experience by discontinuing these services that contribute to a range of recreational opportunities. National Park Service visitor services, such as trash removal and restrooms, would continue to be maintained, benefiting the visitor experience by providing these services that reduce the likelihood for trash and human waste on the landscape.

Allowing for natural conditions would benefit the visitor experience by restoring habitat, which would enhance the viewshed and contribute to the desired condition that natural resources would be enhanced from changes in infrastructure to preserve water quality and aquatic habitats that support aquatic ecosystems.

Echo Bay – The National Park Service would not extend or relocate the launch ramp to provide motorized access, causing adverse impacts on the visitor experience by not providing opportunities for water-based motorized recreation and limiting the range of recreation opportunities at Echo Bay.

Actions to terminate the concession contract and associated services adversely impact the visitor experience by discontinuing opportunities such as concessions-operated land-based fuel, retail, and the trailer village and RV sites (with no on-water operations). This adversely impacts the visitor experience by removing the opportunity for a range of visitor services and recreational experiences.

Allowing for natural conditions in the area would benefit the visitor experience by restoring habitat, which would enhance the viewshed of the area. This would contribute to the desired condition that visitors would have an opportunity to experience the natural resources of the area such as birding opportunities, the dark night sky, and high-quality natural sounds at Echo Bay.

Management would evaluate opportunities for overnight use backcountry permits for visitors, which would benefit the visitor experience by contributing to a range of recreation opportunities at Echo Bay.

Callville Bay – The National Park Service would not extend or relocate the launch ramp or marina to provide recreational motorized access, causing adverse impacts on the visitor experience by not providing opportunities for water-based motorized recreation and limiting the range of recreation opportunities at Callville Bay.

Actions to terminate the concession contract and associated services adversely impact the visitor experience by not providing opportunities such as marina services, which include houseboat and small boat rental, food and beverage services, the trailer village, the boat shop, water- and land-based fuel, and sightseeing and educational boat tours which contribute to a range visitor services and recreational opportunities at Callville Bay.

Allowing for natural conditions in the area would benefit the visitor experience by restoring habitat, which would enhance the viewshed of the area, contributing to the desired condition that natural resources would be maintained to provide a scenic experience at Callville Bay.

Under 950 feet water levels, the National Park Service would reevaluate the longevity of overnight use given the lack of potable water. If evaluation deems these campground options feasible, providing opportunities for overnight use would benefit the visitor experience by contributing to a range of visitor experience opportunities at Callville Bay. If the opportunity for overnight use is removed as a result of evaluation, this will have adverse impacts on the visitor experience by removing an experience that contributes to a range of recreational opportunities at Callville Bay.

South Cove – The National Park Service would not extend or relocate primitive launching areas to provide motorized access, causing adverse impacts on visitor use and experience by limiting motorized access to Lake Mead and limiting water-based recreational opportunities requiring a motorized vessel at South Cove.

Allowing for natural conditions in the area would benefit the visitor experience by restoring habitat which would enhance the viewshed of the area, contributing to the desired condition that natural resources would be maintained to provide a scenic experience at South Cove.

Under this alternative, actions for facilities and services would be the same as described in alternative 1 (current management).

Temple Bar – The National Park Service would not extend or relocate the launch ramp or marina to provide recreational motorized access, causing adverse impacts on visitor use and experience

by limiting motorized access to Lake Mead and limiting water-based recreational opportunities requiring a motorized vessel at Temple Bar.

Actions to terminate the concession contract and associated services adversely impact the visitor experience by not providing visitor services at the concessions-operated marina, concession facilities, and NPS campground operations, including land and water fuel stations, the hotel, the store, restaurant, and the trailer village and RV sites, all of which contribute to the range of recreational opportunities at Temple Bar. This would remove opportunities for a range of visitor services and experiences including leasing boat slips and renting powerboats, fishing boats, and personal watercraft, adversely affecting the visitor experience.

Allowing for natural conditions in the area would benefit the visitor experience by restoring habitat which would enhance the scenic viewshed of the area, contributing to the desired condition that natural resources be maintained to provide a natural experience at Temple Bar.

Cumulative Impacts – When combined with the cumulative actions described in the environmental trends and planned actions sections, impacts from actions in this alternative would result in overall adverse impacts on the visitor experience.

In response to low water levels, the actions under this alternative would continue to reduce access for motorized launching, with the National Park Service ceasing to continue extending launch ramps, closing associated marinas, and terminating concession contracts, all adversely impacting the visitor experience by reducing a range of recreational opportunities. Overtime, Lake Mead would see decreased motorized use because of limited-to-no launch opportunities, as no future launch ramp extensions or relocations would occur. These actions would continue to provide more nonmotorized recreational access and opportunities at these locations, benefiting the overall visitor experience and contributing to the desired condition that visitors would have opportunities for nonmotorized water-based recreational experiences that are safe and enjoyable. Minimal, primitive, and rudimentary nonmotorized access to the water would benefit the visitor experience by supporting nonmotorized water-based recreation opportunities. Land-based recreation would provide opportunities for overnight use and allowing for natural conditions to enhance the visitor experience and viewshed, benefiting the overall visitor experience. Under this alternative, concession services would not be provided, adversely impacting the overall visitor experience by limiting the range of available water-based recreation opportunities. When combined with past, present, and reasonably foreseeable actions, and despite beneficial impacts resulting from nonmotorized and land-based recreation, impacts from actions in this alternative would result in overall adverse effects to visitor use and experience.

Common to Alternatives 1 and 2

The following management concepts and their resulting impacts are actions common to alternatives 1 and 2 that apply across locations.

Evaluating the financial viability of concessioner managed launch ramps, if implemented after compliance, would benefit the visitor experience by providing opportunities to launch motorized and nonmotorized vessels to engage in water-based recreation experience that contribute to the range of available visitor services and opportunities.

Considering using a portable and accessible launching surface built of flexible materials (e.g., Mobi-Mat) if the water level is rising, if implemented, would benefit the visitor experience by supporting recreation and motorized access opportunities.

Supporting new and existing land-based and water-based sustainable recreational opportunities, such as kayaking, paddleboarding, biking, hiking, swimming, and camping, would benefit the visitor experience by providing a range of experiences and recreational opportunities.

Developing reservation options for launching and retrieving boats, after evaluation and additional compliance, would benefit the visitor experience by managing expectations and organizing launching and retrieval in a way that reduces congestion and mitigates issues associated with congestion, thereby enhancing the quality of visitor experience. While this action may relieve congestion in crowded areas, visitors who do not get a reservation when the system is at capacity would not be able to gain access at that specific time and may be displaced to another day/time, resulting in adverse impacts on the visitor experience. Visitors may also be inconvenienced by having to obtain a reservation, resulting in an adverse impact because this requirement would reduce spontaneity and flexibility in launching and retrieving vessels for visitors who prefer to launch or retrieve unscheduled. A reservation system would also require planning and knowledge to obtain the reservation, which may prevent those who are less experienced from launching or retrieving vessels altogether, adversely impacting the visitor experience.

Environmental Consequences Associated with Indicator and Threshold Potential Future Management Strategies – Appendix B identifies several adaptive management strategies that would impact visitor use and experience. As these are potential future management strategies, they would only be implemented if and when conditions dictate they are necessary.

Options for implementing a reservation or timed-entry permit system to access Willow Beach are in the "Project Areawide General Actions" section under impact analysis.

Implementing temporary closures by site would adversely impact the visitor experience by temporarily limiting or eliminating the opportunity to access these locations and all visitor services and experiences associated with these locations, adversely impacting the quality of and range of visitor experience opportunities. Adverse impacts on the quality of visitor experience are also caused by the change in access and subsequent changes to visitor circulation patterns. This state of change creates uncertainty and may deter visitors from attempting to access these sites altogether, adversely impacting the visitor experience.

The temporary or permanent closure of areas with hazards, followed by a risk assessment to determine the acceptability of reopening the area, would have both beneficial and adverse impacts on the visitor experience. Closures of areas with hazards would have beneficial impacts on the quality of visitor experience by discontinuing the opportunity for visitors to interact with hazards/hazardous conditions at these locations. Depending on the area experiencing the temporary or permanent closure, the closure could adversely impact the visitor experience by temporarily or permanently eliminating the opportunity for visitors to engage in recreational experiences at these locations, decreasing the range of and quality of visitor experiences.

Reservation options for backcountry permits at Echo Bay, Temple Bar, and South Cove, if implemented, are in the "Project Areawide General Actions" section under impact analysis.

Options for using a reservation system during peak times with associated staff support to monitor reservations at Callville Bay, if implemented, are in the "Project Areawide General Actions" section under impact analysis.

Alternative 3

Under this alternative, actions and associated impacts for potable water would be the same as described in alternative 1 across all the sites except Hemenway Harbor.

Hemenway Harbor – Actions at Hemenway Harbor are the same as alternative 1. As a result, impacts on visitor use and experience would be similar to those described in the affected environment section and the new actions as described under the alternative 1 impact analysis.

Though implementing the actions in this alternative would result in beneficial impacts on the visitor experience described in the above analysis, the extension of the marina operations and launch ramps to 950 feet was determined to be infeasible. The remainder of the actions would beneficially impact visitor experience, and trends would be similar to what is described in the impact analysis for alternative 1.

Echo Bay – If reestablished after evaluating full-service marina operations based on public safety, utilities, and commercial interest, the launch ramp and marina would extend to a water level of 1,000 feet, benefiting the visitor experience by providing opportunities to launch motorized and nonmotorized vessels that contribute to a range of water-based recreation experiences. This would contribute to a range of recreation opportunities at Echo Bay and contribute to the desired condition that visitors would have opportunities for nonmotorized water-based recreational experiences that are safe and enjoyable. If reestablished after evaluation and at water levels below 1,050 feet, the launch ramp and marina would be relocated north to Pumphouse Bay with associated roads and parking, benefiting the visitor experience by providing opportunities for motorized and nonmotorized launching and recreation at Echo Bay.

If reestablished after analysis, full-service marina operations would include the concessioner-operated trailer village and RV sites, land-based fuel, and limited retail, and the site would continue to provide camping and shoreline access, benefiting the visitor experience by continuing to provide these visitor experience opportunities that contribute to a range of available opportunities at Echo Bay.

Though implementing the actions in this alternative would result in beneficial impacts on the visitor experience described in the above analysis, the action is not selectable because NPS staff determined it's infeasible to reestablish full-service marina operations or relocate the launch ramp north to Pumphouse Bay due to topography and spatial constraints of this area. As a result, there would be adverse impacts on the visitor experience and trends would be similar to what is described in the affected environment.

Callville Bay – Sustaining marina operations and launch ramps by extending to a water level of 950 feet, relocating the launch ramp farther into the lake or into Swallow Bay at water elevations below 1,065 feet, and providing a new accessible courtesy dock would benefit the visitor experience by providing continued access to Lake Mead for motorized boat launching and the opportunity for a range of water-based recreation. Providing these opportunities for motorized and nonmotorized recreation contributes to the types and range of available visitor experiences at Callville Bay. Below a 950 feet water level, all launching operations would be closed, removing the

opportunity for motorized launching, and reducing the range of water-based recreation opportunities at Callville Bay, adversely impacting the visitor experience.

Maintaining full operation of concession-required services described in the 2019 FONSI, benefits the visitor experience by providing marina services such as houseboat and small boat rental, food and beverage services, the trailer village, the boat shop, and water- and land-based fuel.

Though implementing the actions in this alternative would result in beneficial impacts on the visitor experience described in the above analysis, the relocation of the launch ramp and marina to Swallow Bay was determined to be infeasible. The action to extend the launch ramp and marina further into the lake would result in beneficial impacts on the visitor experience described in the impact analysis for alternative 1.

South Cove – Actions and associated impacts under this alternative are the same as described in the affected environment section.

Temple Bar – Sustaining marina operations and launch ramps by extending to a water level of 950 feet and relocating the launch ramp farther into the lake to the northeast at water levels below 1,050 feet with associated roads, parking, and utilities, would benefit the visitor experience by providing continued access to Lake Mead for motorized boat launching and the opportunity for a range of water-based recreation. Providing these opportunities for motorized and nonmotorized recreation contributes to the types and range of available visitor experiences at Temple Bar.

Maintaining full operation of concession-required services described in the 2019 FONSI, benefits the visitor experience by providing concession-required services that contribute to the types and range of visitor experience opportunities at Temple Bar, including leased slips; powerboat, fishing boat, and personal watercraft rentals; a restaurant; and the boat shop.

Though implementing the actions in this alternative would result in beneficial impacts on the visitor experience, the action is not selectable because NPS staff determined it's infeasible to relocate the launch ramp and the marina. As a result, there would be adverse impacts on the visitor experience and trends would be similar to what is described in the affected environment.

Cumulative Impacts – When combined with the cumulative actions described in the environmental trends and planned actions sections, impacts from actions in this alternative would result in overall adverse impacts on the visitor experience.

Actions under this alternative would support additional access for motorized launching, benefiting the visitor experience by providing new motorized launching opportunities for a range of water-based recreation. Over time, Lake Mead would see an increase in motorized use compared to current use levels because of increased opportunities for launching under this alternative. Actions under this alternative would continue to provide motorized and nonmotorized recreational access and opportunities at these locations, benefiting the overall visitor experience. Under this alternative, concession services would be provided, benefiting the visitor experience by providing a range of available water-based recreation opportunities and services.

Though implementing the actions in this alternative would result in beneficial impacts on the visitor experience described in the above analysis, the action is not selectable because some aspects of alternative 3 are infeasible, as described in the alternative 3 impact analysis, such as extending the launch ramp at Hemenway Harbor to 950 feet, reestablishing full marina services at

Echo Bay, and relocating the launch ramp and marina from Callville Bay to Swallow Bay. Therefore, alternative 3 would adversely impact visitor use and experience due to the level of uncertainty and infeasibility of actions.

FACILITIES

Affected Environment

As Lake Mead's water levels continue to drop and expose critical facilities and infrastructure within the project area, the potential for impacts on infrastructure and changes in park maintenance operations is imminent. Increased management of unused/underused facilities would shift operations for NPS staff, requiring additional time and effort for these specific assets. In contrast, other assets would be deactivated and preserved to consolidate maintenance tasks and the overall management of these facilities. The following section describes the existing conditions related to facilities in the five sites.

Hemenway Harbor

Hemenway Harbor currently has two operating marinas with a landing barge (floating platform). Lake Mead Resort Marina and Las Vegas Boat Harbor provide leased boat slips and small boat and personal watercraft rentals. The harbor has a store selling boating parts, food, and beverages and a restaurant and a bar at both locations. Las Vegas Boat Marina is the only one that provides fueling services and dry land storage.

Hemenway Harbor infrastructure is at capacity, limiting growth and requiring improvements before expansion. The two marinas at Hemenway Harbor are vital to the harbor's infrastructure, given that most visitor facilities are located within the floating marinas except for a comfort station, a fish cleaning station, and a boat wash area.

The floating marinas were relocated to about 3,000 feet from the paved access road as the water in the area receded. The National Park Service has confirmed that if water levels reach 1,000 feet, the marinas can still operate with minimal modifications to their operations.

Located north of the marinas, and with its present alignment, the concrete launch ramp could be extended to an elevation of 1,000 feet and would have a natural slope with a 5% gradient optimal to allow the continuation of the ramp. Temporary pipe mats are in place to provide motorized access to the lake. With the ongoing extension of the launch ramp to 1,000 feet and reconfiguring all the necessary infrastructure (e.g., electricity, access routes, parking, comfort stations) to continue providing support, increased maintenance efforts are needed to maintain adequate facilities and marina operations. The previous parking areas that supported access to the launch ramp sit abandoned and unusable at Hemenway Harbor due to the receding water levels and current distance from the water. All services and utilities provided to the marina are located within a utility corridor connecting the two marinas. These services include potable water, wastewater, electricity, communications, and fuel.

Echo Bay

Echo Bay currently does not have a marina, as it closed in 2013, resulting in a reduced staff capacity and maintenance of the facilities. However, land-based services are provided by a concessioner. The trailer village infrastructure is beyond repair, and to bring them up to

standards will not be cost-effective. These assets have reached the end of their life cycle due to numerous repair needs.

National Park Service-operated facilities at Echo Bay include the campground, fish cleaner, dump station, restrooms, and trash collection. The National Park Service also manages the water treatment and sewage collection, with a recently completed project to move the water intake barge to deeper water to continue providing potable water and fire prevention services.

The original concrete launch ramp (upper) and newer concrete launch ramp (lower) have both closed due to low water levels. The closure of these launch ramps has led to abandoned infrastructure that results in negative trends to NPS staff responsibilities and operations. However, the closure of these concrete launch ramps reduces cyclic maintenance needs. The ongoing designation of a primitive access road for motorized and nonmotorized launching reduces overall maintenance and upkeep, similar to operations at South Cove.

Relocating the water barge and launch ramp is critical to maintaining visitor services for recreational, operational, and domestic uses. Not only would this ensure the longevity of the area's infrastructure, but it would retain emergency response services such as fire suppression. This area would also benefit from the reduced maintenance and upkeep similar to Hemenway Harbor.

The lack of potable water provision below 980 feet would reduce water infrastructure since it would not be utilized, maintained, or monitored, leading to accelerated deterioration impacting recreation, concessions, emergency response, and overall park operations. Possible contamination hazards to water quality from abandoned infrastructure may occur.

Callville Bay

The Callville Bay marina comprises facilities that offer options for leasing boat slips and houseboats, rental of small boats and personal watercraft, and food and beverage provisions. Some land-side services include dry boat storage, employee housing, trailer villages and RV sites, restaurants, retail stores, and fuel filling stations on land and at the marina. Currently, the marina is approximately 2,500 feet from supporting facilities since its relocation to the center of the bay to continue providing services as water has receded. The ongoing extension of the marina further into the lake results in additional needs for park staffing and operations.

The trailer village infrastructure is beyond repair, and to bring them up to standards will not be cost-effective. These assets have reached the end of their life cycle due to numerous repair needs.

National Park Service-operated facilities at Callville Bay include the campground, fish cleaner, water treatment and sewage collection, dump station, restrooms, and trash collection.

The original concrete launch ramp at Callville Bay was closed due to low water levels and once the launch ramp no longer provided access to the water. While the launch ramp closure results in reduced ongoing maintenance, the abandoned infrastructure can lead to an increased need for park presence.

The National Park Service constructed another launch ramp close to the water, and ongoing extensions of this launch ramp and the associated marina infrastructure has led to an overall rehabilitation of the facilities since access opportunities are augmented with the use of the

portable launch maintained by the concessioner. This results in an alignment with rehabilitated and adaptable infrastructure.

Several utilities are provided and managed in the Callville Bay area to support the marina operations. Potable water, wastewater treatment, electricity, fuel, and communications are the primary services for NPS facilities, concessioners, and visitors. The lack of water provision below 950 feet would create adverse impacts on potable water infrastructure, impacting recreation, concessions, emergency response, and overall park operations.

Infrastructure integrity, visitor safety, and provision of services are in jeopardy as water levels continue to drop at Callville Bay.

South Cove

South Cove does not have a marina. South Cove has one launch ramp in the northern area of the cove. Due to low water levels, the ramp has been closed since June 2021. The abandoned infrastructure decreases the need for routine maintenance but can increase the need for law enforcement presence and cause additional strain on NPS staff. Opportunities currently exist to access the site and launch boats from a park-approved dirt/gravel road south of the existing launch ramp.

Supporting Infrastructure – National Park Service-operated facilities at South Cove include restrooms and trash collection that are maintained and require NPS staff attention.

Temple Bar

The marina provides both water and land-side services to visitors. The operations at Temple Bar include fuel docks, houseboats, and watercraft rentals, leased boat slips, restaurant and bar retail stores, employee housing, trailer villages and RV sites. The marina is currently located 3,600 feet from upland support facilities, and it can continue operating until the water level reaches 1,000 feet. The ongoing extension of the marina further into the lake has resulted in continued operational needs at this location.

National Park Service-operated facilities at Temple Bar include the campground, fish cleaner, water treatment and sewage collection, dump station, restrooms, and trash collection.

The trailer village infrastructure is beyond repair, and to bring them up to standards will not be cost effective. These assets have reached the end of their life cycle due to numerous repair needs.

The concrete launch ramp at Temple Bar was closed in June 2021 due to low water levels. While the closure of this launch ramp reduced maintenance needs for extending, the abandoned infrastructure causes additional constrains for NPS staffing and operations. The concessioner-operated portable launch ramp made of flexible materials reduces the overall impacts on park facilities and operations.

Potable water, wastewater treatment, fire protection, fuel, electricity, and communications are currently being provided at Temple Bar. Continued low water levels threaten infrastructure reliability and add operational constraints, reducing the likelihood that services can be provided in the years to come. Future opportunities to maintain boat fueling services for emergency operations have been explored by NPS management.

Environmental Trends

Lake Mead has been experiencing a significant decline in water levels due to prolonged drought conditions and increased water demand from surrounding areas. This has reduced the lake's overall boat launching capabilities/accessibility, affecting the environment, park facilities and infrastructure, and human activities. This decline has exposed previously submerged land and infrastructure, negatively impacting the lake's ecosystem. With lower water levels, there has been an increased risk of water quality issues due to higher concentrations of pollutants and nutrients which can become more concentrated in the reduced volume of water, leading to harmful algal blooms and degradation of water quality and infrastructure.

The declining water levels have necessitated adjustments to the infrastructure around Lake Mead. To address this trend, the park is implementing infrastructure improvements by adapting docks and marinas to lower water levels, repositioning and extending boat launch ramps to maintain access to the water, and relocating facilities that can no longer provide services and amenities given the water level.

To continue providing recreation opportunities, functional facilities, and amenities, Lake Mead must modify existing infrastructure and implement new construction techniques to accommodate changing water levels. There will also be a focus on conducting regular inspections and maintenance activities to ensure the safety and usability of facilities and exploring innovative solutions, such as floating docks and adjustable structures, to adapt to changing conditions and optimize facility operations.

Overall, the ongoing construction projects and abandonment of facilities and infrastructure have caused operational constraints on park staffing and operations. The closure of concrete launch ramps at South Cove, Temple Bar, Callville Bay, and Echo Bay have resulted in hundreds of feet of abandoned concrete and unused facilities in the project area. Abandoned infrastructure can result in both positive and negative trends in park facilities and maintenance. While abandoned infrastructure reduces day-to-day maintenance requirements it also neglects infrastructure, which would eventually require removal or pose challenges for park operations due to visitor and/or staff safety. At Hemenway Harbor, Callville Bay, and Temple Bar the extension of marinas requires additional supporting infrastructure, which can increase the need for NPS staff during such construction projects.

Impact Analysis

Alternative 1 (NPS Preferred)

Under the preferred alternative, current management would continue and new actions—such as extending the launch ramps at identified locations and evaluating abandoned infrastructure for removal—would occur. Impacts on facilities and infrastructure from ongoing actions, including providing potable water, would be the same or similar to what is described above in the affected environment section, which describes the current and expected future conditions of this resource. Extending the launch ramps and marinas at Callville Bay, Temple Bar, and Hemenway Harbor would result in additional maintenance and need for staff presence. Additionally, if NPS staff relocate the launch ramp and marina closer to the Hemenway Wall, this would result in adverse impacts on facilities as it would result in abandoned infrastructure at the existing location.

The evaluation of abandoned infrastructure for removal at all locations within the project area would provide beneficial and adverse impacts on facilities and operations. If facilities are removed, this would lead to short-term adverse impacts due to increased staff needs and changes in operations; however, there would be long-term beneficial impacts due to an overall reduction in number of facilities within the park.

Cumulative Impacts – Under the preferred alternative, current management would continue and trends in facilities would be similar to what is described in the affected environment section. The impacts from new actions, such as launch ramp and marina extensions, relocation of facilities at Hemenway Harbor, and evaluating infrastructure for removal would result in beneficial and adverse impacts. Overall, when impacts from alternative 1 are paired with impacts from past, present, and reasonably foreseeable future actions, there would beneficial impacts on facilities due to a consolidation of facilities to support concessioner operations and an evaluation of abandoned infrastructure. In the short-term, there would be adverse impacts while facilities remain abandoned and unused. Park operations would benefit from the strategic approach and facilities would be more sustainable and adaptable.

Alternative 2

Under alternative 2, actions to decommission infrastructure and discontinue extensions and relocations of launch ramps would be similar to what is described above in the affected environment section, under environmental trends, which describes the current and expected future conditions of facilities. The downward trend described in the environmental trends would lead to the greatest adverse impact under alternative 2, as facilities and infrastructure would be abandoned in place until further evaluation and funding became available for removal.

Additionally, with the decommissioning of infrastructure and by discontinuing launch ramp relocations and concession services across the five locations, there would be beneficial impacts on park infrastructure by opening additional opportunities for the reconfiguration of minimal access points for nonmotorized recreation. Another beneficial impact that would result from the discontinuation of concessions contracts is a reduction in NPS asset management, as additional maintenance costs would have been incurred by the concessioners across locations.

Cumulative Impacts – Under alternative 2, actions would continue and trends in facilities would be similar to what is described in the affected environment section. The impacts from decommissioning infrastructure and discontinuing launch ramp relocations and concessions services would provide some beneficial impacts in addition to the adverse impacts described under environmental trends. Overall, when impacts from alternative 2 are paired with impacts from past, present, and reasonably foreseeable future actions, there would be adverse and beneficial impacts on facilities due to reconfigurations of more minimal facilities to support nonmotorized recreation. Park operations and maintenance needs would also be reduced providing beneficial impacts long-term. The longevity of adverse impacts is unclear, as the National Park Service would wait for available funding to remove facilities that have been abandoned and unused.

Alternative 3

Actions under alternative 3 would result in adverse impacts on facilities and infrastructure, as the various projects to extend or relocate launch ramp and marinas would add additional maintenance and operational needs across the project area. Furthermore, an extension or

relocation of launch ramp and marinas would lead to abandoned infrastructure. While some of the actions are infeasible, the remainder of the actions from alternative 3 would result in similar impacts as described in alternative 1.

Cumulative Impacts –When combined with the past, present, and reasonably foreseeable actions described in the affected environment summary, impacts from alternative 3 would not meaningfully impact conditions of facilities and infrastructure, as described in the affected environment section. As described above and in chapter 2, some aspects of alternative 3 are infeasible for the National Park Service to implement; as a result, the actions to provide facilities and infrastructure to maintain launching access within the project area would result in adverse impacts due to additional maintenance and operational constraints. While abandoned infrastructure reduces day-to-day maintenance requirements, it also neglects infrastructure, which would eventually require removal or pose challenges for park operations due to visitor and/or staff safety.

NATURAL RESOURCES – TERRESTRIAL AND AQUATIC VEGETATION

Natural resources that could be affected by implementing the action alternatives in the plan/EA include terrestrial and aquatic vegetation and federally listed species.

Affected Environment

This section describes the affected environment for the terrestrial and aquatic vegetation at the park. The description of these elements is based on the best professional judgement of NPS staff, existing data, monitoring reports, research and studies, and anecdotal observations from NPS staff. Sources, where used, are noted for published references only. Terrestrial and aquatic vegetation will be discussed.

The conditions creating Lake Mead National Recreation Area primarily consist of human modifications to include two massive reservoirs—Mead and Mohave—by damming of the Colorado River. More than half of the park is covered by open water, and where natural terrestrial conditions prevail, is sparsely vegetated. Reservoir water covers 1.5 million acres of the Mojave Desert in Clark County, Nevada, and Mohave County, Arizona. The elevation gradient, including areas that are inundated, range from 499 to 5,640 feet (inundated canyon bottoms to highest terrestrial elevation point) (Fleishman et al. 2019). Elements of the Mojave, Sonoran, and Great Basin Deserts are represented throughout the park. The geologic diversity and convergence of these desert ecosystems, and associated mountain ridges, layers of rock formations, and wide bajadas including deep canyons and sheer cliffs provide habitat for a rich diversity of plants and animals.

Native terrestrial vegetation at the park reflects the greater Mojave Desert ecology in which the park is situated. The terrestrial vegetation at the park tends to be widely dispersed and is heavily dependent on soil formation and moisture levels. The vegetation here is represented by widely spaced sparce scrub or creosote shrubs, with cactus and bunch grasses interspersed throughout, and annual flushes of wildflowers when winter and spring vegetation is adequate (Salas et al. 2016).

As water is depleted, new shoreline areas are exposed creating new niches for weedy annual herbaceous vegetation and aggressive shrubs and trees (e.g., salt cedar) (Salas et al 2016). Patterns of disturbance to terrestrial vegetation and soils along the shorelines, which includes the project

areas, include the initial construction and establishment of the reservoir, and later construction activities that established roads, parking areas, marinas, and docks, to support subsequent decades of recreational use of the reservoirs. For example, soils and vegetation at Hemenway Harbor and Callville Bay have been compacted by decades of boat launch, vehicle, and pedestrian activities, which have steadily moved downslope to follow the receding shorelines. Similarly, parking areas to support visitors, heavy construction equipment staging and movement, have compacted soils and denuded terrestrial vegetation where these activities have occurred. However, if there is sufficient seasonal precipitation, among other factors, such as temperature, vegetation is observed to recover in some areas where heavy visitor, park operations, and construction activities have occurred. Nearer the reservoir shorelines, the terrestrial vegetation is affected by repeated patterns of disturbance. However, where it exists, the native terrestrial vegetation established near the shore's edge provides protective cover for small fish, stabilizes soils and shoreline structure, and can reduce rates of sedimentation into the aquatic environment at its junction with the shoreline.

In addition to visitor use impacts over time, the action of removing refuse from newly exposed shoreline areas as water levels drop, as well as National Park Service and other bureaus' capacity to remove newly exposed debris, has become an emerging threat to natural resource conditions. In some cases, a responsible entity and plan for removing the debris needs to be identified, which further delays and complicates cleanup procedures.

In most cases, upland areas affected by facilities development were once covered by the lake and are composed of bare ground and rock and are covered by little-to-no vegetation or by nonnative vegetation (e.g., tamarisk [*Tamarix spp.*]). Soils in the inundation zone of the lake have experienced repeated drying and flooding cycles as lake levels have fallen, which limits their integrity for sustaining native Mojave Desert vegetation (NPS 2018). None of the project areas are known to have rare vegetation or support a high plant diversity.

The establishment of the reservoirs drastically changed the original habitat, and the slower slackwater qualities of the reservoir created conditions for emergent and aquatic plant species to establish. Lowering lake water levels exposes lands that were previously below the last highest water level. As water levels drop, denuded shorelines, dry lakebed, and mud flats can be colonized by native emergent vegetation (cattails, rushes, sedges), and create conditions for native invertebrate species that will support foraging fish species where shallow water conditions exist at the shorelines (Rosen et al. 2012a). However, these areas are also susceptible to the establishment of invasive nonnative plants (both terrestrial and aquatic). Native terrestrial and aquatic vegetation is supported by generally high water quality, though warming temperatures along shoreline waters threaten the conditions that support natural communities. Low water levels exacerbate conditions that degrade water quality and increases the potential spread of invasive aquatic plant species and harmful algal blooms (NPS 2018). Cyanobateria, which cause hazardous algal blooms, consume oxygen, and deplete oxygen levels in water, resulting in low oxygen levels and poor water quality.

The establishment of invasive nonnative plants within the lake areas is a well-recognized ecological issue. Nonnative aquatic plant infestations that establish within the project sites can negatively impact the lake's aquatic functions and reduce the water quality for aquatic organisms The lowering water levels, as well as excess nitrogen and phosphorus runoff from human or livestock activities along the shoreline can contribute to toxic algal blooms and low dissolved oxygen. These conditions can result in vegetation die off and create conditions for certain

invasive plants that may spread from the recreation area to the riparian corridors associated with the Colorado River (NPS 2018). When combined with warming surface water temperatures, there is an increased potential for the spread of water-borne pathogens and other invasive aquatic species, as well.

Environmental Trends and Planned Actions

Within park boundaries, development-related impacts, such as the construction, rehabilitation, and maintenance of roads, parking areas, buildings, and utility corridors, have directly disturbed vegetation—mainly terrestrial communities. Past and current activities, such as feral burro use and unauthorized off-road vehicle use, have also disturbed soils and vegetation over areas of the park where they are able to access. For example, errant, trespass cows and burros have been known to become stuck in muddy areas along receding shorelines. These animals need to be rescued or they die. Livestock can also trample fragile soils that host native plants and habitat (e.g., gypsum soil). However, fragile soils, vegetation, and springs vulnerable to livestock impacts are not located in the developed areas of any of the project sites in this plan.

Construction of berm extensions to prevent visitors from driving to the edge of the shoreline are designed to both provide visitor safety and protect resources. Materials used to construct berms are sourced from approved sites near the harbor. The berms have become part of the lake's landscape in the harbor area. The terraced berms mark periods of water recession and do not noticeably disturb soils or trample more than small patches of vegetation. Parkwide natural resource protection objectives are to intensively manage these activities to prevent further disturbance or to limit disturbance from authorized activities to the extent possible.

At existing boat launches at the project area sites, however, most soils in the project are denuded of any vegetation (e.g., Hemenway Harbor) stemming from many years of use. Because most aquatic plants near shorelines are common and prolific native species that quickly colonize disturbed areas, they tend to grow when and where water is present. However, some of the more ecologically desirable species, like willows, cannot persist near project area sites. Drought conditions, receding and fluctuating water levels, and intensive human disturbances at these sites (e.g., vehicle traffic on hard, compacted soils) do not allow for the growth or recovery of this plant species.

Climate change would have ongoing effects to project area vegetation from rising temperatures and changing precipitation patterns, such as infestations of both native and nonnative weeds along receding shorelines. At a larger scale, the 20-year climate-induced drought has led to drastically lower water levels and changed the growing season for natural vegetation, which generally starts earlier and lasts longer, leading to increased seasonal transpiration (NPS 2021).

Past, present, and foreseeable projects within the recreation area, as well as in surrounding areas, have the potential to affect terrestrial and aquatic vegetation. As noted, within park boundaries, development-related impacts have disturbed terrestrial vegetation communities. Past and current activities, such as feral burros and unauthorized off-road vehicle use, have also disturbed areas of the park, including soils and vegetation. Parkwide natural resource protection objectives are to intensively manage these activities to prevent further disturbance or to limit disturbance from authorized activities to the extent possible.

Details on the affected environment (terrestrial and aquatic vegetation) for specific project locations follow.

Hemenway Harbor – Recent efforts, such as extending the public launch ramp at Hemenway Harbor to the lower lake levels, have caused temporary adverse impacts on shoreline vegetation and biotic communities from construction activities. Mitigation measures have minimized negative effects to soils and vegetation in these areas. Best management practices for controlling soil erosion—such as installing silt fences, retaining and replacing topsoil, salvaging seeds or plants, and revegetating sites with native species—have been implemented to reduce runoff and soil loss from construction sites and facilitate the reestablishment of native vegetation.

Ongoing enforcement of regulations covering discharges from boats at project sites (especially Hemenway Harbor) is expected to help minimize hydrocarbons, harmful chemicals, and boats contaminated with weedy, invasive plant species originating from marina operations.

Echo Bay – Closing launch operations and discontinuing other visitor uses of the area below approximately 980 feet would allow Echo Bay to become a primitive location. These actions would allow vegetation to recover and provide long-term stabilization of soils and vegetation at this site. It is likely, however, that both native and nonnative vegetation would return to previous areas of operations and human use.

Maintaining the launch ramp closures at Echo Bay below approximately 1,000 feet, as currently planned, would allow the areas would allow vegetation to recover and provide long-term stabilization of soils and vegetation at these sites. It is likely, however, that both native and nonnative vegetation would return to previous areas of operations and human use. While the closure of the original NPS launch ramp is also planned to be maintained, the concessioner will continue to operate and maintain a portable launch ramp at the site, so this area would not see an increase in vegetation to the same degree as Echo Bay and Callville Bay.

Callville Bay – Closing launch operations and discontinuing other visitor uses of the area below approximately 1,065 feet would allow Callville Bay to become a primitive location. Similar to Echo Bay, these actions would allow vegetation to recover and provide long-term stabilization of soils at this site. However, both native and nonnative vegetation would be likely to return to previous areas of operations and human use.

Recent efforts, such as extending the public launch ramp at Callville Bay to the lower lake levels, have caused temporary adverse impacts on shoreline vegetation and biotic communities from construction activities. Mitigation measures have minimized negative effects to soils and vegetation in these areas. Best management practices for controlling soil erosion—such as installing silt fences, retaining and replacing topsoil, salvaging seeds or plants, and revegetating sites with native species—have been implemented to reduce runoff and soil loss from construction sites and facilitate the reestablishment of native vegetation.

Maintaining the launch ramp closures at Callville Bay below approximately 1,065 feet, as currently planned, would allow the areas would allow vegetation to recover and provide long-term stabilization of soils and vegetation at these sites. It is likely, however, that both native and nonnative vegetation would return to previous areas of operations and human use.

South Cove – Unauthorized off-road use, such as incursions that have occurred to resources at Sandy Point within the greater South Cove area, raise concerns that terrestrial areas could be further impacted as water levels drop. Off-road travel at this site typically involves visitor efforts to find access to the lake, which leads to the creation of multiple unauthorized vehicle trails across potentially fragile terrain. There are no park fences or intentional impediments (e.g., post

and cable ties, boulders) to keep visitors from driving outside developed areas, which makes this project area difficult to manage for impacts on vegetation, soils, and other resources.

Providing operational support for primitive launch access on natural slopes (as conditions allow) would permanently disturb soils and remove existing vegetation within the proposed primitive footprint at this location and its downslope access. As noted for other sites, much of the site has been impacted by heavy visitor use, previous construction activities, and other human-related land disturbances.

Temple Bar – Closing launch operations and discontinuing other visitor uses of the area would allow Temple Bar to become a primitive location and benefit the long-term recovery of soils and vegetation at this site. Potentially removing abandoned infrastructure where appropriate would also allow these footprint areas to recover and provide some vegetative cover in the long term.

While the closure of the original NPS launch ramp is also planned to be maintained, the concessioner will continue to operate and maintain a portable launch ramp at the site, so this area would not experience the impacts on vegetation to the same degree as Echo Bay and Callville Bay.

Impact Analysis

Alternative 1 (NPS Preferred)

Under alternative 1, current management would continue. As a result, impacts on terrestrial and aquatic vegetation would be similar to what is described in the affected environment section, which describes the current and expected future conditions. There are a few exceptions at Hemenway Harbor, Callville Bay, and Temple Bar. These exceptions are described below.

Hemenway Harbor – The launch ramp at Hemenway Harbor would be extended to 1,000 feet, with marina facilities relocated below the ramp. These actions would affect recently exposed vegetation and soil well below the high waterline elevation. Much of this terrestrial landscape is characterized by bare, compacted ground, rock, and both native and nonnative vegetation (such as tamarisk). Soils in the inundation zone of the lake have experienced repeated flooding and drying cycles as the lake rises and falls, which limits their integrity for sustaining native Mojave Desert vegetation. Construction would result in the compaction and displacement of previously disturbed soils and the loss of primarily nonnative vegetation.

This alternative would allow for more natural conditions to persist in the upper area of harbor and removing abandoned infrastructure where appropriate would allow these footprints to recover and provide some vegetative cover in the long term.

Echo Bay – Relocating the launch ramp and grade to approximately 1,000 feet would permanently disturb soils and remove existing vegetation within the proposed construction footprint at this location. As noted, much of the site has been impacted by heavy visitor use, previous construction activities, and other human-related land disturbances., so relocating the launch ramp would remove a negligible amount of the natural, terrestrial vegetation and have a comparably negligible impact on the overall landscape given the intensity of human uses that have occurred here in the past. Therefore, the relocation would not have population-level impacts on vegetation communities.

Callville Bay – Extending the launch ramp and marina facilities further into the lake would permanently disturb soils and remove existing vegetation within the proposed construction

footprint at this location. As noted, much of the site has been impacted by heavy visitor use, previous construction activities, and other human-related land disturbances. Extending the launch ramp would remove a negligible amount of the natural, terrestrial vegetation and have a comparably negligible impact on the overall landscape given the intensity of human uses that have occurred here to the present.

Potentially removing abandoned infrastructure where appropriate would allow these footprints to recover and provide some upland vegetative cover in the long term. Similarly, removing out-of-water launch facilities (if feasible) would provide allow for additional, long-term landscape recovery. However, if the ramp alignment is moved to the west, vehicular activities at this site would remove vegetation in the proposed alignment and add to further disturbance, compaction, and possible erosion at this site.

Building supporting infrastructure (e.g., roads, a parking lot, and all utilities associated with the relocation, design, and access of the marina) would permanently disturb soils and some existing vegetation at this site; however, impacts would not be appreciable due to the site's history of human use, previous construction, and other human-related disturbances that have occurred at this site.

South Cove –Impacts are the same as those described in the affected environment and trends.

Temple Bar – Allowing a concessioner to relocate the marina and portable launch ramp to provide water access to 950 feet. This would permanently disturb soils and remove existing vegetation within the proposed construction footprint at this location. As noted, much of the site has been impacted by heavy visitor use, previous construction activities, and other human-related land disturbances., so relocating the launch ramp would remove a negligible amount of the natural, terrestrial vegetation and have a comparably negligible impact on the overall landscape given the intensity of human uses that have occurred here in the past. Therefore, the relocation would not have population-level impacts on vegetation communities

However, if the National Park Service is unable to secure financial resources, the marina and launch ramp would be closed which would allow Temple Bar to become a primitive location and benefit the long-term recovery of soils and vegetation at this site. Potentially removing abandoned infrastructure where appropriate would also allow these footprint areas to recover and provide some vegetative cover in the long term.

Cumulative Impacts

Alternative 1 could result in the loss or degradation of native terrestrial and aquatic vegetation communities and soils structure at the project sites, due to the construction activity expected for extending or relocation of launch ramps, or where construction of new access roads and launch ramps / areas would be developed. Shorelines that are subject to reservoir fluctuations plus heavy amounts of human activity (vehicle, watercraft, pedestrians) are vulnerable to erosion, siltation, nutrient runoff, as well as dispersal of nonnative vegetation as an outcome of human activity, which includes fluctuating water levels, and movement of people, watercraft, and vehicles.

When the incremental impacts of alternative 1 are combined with the impacts of past, ongoing, and reasonably foreseeable future planned actions described in the affected environment, the overall cumulative impact on terrestrial vegetation in the project areas would continue to be

adverse. The incremental impacts of alternative 1 would contribute to, but would not substantially change, the impacts that are already occurring.

Alternative 1 could result in the loss or degradation of terrestrial and aquatic vegetation and soils conditions to extending or relocating launch ramps and constructing new access roads. It could also result in damage to previously undisturbed, lesser disturbed, or previously recovered terrestrial vegetation due to the movement of equipment and vehicles between staging areas and project sites. When the incremental impacts of alternative 1 are combined with the impacts of past, ongoing, and reasonably foreseeable future planned actions described in the affected environment, the overall cumulative impacts on native terrestrial and aquatic vegetation would continue to be adverse. The incremental impacts of alternative 1 would contribute to, but would not substantially change, the impacts that are already occurring.

Alternative 2

Hemenway Harbor – Removing abandoned infrastructure, such as marina maintenance facilities at Hemenway Harbor, would reduce the human activity associated with this area, and would allow these footprints to recover and provide beneficial impacts on vegetative cover in the long term.

As noted in the affected environment, the conditions that cause algal blooms are of particular concern at Hemenway Harbor. As lake levels continue to drop, blooms would continue to harm native aquatic vegetation communities and water quality and create negative and potentially harmful conditions for visitors where blooms encroach on boating and other popular lake activities.

Echo Bay – Beneficial impacts on terrestrial and aquatic vegetation at Echo Bay would be like those discussed for Hemenway Harbor. The unintentional human distribution of invasive plants associated with visitation and recreation activities could exacerbate weedy infestations and soils compaction in this area, which could compromise native upland vegetative assemblages in this area.

Adverse impacts on terrestrial and aquatic vegetation at Echo Bay would be like Hemenway Harbor. The unintentional human distribution of invasive plants associated with visitation and recreation activities can cause weedy infestations in this area, which could compromise native upland vegetative assemblages in this area.

Callville Bay, South Cove, and Temple Bar – Impacts on terrestrial and aquatic vegetation (beneficial and adverse) would be like those discussed for Hemenway Harbor and Echo Bay.

Cumulative Impacts

Alternative 2 could result in both beneficial impacts and adverse impacts on terrestrial and aquatic vegetation. The benefits would largely be due to a long-term reduction in soil disturbances, sedimentation, and runoff near the launch ramps from the reduction and changes in types of recreation, as well as reduction of boat launching and other motorized activities that are associated with heavy levels of human activity. However, the removal of abandoned infrastructure, and continued recreational access has the potential disturb native vegetation communities following changes in visitor use patterns, though this likely would be to a lesser degree than alternatives 1 and 3. When the incremental impacts of alternative 2 are combined with the impacts of past, ongoing, and reasonably foreseeable planned actions described in the

affected environment, the overall cumulative impacts on native vegetation communities would continue to be adverse. The incremental impacts of alternative 2 would contribute to, but would not substantially change, the impacts that are already occurring.

Common to Alternatives 1 and 2

Impacts on soils and vegetation noted in this section, such as visitor activities that disturb fragile and muddy soils and release sediments into the lake, would be similar at each project area site across all alternatives, including the no-action alternative. Additional impacts common to alternatives 1 and 2 for each project area are described further below. This discussion is followed by impacts from each alternative by location.

Hemenway Harbor – Ongoing berm extensions would continue to have permanent, effects on the landscape at Hemenway Harbor because they are visible from local viewpoints and overlooks and the park has no long-term plan to remove them. However, the extensions would have a negligible impact on the current condition of the native vegetation, as much of the area has been denuded of vegetation from years of heavy use and other human-related disturbances at the site. In contrast to the large areas of shoreline and sparse vegetation exposed as water levels lower, the berm extensions, which are typically a few feet tall and run in narrow, terraced lines across the harbor area, would not noticeably disturb soils or trample more than small patches of vegetation.

Callville Bay – If water levels rise above 950 feet, the National Park Service would reevaluate appropriate uses at this site and the potential impacts on vegetation and park resources from visitor activities. In this scenario, visitor use would likely increase at Callville Bay, and soil compaction impacts would likely follow, as well.

Alternative 3

Hemenway Harbor – Under this alternative, the launch ramp at Hemenway Harbor would be extended to 1,000 feet, with marina facilities relocated below the ramp. These actions would affect recently exposed vegetation and soil well below the high waterline elevation. Much of this terrestrial landscape is characterized by bare, compacted ground, rock, and both native and nonnative vegetation (such as tamarisk). Soils in the inundation zone of the lake have experienced repeated flooding and drying cycles as the lake rises and falls, which limits their integrity for sustaining native Mojave Desert vegetation. Construction would result in the compaction and displacement of previously disturbed soils and the loss of primarily nonnative vegetation.

Removing abandoned infrastructure, such as marina maintenance facilities at Hemenway Harbor would allow these footprints to recover and provide some vegetative cover in the long term.

As noted in the affected environment, the conditions that cause algal blooms are a particular concern at Hemenway Harbor. As lake levels continue to drop, blooms would continue to harm native aquatic vegetation communities and create negative and potentially harmful conditions for visitors where blooms encroach on boating and other popular lake activities.

Echo Bay – Like Hemenway Harbor, potentially removing abandoned facilities and infrastructure where appropriate would allow these footprints to recover and provide some vegetative cover in the long term.

Adverse impacts on terrestrial and aquatic vegetation at Echo Bay would be like Hemenway Harbor. The unintentional human distribution of invasive plants associated with visitation and

recreation activities can contribute to weedy infestations in this area, which could compromise native upland vegetative assemblages in this area.

Actions at Echo Bay include relocating the launch ramp and grade to approximately 1,000 feet which would permanently disturb soils and remove existing vegetation within the proposed construction footprint at this location. As noted, much of the site has been impacted by heavy visitor use, previous construction activities, and other human-related land disturbances. The planned action to relocate the launch ramp would permanently remove a comparable footprint of terrestrial vegetation and would have a comparably negligible effect on the overall landscape given the intensity of human uses that have occurred here in the past. Therefore, the relocation would not have population-level impacts on vegetation communities.

Callville Bay – Removing abandoned infrastructure where appropriate would allow these footprints to recover and provide some vegetative cover in the long term.

Adverse impacts on terrestrial and aquatic vegetation at Callville Bay would be like Hemenway Harbor and Echo Bay. In addition, unpaved roads in this area could be used to access areas that are unauthorized for off-road activities. Unauthorized road activities fragment undisturbed vegetation and soils, and cause compaction, trampling, and erosion of desert soils near these roads.

South Cove – Beneficial and adverse impacts on terrestrial and aquatic vegetation under the no-action alternative would be like Echo Bay and Callville Bay.

Temple Bar – Beneficial and adverse impacts on vegetation under the no-action alternative at Temple Bar would be like those indicated for Echo Bay.

Cumulative Impacts

Alternative 3 could result in the loss or degradation of vegetation communities and soil conditions due to extending or relocating launch ramps and construction of new access roads. It could also result in damage to previously undisturbed, lesser disturbed, or previously recovered terrestrial vegetation due to the movement of equipment and vehicles between staging areas and project sites. When the incremental impacts of alternative 3 are combined with the impacts of past, ongoing, and reasonably foreseeable future planned actions described in the affected environment, the overall cumulative impacts on native vegetation communities would continue to be adverse. The incremental impacts of alternative 3 would contribute to, but would not substantially change, the impacts that are already occurring.

NATURAL RESOURCES – FEDERALLY LISTED SPECIES

Affected Environment

Consultation History and Species Evaluation

The National Park Service initiated informal consultation in October 2022 with the US Fish and Wildlife Service (USFWS) Southern Nevada and Arizona Ecological Services Field Offices to discuss the plan and potential impact on federally listed species and their critical habitats. The project area was reviewed for potential/suitable habitat for federally listed (threatened or endangered) species on July 7, 2022 (USFWS 2022). A review of this list was completed on October 11, 2022, by USFWS staff and Lake Mead National Recreation Area natural resource

managers. Accuracy of the list was verified on April 7, 2023 (USFWS 2023). No change was made to the list at that time.

Table 7. Federally Listed Threatened, Endangered, or Candidate Wildlife Resources Occurring or Potentially Occurring in Lake Mead National Recreation Area

Common Name *Scientific Name*	Federal Status	Potential to Occur	Critical Habitat Identified for this Species?	Considered for Further Analysis?	Rationale for Exclusion (Limiting Factors)
Insects					
Monarch butterfly *Danaus plexippus*	Candidate	No	No	No	Consultation with US Fish and Wildlife Service under section 7 of the Endangered Species Act is not required for candidate species.
Fish					
Bonytail *Gila elegans*	Endangered	No	Yes, location information not available	No	Not reported to maintain breeding populations within the defined project areas and are unlikely to be present in the project areas. This is likely due to the persistence of the previous intensive habitat modifications that have occurred to date.
Humpback chub *Gila cypha*	Threatened	No	Yes, but well outside project area	No	Bio-West Consulting has been monitoring native fish population in Lake Mead, including the Humpback Chub, for more than 20 years. The only known humpback populations at Lake Mead are above Pearce Ferry Rapids near Grand Canyon, well outside the project areas.
Moapa dace *Moapa coriacea*	Endangered	No	No	No	The ecological factors associated with this species and the current species' distribution occur approximately 37 upstream miles from the nearest project location. Therefore, it is highly unlikely that the species would be present in the project areas.

Common Name *Scientific Name*	Federal Status	Potential to Occur	Critical Habitat Identified for this Species?	Considered for Further Analysis?	Rationale for Exclusion (Limiting Factors)
Razorback sucker *Xyrauchen texanus*	Endangered	Yes	Yes, overlaps project area	Yes	A spawning area of this species is known to exist in the Echo Bay project area. As lake levels decline, the spawning locations may be abandoned and new locations inhabited. It is also possible the razorback spawning area around Echo Bay would remain in the same area if appropriate substrate (e.g., gravels) are present at different lake levels (Rogers et. 2021). The National Park Service will consult with Bio-West to get up-to-date spawning locations before implementing the Echo Bay project.
Virgin River chub *Gila seminuda (=robusta)*	Endangered	No	Yes, location information not available	No	Endemic species are historically restricted to the Virgin River and Muddy River and associated stream reach with suitable habitat. The project areas are located outside of this species' known range and its designated critical habitat.
Woundfin *Plagopterus argentissiumus*	Endangered	No	Yes, location information not available	No	Endemic species are historically restricted to the Virgin River and Muddy River and associated stream reach with suitable habitat. The project areas are located outside of this species' known range and its designated critical habitat.
Reptiles					
Desert tortoise *Gopherus agassizii*	Threatened	No	Yes, does not overlap the project areas	Yes	This species and its primary habitat, as well as its designated critical habitat, are outside the project areas. However, there may be isolated occurrences of this species outside of its primary habitat as individuals move between habitat patches Mitigation measures that are described in appendix D for the desert tortoise will be undertaken to reduce impacts on individuals of this species.

Common Name *Scientific Name*	Federal Status	Potential to Occur	Critical Habitat Identified for this Species?	Considered for Further Analysis?	Rationale for Exclusion (Limiting Factors)
Northern Mexican gartersnake *Thamnophis eques megalops*	Threatened	No	Yes, location information not available	No	This species is a riparian-obligate species and is not known to occur within the project areas or park lands.
Birds					
California condor *Gymnogyps californianus*	Endangered	No	Yes, location information not available	No	There are no known sightings of this species in the park.
California condor *Gymnogyps californianus*	Experimental population, nonessential	No	Proposed critical habitat; location information not available	No	There are no known sightings of this species in the park.
Southwestern willow flycatcher *Empidonax traillii extimus*	Endangered	No	Yes, overlaps project area	No	The preferred riparian habitat structure does not characterize the project areas; it is unlikely that management activities would affect this species. Mitigation measures that are described in appendix D for the southwestern willow flycatcher will be undertaken to reduce impacts on individuals of this species.
Yellow-billed cuckoo *Coccyzus americanus*	Threatened	No	Yes, overlaps project area	No	The preferred riparian habitat structure does not characterize the project areas.
Yuma Ridgway rail *Rallus obsoletus yumanensis*	Endangered	No	No	No	The preferred wetland habitat structure does not characterize the project areas.

As indicated in table 7, there are 13 federally listed threatened or endangered, candidate/proposed species or subspecies with the potential to occur within or near the project area, and critical habitat is identified for three of those species within or near the project area. Based on an assessment of known habitat types in the project area and on previous NPS survey efforts, two federally listed species (the razorback sucker and the desert tortoise) are known to occur within the planning area and are evaluated in detail in this environmental assessment. Species with no potential or suitable habitat in the project area and species whose distributional and/or elevation range are outside the project location were excluded from further review. Table 7 lists the species that were excluded from further review in this environmental assessment and a summary of the rationale for excluding them.

Razorback Sucker

The razorback sucker *(Xyrauchen texanus)*, recognized by the bony keel on its back, is the largest species of suckers (up to 36 inches long) in the Colorado River Basin. Lake Mead includes historic spawning beds for this endemic, federally endangered species. The abundance and distribution of the razorback sucker is greatly reduced from historical levels, primarily due to the construction of mainstem dams and introduction of nonnative sport fish. All of Lake Mead is designated as critical habitat for this species. As water levels drop in Echo Bay and other potentially suitable habitat along Lake Mead shorelines, the sucker must find new habitat. Spawning areas are typically located along relatively shallow shorelines with cobble and gravel substrates, which is determined by annual surveys conducted during the spawning season and includes suitable habitat locations throughout Lake Mead (Rogers et. al 2021).

The Lake Mead population appears to reproduce successfully in the lower Colorado River Basin and is one of the few populations on the Colorado River that continues to have recruitment solely from naturally spawning adults (NPS 2018). The abundance and distribution of razorback suckers in the lake is not well known, although recent surveys indicate that the Lake Mead population is young and resilient. The adult population in Lake Mead remains small; based on modeling in 2017, the population was estimated to be 421 fish, with a range of between 305 and 615 fish (NPS 2018).

The continuing drought and resulting drop of the lake elevation continues to affect the habitat and population of the razorback sucker. Sites previously used for spawning are now dry. In the past, the fish are observed to adapt to the lowering water and located new areas in which to spawn, though it is unclear how long this would continue.

Surveys have identified two known locations for razorback spawning, one of which is an area in Echo Bay (the other area in Las Vegas Bay would not be affected by actions proposed in this plan/EA). No spawning is known to occur in other areas along the shoreline that may be affected by the alternatives. As one of the largest or most active spawning areas in Lake Mead, Echo Bay is of particular importance for the razorback sucker. However, the number of larvae collected at Echo Bay has been declining. In 2021, 182 larvae collected at Echo Bay (Rogers et al. 2021). Though this number falls within the historical context for Echo Bay, it is consistent with the annual decline in larval fish counts since 2016.

Several explanations have been offered for the decline, although none are particularly definitive for this species at Lake Mead. A major factor causing the falloff of razorback suckers and other big-river fishes was the construction of mainstem dams and the resulting cool tailwaters and reservoir habitats, which replaced warm, riverine environments (Holden and Stalnaker 1975). Competition and predation by nonnative fish in the Colorado River and its reservoirs have also contributed to the decline of these endemic species (Minckley et al. 1991). It may be that the declining lake elevation has reduced the available spawning area and forced some fish to use other areas that have not yet been identified. Rogers et al. (2021) noted that for many years the primary spawning location was in the western part of the bay; however, in 2016 and 2017, the spawning area was in the south side of the bay, near the mouth of Echo Bay over patches of cobble and gravel. In 2017, the highest concentration of larvae was on the southern shoreline of Echo Bay across from the boat ramp; some larvae were also collected on the northern shore near the boat ramp. Rogers et al. (2017) observed the primary spawning location is in a shallow area, adjacent to a steep edge where the fish may retreat during daytime hours. In 2021, Rogers et al.

noted that despite changes in reservoir elevation, the razorback sucker population in Lake Mead persists in finding suitable spawning habitat at the long-term monitoring study areas (e.g., Echo Bay). This species continues to demonstrate recruitment. where appropriate substrate (e.g., gravels) are present.

Environmental Trends and Planned Actions

Water levels at Lake Mead are impacted by changes in precipitation, which may result in low lake levels during dry periods due to diminished inputs and increased evaporation, or high water levels due to intense storms or consistent precipitation over a prolonged period. Reservoirs and lakes with controls on inlet and outlet flows are used to manage surface water levels; however, climate change may result in extremes that limit the ability to meet water level requirements for user needs or overwhelm control systems resulting in flooding. A combination of changing snow conditions, storm intensity, as well as increased drought within the Colorado River system will affect Lake Mead. This may result in lowering lake levels, increases in surface water temperature, and increases in urban runoff to the lake resulting from flash floods (Ryan et al. 2019). Habitat changes could affect razorback sucker reproduction through decreased spawning habitat and reduction in survival and recruitment through increased predation and decreasing cover (USFWS 2018). Warming water temperatures could benefit survival, reproduction, and distribution of nonnative, warm-water species that are known to have negative impacts on razorback sucker survival and recruitment (USFWS 2018). Warming surface water temperatures of the lakes may also increase the potential for water-borne pathogens, aquatic invasive species, and harmful algal blooms (Ryan et al. 2019).

Past actions that have impacted the razorback sucker include development and maintenance of administrative and recreational facilities, including marinas with a variety of services, public boat launch ramps and parking, and access roads. Placement of launch ramps into the lake has resulted in the conversion of natural substrates to artificial materials, potentially eliminating fish spawning habitat and reducing habitat for adult fish; installation of anchoring systems for marinas has also resulted in loss of habitat in localized areas. Drainage off roads and parking lots may cause localized erosion that increases sediment inflow to the lake, reducing water quality and potentially covering spawning habitat for razorback suckers.

Ongoing actions to maintain launch access and marina operations would result in the continued noise of boat engines, as well as water turbulence that could disturb razorback suckers and other fish and result in their displacement. In shallow areas, motorized vessels also create wave action and persistently disturb substrates, which could be detrimental to the fish, especially during spawning. However, boating activity is reduced on Lake Mead during the razorback's January-to-April spawning season, therefore limiting impacts on spawning razorback suckers and thus population recruitment. National Park Service staff would obtain current information on spawning activity and locations before implementing the management activities described in this document to reduce the risk of incidental impacts on this species.

Outside the national recreation area, the Bureau of Reclamation is the lead bureau for initiating a supplemental environmental impact statement that would offer alternatives for managing water in the Colorado River and ultimately the water level at Lake Powell and Lake Mead. The supplemental environmental impact statement encompasses the larger Colorado River system and complex water storage and discharge choices throughout seven states. Depending on the depth of potential water level declines, actions proposed in this effort would negatively impact

razorback sucker habitat in the vicinity of the five locations within this plan/environmental assessment. If present, suckers would continue to move away from these bays and coves seeking deeper water in other areas of the lake. The Bureau of Reclamation plan would impact other natural resources, such as wildlife migration—including desert tortoise—that sometimes seek vegetation near springs and shoreline areas at the five locations within this plan/EA and parkwide.

Current planned actions include best management practices to protect the razorback sucker and its spawning habitat. These practices include clearly marking mooring and boating areas from adjoining spawning areas with buoys and signing, maintaining a public awareness campaign, maintaining a flat-wake zone near spawning areas, and requiring the implementation of best management practices at marinas to protect water quality. The National Park Service would continue to monitor spawning areas and would temporarily implement closures of areas used for spawning if determined to be necessary to protect razorback sucker populations.

The National Park Service has worked with the US Fish and Wildlife Service to develop mitigation to reduce or eliminate potential adverse impacts on desert tortoises from construction activities. Examples of such mitigation include clearly marking construction limits, surveying construction areas, relocating tortoises outside the construction area, educating construction personnel about tortoises, instituting a litter-control program, and surveying or handling of tortoises by a qualified biologist. Please refer to appendix D for a complete description of mitigation measures.

Current planned actions also include continued use of the temporary, portable launch ramp at Temple Bar and Callville Bay, which reduces impacts on potential spawning habitat from extending or relocating the launch ramp by precluding the need to install concrete or other materials. Given the small percentage of habitat that would be impacted under this planned action, razorback suckers would likely be able to find alternative locations to spawn and therefore impacts on razorback sucker spawning would be negligible.

Boat launches are currently planned on natural surfaces at Echo Bay, which may disturb sediments during boat launches, causing similar adverse impacts on razorback sucker as the construction activities described above. However, mitigation measures would be implemented to reduce adverse impacts on razorback sucker habitat from recreational use of the area, such as clearly marking mooring and boating areas from adjoining spawning areas with buoys and signing, maintaining a public awareness campaign, and maintaining a flat-wake zone near spawning areas. Furthermore, spawning and the highest concentration of use of Echo Bay by individual razorbacks is during the lower visitor use periods, and therefore overall human disturbance is minimal during these critical periods. Please refer to appendix D for a complete description of mitigation measures.

At South Cove, existing launch points are used, and as a result, effects on the razorback sucker would be the same or similar to what is described above.

Desert Tortoise

Of note, the federally threatened desert tortoise *(Gopherus agassizii)* is known to occur in the Lake Mead vicinity, although critical habitat for this species is not located within the project area. The desert tortoise is a terrestrial species characterized by a domed shell and round, stumpy elephantine hind legs. The front limbs are flattened for digging and heavily scaled without

webbed toes. The species occurs in the Mohave Desert, west and north of the Colorado River (USFWS and NPS 2010). Habitat for the tortoise is usually characterized by creosote bush (*Larrea tridentata*) vegetation, which is a common vegetative feature the Mohave and Colorado Deserts and may include creosote bursage *(Ambrosia dumosa)* and shadscale *(Atriplex)* scrub. Often, native desert grasses, especially galleta *(Hilaria/Plueraphis)* and Indian ricegrass *(Achnatherum hymenoides),* are associated with high tortoise densities.

This species occurs throughout Lake Mead National Recreation Area in Mojave desert scrub habitats away from the shoreline areas. Tortoise populations in the park are generally low density, with scattered high-density areas (NPS 2023). The developed areas of the park are in marginal habitat with low tortoise densities (NPS 2014). The USFWS identified biological and physical features that are essential to the desert tortoise's conservation, including sufficient space to support viable populations within each recovery unit and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

The tortoise has encountered declines in abundance in many areas resulting from several factors, including widespread habitat loss, degradation, and fragmentation caused by road development, urbanization, and agricultural development (USFWS and NPS 2010). Other factors include the presence of livestock grazing and the invasion of exotic grass annuals (which fuel local fires), energy and mineral development, and off-road vehicle use. Individual mortality can be attributed to vehicle use on roads, disease, vandalism (illegal shooting), and collecting, which has an aggregate affect in population abundance, particularly as these species mature slowly before they are able to reproduce. These factors vary regionally in their severity.

In a review of desert tortoise status, the US Fish and Wildlife Service (2010) found that habitat loss, degradation, and fragmentation continue to impact desert tortoises. These threats are combined with the indirect impacts associated with increased human presence. This includes illegal dumping and predation from scavengers and predators that are associated with human disturbance, such as ravens and coyotes, as they may be significant predators on young (< 7 years old). See the *Desert Tortoise (Mojave Population) Recovery Plan* (USFWS 1994) for a review of factors affecting Mohave and Colorado desert populations.

Environmental Trends and Planned Actions

Desert-inhabiting wildlife species already live close to the limits of their physiological tolerances. A shift in vegetation communities from climate change could alter the amount of suitable habitat in a specific area for wildlife species, influencing their distribution. Desert reptiles, such as desert tortoises, can generally avoid high temperatures by shifting activity periods, seeking shelter below vegetation, and burrowing in crevices and burrows. However, modeling indicates that the increased duration and intensity of drought conditions may reduce suitable desert tortoise habitat by nearly 66% in the Mojave Desert (Barrows 2011 in NPS 2023). Warming temperatures could also produce a shift in the sex ratio of reptile eggs, resulting in a higher frequency of male hatchlings (Barrows 2011 in NPS 2023).

In addition to changes from climate change and ongoing threats, past and ongoing actions have effects on desert tortoise. Past actions that have impacted desert tortoises include development of

administrative and recreational facilities, including roads, public boat launch ramps and parking, campgrounds (undeveloped and developed), day use areas, and sanitation facilities. Recent actions that have affected desert tortoise include facility construction and maintenance projects such as the flood diversion structure, sewer force main replacement, water well installation, and water well supply line replacement projects. These actions have resulted in loss of desert tortoise habitat, injury or mortality of tortoises from vehicles, and disturbance by visitors. Ongoing administrative and visitor use of roads contributes injury or mortality of vehicles from vehicles. Future rehabilitation of Cottonwood Cove Road could adversely impact desert tortoise through permanent loss of approximately 7.8 acres of desert scrub-shrub habitat adjacent to the existing road, potential for injury or mortality from use of construction equipment and vehicles in the area, and increased predation.

Desert tortoise habitat is not present in the area where launch ramp and/or marina extensions are currently planned for Hemenway Harbor, Echo Bay, Callville Bay, and Temple Bay. Shoreline areas below the high-water line are considered unsuitable habitat and are typically composed of bare ground, rock, or nonnative tamarisk (versus upland areas and desert washes outside the project area that provide better habitat for this species). However, the movement of equipment and vehicles between staging areas and project sites may inadvertently adversely affect individuals of this species through damage to habitat or direct injury or mortality. Mitigation measures would be implemented to reduce impacts on individual desert tortoises, including having qualified and authorized biologists monitor all activities, training construction personnel on the occurrence and status of the desert tortoise, and revegetating areas disturbed by construction. In addition, any development proposed outside previously disturbed areas above the high-water line would be surveyed for desert tortoises and burrows before construction. Please refer to appendix D for a complete description of mitigation measures.

At South Cove, existing launch points are used, and as a result, effects on desert tortoises would be the same as or similar to what is described above.

Outside the national recreation area, the Bureau of Reclamation is the lead bureau for initiating a supplemental environmental impact statement that would offer alternatives for managing water in the Colorado River and ultimately the water level at Lake Powell and Lake Mead. The supplemental environmental impact statement encompasses the larger Colorado River system and complex water storage and discharge choices throughout seven states. Depending on the depth of potential water level declines, the BOR plan would adversely impact wildlife—including desert tortoise—that sometimes seek vegetation near springs and shoreline areas at the five locations within this plan/environmental assessment and parkwide. Higher rates of mortality to ravens and coyotes, known tortoise predators, are expected as water levels recede, resulting in some beneficial impacts on desert tortoise through reduced mortality from predators.

Impact Analysis

Because this section includes federally listed species, the following environmental consequences analysis will address NEPA standards (“impacts”) as well as Endangered Species Act (ESA) Section 7 standards (“effects”). For the purposes of this section, the term “impacts” refers to both NEPA impacts and ESA effects. In this document, the anticipated ESA determination categories are based on the US Fish and Wildlife Service and the National Oceanic and Atmospheric Administration’s National Marine Fisheries Service guidance for implementing section 7 consultation under the Endangered Species Act (USFWS and NMFS 1998) and are as follows:

- No effect: The appropriate conclusion when the action bureau determines its proposed action would not affect a listed species or designated critical habitat.

- May affect, not likely to adversely affect: The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous favorable effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur.

- May affect, likely to adversely affect: The appropriate finding in a biological assessment (or conclusion during consultation) if an adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions and the effect is not discountable, insignificant, or beneficial (see the definition of may affect, not likely to adversely affect). In the event that the overall effect of the proposed action is beneficial to the listed species but is also likely to cause some adverse effects, then the proposed action is likely to adversely affect the listed species. If incidental take is anticipated to occur as a result of the proposed action, a likely to adversely affect determination should be made.

Alternative 1 (NPS Preferred)

Impacts on federally listed species would be the same or similar to what is described above in the affected environment section, which describes the current and expected future conditions of this resource. A few additional actions are proposed for Hemenway Harbor, Callville Bay, and Temple Bar under alternative 1. Impacts on these actions are described below.

Razorback Sucker – Under alternative 1, launch ramps and marina operations would be moved into deeper waters or relocated from their current locations and planned actions at Hemenway Harbor, Callville Bay, and Temple Bar. Construction activities could result in soil erosion, leading to increased water turbidity and sedimentation during construction. Moving marinas to deeper water would require moving anchoring systems to different locations, temporarily disturbing the lakebed in those locations. Razorback sucker prefer cobble and or rocky substrate for spawning, and therefore increased sediments in those areas may inhibit spawning. However, mitigation measures would be implemented during construction activities to reduce effects on razorback suckers, such as installation of silt fences and/or silt curtains and limiting construction to outside of spawning season, unless NPS divers have surveyed the area to confirm that there is no active spawning.

Extending or relocating launch ramps could result in launch ramps being built in gravel-bottom areas, permanently removing existing or potential razorback sucker spawning habitat by replacing the natural substrate with concrete or other materials. However, recent razorback sucker monitoring at the park indicates that the razorback sucker population has been able to adjust to changing water elevation to locate areas in which to spawn and find suitable nursery habitat. Continued use of the temporary, portable launch ramp at Temple Bar and Callville Bay would also reduce impacts on potential spawning habitat from extending or relocating the launch ramp by precluding the need to install concrete or other materials. Given the small percentage of habitat that would be impacted under alternative 1, razorback suckers would likely be able to find

alternative locations to spawn and therefore impacts on razorback sucker spawning would be negligible.

Desert Tortoise – Desert tortoise habitat is not present in the area where the Hemenway Harbor, Callville Bay, and Temple Bay launch ramps would be extended or where new access roads and launch ramps/areas would be developed beyond current planned actions described in the affected environment section. Shoreline areas below the high-water line are considered unsuitable habitat and are typically composed of bare ground, rock, or nonnative tamarisk (versus upland areas and desert washes outside the project area that provide better habitat for this species). However, the movement of equipment and vehicles between staging areas and project sites may inadvertently adversely affect individuals of this species through damage to habitat or direct injury or mortality. Mitigation measures would be implemented to reduce impacts on individual desert tortoises, including having qualified and authorized biologists monitor all activities, training construction personnel on the occurrence and status of the desert tortoise, and revegetating areas disturbed by construction. In addition, any development proposed outside previously disturbed areas above the high-water line would be surveyed for desert tortoises and burrows before construction.

Cumulative impacts – Alternative 1 could result in the loss or degradation of razorback sucker spawning habitat due to extending or relocating launch ramps and constructing new access roads. It could also result in damage to desert tortoise habitat or injury or mortality of individuals from the movement of equipment and vehicles between staging areas and project sites. When the incremental impacts of alternative 1 are combined with the impacts of past, ongoing, and reasonably foreseeable future planned actions described in the affected environment, the overall cumulative impacts on razorback sucker and desert tortoise would continue to be adverse. The incremental impacts of alternative 1 would contribute to, but would not substantially change, the impacts that are already occurring.

Alternative 2

Hemenway Harbor – Under alternative 2, NPS staff would not extend or relocate launch ramps to provide recreational motorized boating access and concession services and related marina services would be closed. Therefore, disturbances from boating use on the lakebed at Hemenway Harbor would be substantially decreased. Sedimentation and turbidity from launch ramp activities and heavy vehicle use near the launch would also be decreased. The cobble and rocky substrate razorback sucker prefer for spawning would be negligibly inhibited from lakebed disturbances and turbidity resulting from current launch ramp and marina activities. Desert tortoise habitat is not present in the Hemenway Harbor launch ramp area and tortoise would not be affected under this alternative.

Echo Bay – Impacts on federally listed species would be like those discussed for Hemenway Harbor. Razorback sucker spawning habitat would not be inhibited from lakebed disturbances and turbidity resulting from current launch ramp and marina activities. Desert tortoise habitat is not present in the Echo Bay launch ramp area and tortoise would not be affected under this alternative.

Callville Bay – Impacts on federally listed species would be like those discussed for Hemenway Harbor and Echo Bay. Razorback sucker spawning habitat would not be inhibited from lakebed disturbances and turbidity resulting from current launch ramp and marina activities. Desert

tortoise habitat is not present in the Callville Bay launch ramp area and tortoise would not be affected under this alternative.

South Cove – Impacts discussed in the affected environment section of this analysis would continue and no new impacts would occur because desert tortoise habitat and razorback sucker spawning habitat is not present at this site.

Temple Bar – Impacts discussed in the affected environment section of this analysis would continue and no new impacts would occur because desert tortoise habitat and razorback sucker spawning habitat are not present at this site.

Cumulative Impacts – Alternative 2 could result in beneficial impacts on razorback suckers from reduced sedimentation and turbidity near launch ramps. It would also lead to reduced disturbances from boating activity to lakebed where there may be potential razorback sucker spawning habitat. Impacts on desert tortoise discussed in the affected environment section of this analysis would continue, and no new impacts on desert tortoise would occur because desert tortoise habitat is not present in the sites discussed above. When the incremental impacts of alternative 2 are combined with the impacts of past, ongoing, and reasonably foreseeable planned actions described in the affected environment, the overall cumulative impacts on razorback sucker and desert tortoise would continue to be adverse. The incremental impacts of alternative 2 would contribute to, but would not substantially change, the impacts that are already occurring.

Alternative 3

Razorback Sucker – Under alternative 3, launch ramps and marina operations would be moved into deeper waters or relocated from their current locations at Hemenway Harbor, Echo Bay, Callville Bay, and Temple Bar. Construction activities could result in soil erosion, leading to increased water turbidity and sedimentation during construction. Moving marinas to deeper water would require moving anchoring systems to different locations, temporarily disturbing the lakebed in those locations. Razorback suckers prefer cobble and or rocky substrate for spawning, and therefore increased sediments in those areas may inhibit spawning. However, mitigation measures would be implemented during construction activities to reduce effects on razorback suckers, such as installation of silt fences and/or silt curtains and limiting construction to outside of spawning season, unless NPS divers have surveyed the area to confirm that there is no active spawning.

Extending or relocating launch ramps could result in launch ramps being built in gravel-bottom areas, permanently removing existing or potential razorback sucker spawning habitat by replacing the natural substrate with concrete or other materials. However, recent razorback sucker monitoring at the park indicates that the razorback sucker population has been able to adjust to changing water elevation to locate areas in which to spawn and find suitable nursery habitat. Given the small percentage of habitat that would be impacted under alternative 3, razorback suckers would likely be able to find alternative locations to spawn and therefore impacts on population viability would be negligible. Impacts on razorback suckers would be further reduced by limiting construction outside of the population's spawning period.

At South Cove, existing launch points would continue to be used, and as a result, impacts on the razorback sucker would be the same or similar to what is described above in the affected environment section.

If full-service marina operations were reestablished at Echo Bay, there would be an increase in noise from boat engines that could disturb the razorback suckers and result in their displacement from areas where there is a high level of boat activity. In shallow areas, motorized vessels also create wave action and disturb substrates, which could be detrimental to the fish, especially during spawning. Similar adverse impacts could result from relocating marina facilities to existing marinas at Hemenway Harbor. However, mitigation measures would be implemented to reduce adverse impacts on razorback suckers from recreational use of those area, such as clearly marking mooring and boating areas from adjoining spawning areas with buoys and signing, maintaining a public awareness campaign, and maintaining a flat-wake zone near spawning areas. Furthermore, spawning and the highest concentration of use of those areas by individual razorbacks is during the lower visitor use periods, and therefore overall human disturbance to razorback suckers is minimal during these critical periods.

Desert Tortoise – Desert tortoise habitat is not present in the area where the Hemenway Harbor, Echo Bay, Callville Bay, and Temple Bar launch ramps would be extended or where new access roads and launch ramps would be constructed. However, the movement of equipment and vehicles between staging areas and project areas may inadvertently adversely affect individuals of this species through damage to habitat or direct injury or mortality. Mitigation measures would be implemented to reduce impacts on individual desert tortoises, including having qualified and authorized biologists monitor all activities, training construction personnel on the occurrence and status of the desert tortoise, and revegetating areas disturbed by construction.

At South Cove, current management would continue, and as a result, impacts on desert tortoise would be the same or similar to what is described in the affected environment section.

Cumulative Impacts – Alternative 3 could result in the loss or degradation of razorback sucker spawning habitat due to extending or relocating launch ramps and constructing new access roads. It could also result in damage to desert tortoise habitat or injury or mortality of individuals from the movement of equipment and vehicles between staging areas and project sites. When the incremental impacts of alternative 3 are combined with the impacts of past, ongoing, and reasonably foreseeable future planned actions described in the affected environment, the overall cumulative impacts on razorback suckers and desert tortoises would continue to be adverse. The incremental impacts of alternative 3 would contribute to, but would not substantially change, the impacts that are already occurring.

SOCIOECONOMICS

Affected Environment

This section describes the existing conditions related to the socioeconomic environment of park communities and commercial services at Lake Mead National Recreation Area. The description of these elements is based on the best professional judgement of NPS staff and both past and recent research. The alternatives considered in this plan/EA are evaluated against the existing conditions to determine the associated impacts and cumulative impacts from the actions as they relate to socioeconomics. Given the complexity of this project and interconnectedness of socioeconomics, the following elements will be discussed:

- Park communities
- Commercial services

Park communities refers to both the gateway communities outside the park boundary and the trailer villages within the park boundary used by concessions and visitors. Commercial services refer specifically to the concessioner, business owner, and the company's employees that provides services. Existing conditions for commercial services are described by location; however, the impacts on commercial services are similar by location and therefore described holistically.

Park Communities

Lake Mead National Recreation Area is in Clark County, Nevada and Mohave County, Arizona. Communities adjacent to the recreation area include the greater Las Vegas area, which includes the cities of Las Vegas, North Las Vegas, Henderson, Boulder City, Overton, Searchlight, and Laughlin, Nevada, and Bullhead City and Meadview, Arizona. This section focuses on Boulder City, Nevada, and Meadview, Arizona, due to their connection with the Hemenway Harbor and South Cove launch ramp areas within the park. Boulder City is the nearest community for access to Hemenway Harbor, where visitors have the opportunities for dining, RV parking, lodging, and retail. The town of Meadview, located approximately 10 miles from South Cove, offers visitor opportunities for dining, RV parking, lodging, and some stores.

Lake Mead National Recreation Area is located near Las Vegas, Nevada, where high tourism exists with many entertainment options that draw visitors to the area from all over the world. Visitors to the park typically come from the Las Vegas metropolitan area for a variety of water-based recreation. Boulder City is located within Clark County, Nevada. In July 2021, Clark County reported a total population of 2,292,476, which is up 1.2% from April 2020 (US Census Bureau 2022a). Clark County covers a large area with several tourism attractions for entertainment and outdoor recreation. Mohave County, which includes Temple Bar and South Cove, reported a total population of 217,692, which is up 2.1% from April 2020 (US Census Bureau 2022b). Employment in both Clark and Mohave counties are highly concentrated in tourism and related industries.

The National Park Service visitor spending effects reported in 2021 that 7.6 million park visitors spent an estimated $374 million in local gateway regions while visiting Lake Mead National Recreation Area. These expenditures supported a total of 4,050 jobs, $168 million in labor income and $457 million in economic output in local gateway economies surrounding the park. Most of these jobs are in the tourism industry, including hotel, restaurants, and recreation industries (NPS 2022). Visitation to Lake Mead National Recreation Area has fluctuated over the last 10 years, ranging from 6.2 million (2012) to 8 million (2020) visitors. A recent report indicates that Las Vegas is expected to see an additional 6,836 hotel/motel rooms added to its inventory by the end of 2024, which is a 4.5% increase of current levels (University of Nevada Las Vegas 2022).

The rapidly declining water levels have forced temporary closures in launch areas during recent years, bringing concern from gateway communities regarding changing visitor access and visitation trends in the area. The public is aware of the ongoing drought issues facing the park and changing access to the water. With the high rate of tourism in Clark and Mohave Counties, the availability of affordable housing for NPS staff and employee housing for concessioner employees is important. Trailer villages are occupied by the public and NPS staff. Although no year-round residency is allowed within the park, owners can stay in them for a maximum of six months throughout the calendar year. Property owners lease the land and own the trailers. The availability of potable water plays a key role in the existence of the trailer villages. As the ability

for the National Park Service to provide potable water within the project area changes due to low water levels, the trailer village and RV sites for both visitors and NPS staff will be untenable.

Past, ongoing, and reasonably foreseeable future actions, such as temporary launch ramp closures at Callville Bay, Echo Bay, and Temple Bar, have prevented occupants of the trailer villages from engaging in motorized recreation from the nearest launch ramp. In some cases, trailer owners rely on short-term trailer rentals, which are also dependent on access to the launch ramps. Past and ongoing actions in response to low water have resulted in negative socioeconomic trends in which there is a high level of uncertainty for trailer owners to invest in their personal property for the long term, not knowing what future conditions will be. In 2023, the use of a temporary, portable launch ramp made of flexible materials (e.g., Mobi-Mat), allowed park community members and visitors to launch at Callville Bay and Temple Bar. This launching access opened these temporarily closed locations, thus reversing the negative trends and providing beneficial impacts. At Echo Bay, the primitive access road and launch area improves socioeconomic trends for the nearby occupants of the trailer village and RV sites. At the regional scale, drought has led to downward trends in socioeconomics and affects the desert southwest. These climate patterns are likely to continue, which could result in residents moving away and impacting business operators and changing the socioeconomic environment of the region.

Boulder City serves as the primary access point to Hemenway Harbor and has experienced positive and negative trends in socioeconomics due to changes in visitation patterns that impact economic activity to this gateway community. The low water levels impact the ability for visitors to access the water; however, Hemenway Harbor has remained open in recent years, and most visitors are traveling through Boulder City to access the water. Ongoing actions near South Cove in response to low water near Meadview have resulted in downward trends in quality of life for the residents and community, who rely on lake access as a primary source of recreation.

Commercial Services

Three concession operators provide services across the project area: Lake Mead National Recreation Area (LMNRA) Guest Services, LLC; Las Vegas Boat Harbor, Inc.; and Aramark Sports and Entertainment, LLC. Rapidly declining water levels are changing the ability to provide visitor facilities and services at each location throughout the project area, thus decreasing the revenue potential for concessioners. Past temporary closures of visitor access facilities in response to receding water levels have contributed to negative economic implications for commercial businesses operating in the park. However, the portable launch ramps at Callville Bay and Temple Bar, paired with the primitive launching access at Echo Bay, have reduced the economic concerns, for now. As water levels decrease, recreation opportunities change, which may also result in a decrease to the financial feasibility of concession businesses. The changes also present an opportunity for concession operators to evolve recreation opportunities and services to increase their financial feasibility.

Marina operators report that there have been changes in the vacation preferences of visitors, particularly a decline of interest in houseboat rentals. Revenues at all marina operations and Lake Mead Cruises have decreased because of these changing preferences. Concessioners indicate that this change in preferences, combined with the negative public perception of declining lake elevations, continue to reduce revenues at facilities located on Lake Mead. National Park Service staff are working to communicate with concessioners on changes and current conditions to give them as much time as possible to plan for future business operations.

The following section is organized by location within the project area; however, because some commercial service operators function at multiple locations within the project area, the impact analysis is presented as impacts on commercial services holistically rather than presented by location.

Hemenway Harbor

Since 2019, NPS staff have maintained operations at Hemenway Harbor and continue to monitor and communicate launch flow and patterns with partners and public daily. Hemenway Harbor has three concession operations: two marinas (Las Vegas Boat Harbor and Lake Mead Marina), managed by Las Vegas Boat Harbor, Inc. and Lake Mead Cruises, managed by Aramark. National Park Service staff maintain concession operations and utility corridors that match lake water levels to provide ongoing visitor services (e.g., marina operations and services extended utility corridors). The ongoing extension of the launch ramp and marina presents challenges to business operators during time of construction; however, the action allows the operators to provide visitor services and access to the water.

Echo Bay

Echo Bay concessions are managed by LMNRA Guest Services, which operates a total of five contracts throughout the park. The services provided at Echo Bay support visitor use. Since 2013, the rapidly declining water has forced the National Park Service to cease concession on-water operations at Echo Bay; however, NPS staff at this location currently maintain the land-based concessions to operate land-based fuel, retail, and the trailer village and RV sites. Operation of the Echo Bay trailer village was transferred to another existing concession contract in 2013. The closure of the original launch ramp at this location reduced business opportunities for owners and employees; however, the relocation of the launch ramp closer to the water allowed for continued launching. In recent years, the National Park Service closed the newer launch ramp due to receding water levels, which further reduced business opportunities for owners and employees at Echo Bay. Now, NPS staff provide motorized and nonmotorized launching opportunities via a primitive road and launching area that maintains visitor access to the water, thus mitigating the impacts of recent launch ramp closures. However, these actions have required the business to adapt, and this change in visitor use may result in negative trends to the financial feasibility of concessioner operations. Providing potable water with the current infrastructure until water levels reach 980 feet has allowed the concessioners to continue providing services for their employees and visitors alike.

Callville Bay

The National Park Service closed the launch ramp at 1,060 feet due to the rapid decline in water levels that did not allow NPS staff enough time to secure funding to extend the launch ramp. While this resulted in negative trends to the financial feasibility of operations, in 2023, the concessioner began operating a temporary, portable launch ramp that provides launching access for visitors at this location as water levels recede. The portable launch ramp (e.g., Mobi-Mat) has been tested and authorized for launching 60-foot boats. National Park Service staff currently maintain full operation of concession-required services, including the marina, food and beverage services, the trailer village, the boat shop, water- and land-based fuel, and houseboat and small boat rentals. However, many of these services have been impacted by changing visitor use patterns due to low water levels. In addition, a floating fuel barge is also maintained to provide

flexible and safe water-based fuel operations to visitors. National Park Service staff have moved the barge towards the center of the lake as water levels recede, thus continuing to provide potable water, which allows concessioner operations and visitor use to continue. Potable water is key to ensuring that concessioners can maintain their services, provide housing to employees, and provide visitor services.

South Cove

No concession operations currently exist at this location. The area previously served as a point of exit for commercially guided rafting trips through the Grand Canyon, along the Colorado River and ending in Lake Mead National Recreation Area. This made the area relatively popular. However, as water levels receded, the rapids above the river made it impassable to reach South Cove as an egress for the rafting trips, resulting in an overall decrease in use levels.

Temple Bar

Temple Bar Marina is operated by the concessioner LMNRA Guest Services, which is currently maintaining concession facilities. Commercial services have been provided at this location for decades. The current services include, but are not limited to, houseboat and watercraft rentals, restaurant, store, and the trailer village and RV sites. Due to changing water levels and the bathymetry at this location, the original launch ramp is closed to motorized vessels; however, the concessioner operates a temporary launch ramp that provides launching access as water levels recede. The changing visitor use levels and patterns impact commercial operations at this location.

Environmental Trends and Planned Actions

Overall, socioeconomics for both park communities and commercials services were trending downward, but recent and ongoing actions to maintain services within the project area have reduced such impacts and trends are improving. The rapidly declining water levels have put additional pressures on the commercial service operators for absorbing the added cost of maintaining marinas and changes to business operations. Temporary launch ramp closures lead to negative trends in the socioeconomics of business operations for commercial operators and park communities; however, the ongoing maintenance of the portable launch ramp has mitigated these trends and allows the concessioners to provide visitor services. Current management would maintain motorized and nonmotorized launching access to the degree financially feasible and cost-effective. Actions to continue providing visitor access to lowering water levels by relocating, or closing visitor-access facilities has led to private and commercial user conflicts, as the demand to use remaining launches increases. The park is seeing trends in which boat owners illegally rent their private slips and private boats at the marina to members of the public, thus competing with concessioners and potentially detracting from their revenue. National Park Service staff have noticed this occurring primarily at Callville Bay and Hemenway Harbor. National Park Service staff commonly observe personal boat rentals operating from the courtesy dock or other areas outside of their assigned slip. These result in safety concerns and insurance liability that could ultimately fall onto the concessioner. In addition, NPS staff have noted that boat tour reservations have decreased with declining lake water levels, which decreases business revenue and results in downward trends for operators.

Temporary launch ramp closures at Callville Bay, Temple Bar, and Echo Bay have led to downward trends in socioeconomics of park communities, as occupants of the trailer village are

unable to engage in motorized recreation from the launch ramp; however, the portable launch ramp at Callville Bay and Temple Bar, in conjunction with the primitive launching area at Echo Bay, mitigates this closure and allows visitors to launch from these locations, which results in improved trends in park communities. Trailer villages will remain open as long as potable water can be maintained at each location, resulting in positive trends. Similarly, NPS staff's efforts to continue providing potable water has resulted in upward trends in quality of life for occupants within these communities.

Impact Analysis

Alternative 1 (NPS Preferred)

Park Communities – Under the preferred alternative, current management would continue and new actions, such as extending the launch ramps, would occur. Impacts on park communities from ongoing actions would be the same or similar to what is described in the affected environment section. The proposed action to relocate the marina and launch ramp at Hemenway Harbor when water levels reach below 1,000 feet would result in short-term adverse impacts during construction but long-term beneficial impacts on nearby Boulder City, as the area would continue to serve as primary visitor destination. Similarly, the extension of the launch ramp at Callville Bay would provide short-term adverse impacts during construction but long-term beneficial impacts on park communities. At Temple Bar, if funding were to be secured to sustain marina operations, there would be beneficial impacts on the community. However, if funding were unable to be secured, the concessioner may continue or discontinue operations of the land-based services, which could result in beneficial or adverse impacts on the community.

Once potable water cannot be provided at Echo Bay, Callville Bay, and Temple Bar, the development of a transition plan would allow trailer village occupants time to relocate themselves and their personal property outside of the park. The relocation would disband the communities and result in adverse impacts, but the transition plan would mitigate these impacts by providing occupants with additional time and clear direction, as needed. While the change would have adverse impacts on park communities, potable water cannot be sustainably secured below specific water levels at each location. These water levels provide a time line for property owners to begin planning for when it becomes necessary to relocate.

Commercial Services – Impacts on commercial service operators from current park actions would remain the same as described in the affected environment section. The proposed action to extend the launch ramps at Callville Bay and Hemenway Harbor, or relocate the launch ramp and marina closer to Hemenway Wall if water levels drop below 1,000 feet, would provide beneficial impacts on commercial services that maintain their business. Any extension or relocation of launch ramps would have short-term adverse impacts on businesses due to construction, which would temporarily close operations. By maintaining operations at each location, concession operators can plan for capital improvements, leading to a higher level of certainty for concessioner planning.

At Temple Bar, commercial service operators would experience beneficial impacts if NPS staff were able to secure funding to extend launch ramps and maintain the contract. However, if funding is not obtainable, the concessioners could continue operations of land-based services, such as trailer villages. The termination of on-water operations would adversely impact the concessioners; however, these impacts may be mitigated by the continuation of land-based

services. While LMNRA Guest Services would maintain concession services at Lake Mohave during the term of its existing concession contract, changes to concession contracts at other Lake Mead locations may negatively impact the provision of services at Lake Mohave.

Cumulative Impacts – Under alternative 1, current management would continue, and socioeconomics trends from ongoing actions would be as described in the affected environment section. New actions to provide launching access across the project area would result in beneficial impacts on park communities and commercial service operators. If potable water cannot be provided in the future, property owners and occupants of the trailer village and RV sites would experience hardship as they are forced to relocate and remove property from the park. The cost of removing a vessel from the marina is expected to range from approximately $50,000 to $100,000 per vessel. To mitigate these effects, the National Park Service would work with partner agencies and the community to assist with the removal of such property.

Overall, under alternative 1, impacts, including those from past, present, and reasonably foreseeable future actions, would result in beneficial impacts on socioeconomic trends, as described in the affected environment section.

Alternative 2

Park Communities – Under alternative 2, all launch ramps across the locations within this plan/EA would be closed as water levels decrease. Boulder City could see a decrease in economic spending if operations were closed at this location; however, visitation to Hoover Dam and the Grand Canyon would continue to provide economic benefits to the community. There would not be adequate funding for retaining potable water at any of the trailer villages.They would be closed, causing adverse impacts on property owners and residents and forcing them to relocate and terminating the park communities. To mitigate these effects, the National Park Service would work with partner agencies and the community to assist with the removal of such property.

Commercial Services – Under alternative 2, all commercial service operations across the locations within this plan/EA would be terminated, and the National Park Service would end all concession contracts. These actions would have direct and adverse effects on the commercial operators Aramark and Las Vegas Boat Harbor, Inc. and their employees. While there would be less uncertainty regarding the viability of the business operations as occurs under current management, businesses that have been in operation since the 1970s would cease to exist, negatively impacting the owners and employees and resulting in job losses. While LMNRA Guest Services also provides commercial services at a location on Lake Mohave, concession contract terminations may also negatively impact the provision of services at other locations.

Cumulative Impacts – Overall, under alternative 2, impacts including those from past, present, and reasonably foreseeable future actions would result in adverse impacts on socioeconomics and would worsen the current conditions as described in the affected environment section. This scenario would force short-term trailer village residents and business operators to move and, due to the cost of moving boats, may result in the abandonment of property. Although the impacts from this alternative would provide a level of certainty to park communities and commercial operators, there would be adverse impacts on socioeconomics.

Actions Common to Alternatives 1 and 2

Park Communities – Under alternatives 1 and 2, impacts on park communities from ongoing actions—such as supporting land and water-based recreation, continuing to adapt operations to

provide launching access, and communicating with the public about changes—would be the same or similar to what is described in the affected environment section. There would be no new direct or indirect impacts on park communities beyond what is described in the current and future condition of this resource.

Commercial Services – Actions within alternative 1 and 2 would result in impacts that are the same or similar to what is described in the affected environment section. The implementation of a reservation system for launching and retrieving boats, identified as a potential management strategy, would result in negative and positive impacts on commercial operators due to added operations and maintenance of the system, while also allowing operators to plan for busy and peak times based on reservations.

Cumulative Impacts – When paired with past, present, and reasonably foreseeable actions, the actions common to alternatives 1 and 2 in this plan/EA would result in both beneficial and adverse impacts on concessions and park communities but would not have meaningful cumulative impacts on the ongoing trends, as described in the affected environment section. Sustainable land- and water-based recreation would provide beneficial impacts, while changes to concession operations and the potential implementation of a reservation system would likely have adverse impacts.

Alternative 3

Park Communities – The no-action alternative would implement the selected action from the 2019 FONSI and continue current management of potable water. Park communities would benefit from the generation of local jobs and labor income of the construction projects. A return of commercially provided visitor services would have a positive impact on visitor spending in gateway communities. Once these services can no longer be provided, a reduction in visitation, subsequent visitor spending, and reduced support of local jobs and fiscal revenues would adversely impact park communities. However, some aspects are infeasible, such as extending the launch ramp at Hemenway Harbor to 950 feet, reestablishing full marina services at Echo Bay, relocating the launch ramp and marina from Callville Bay to Swallow Bay, and relocating the launch ramp at Temple Bar to the northeast. Therefore, this alternative would adversely impact park communities due to the level of uncertainty and infeasibility of actions.

The remainder of the actions would beneficially impact park communities and impacts would be similar to impacts from alternative 1.

Commercial Services – The no-action alternative would add to commercial operators' expenses to relocate or extend operations, which requires additional utility line extensions. There would be adverse impacts on the operators during construction, but continuing to operate the marinas and launch ramps would result in increased sales and revenues, thus providing beneficial impacts on commercial services. However, due to the level of uncertainty and infeasibility of some actions, such as reestablishing concessioner services at Echo Bay, relocating the launch ramp and marina at Callville Bay, and extending the launch ramp at Hemenway Harbor until 950 feet, components of this alternative would not be implemented and would result in adverse impacts on commercial operators. The remainder of the actions would beneficially impact commercial service operators, and impacts would be similar to impacts from alternative 1.

Cumulative Impacts – Overall, under alternative 3, impacts including those from past, present, and reasonably foreseeable future actions would not meaningfully impact conditions of the

resource as described in the affected environment section. Visitor vacation preferences, public perception of recreation opportunities, and unrelated economic factors would drive a majority of the adverse cumulative impacts, as described in the 2019 FONSI. As described above and in chapter 2, some aspects of alternative 3 are infeasible for the National Park Service to implement; as a result, this alternative would adversely impact socioeconomics.

CULTURAL RESOURCES

Affected Environment

Lake Mead National Recreation Area is home to both submerged and terrestrial cultural resources. The lake's waters cover numerous archeological sites, Native American sacred sites, European American settlements, as well as transportation features, buildings, and structures associated with the construction of Hoover Dam, a national historic landmark. Damage to, and looting of, these resources is known to occur. As ongoing drought and changing climate conditions cause water levels to recede, these cultural resources are increasingly revealed, putting them at greater risk to anthropogenic disturbance and damage from natural causes.

Some areas in the park have not been surveyed for cultural resources. There is the potential for these resources to exist in these locations. Potential cultural landscapes relate to Native Americans residing on these lands, historic mining and settlement, and park development. (Cultural landscapes include both natural elements, such as landforms, soil, and vegetation, and cultural elements, including archeological sites and historic structures.) Historic structures include buildings, roads, and railroads. Potential associated artifacts and archeological sites related to Native American or historic-era occupation could exist in these locations.

Pursuant to the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR Part 800, the National Park Service must consider the effects on properties eligible for or listed in the National Register of Historic Places. National Park Service staff must follow a suite of federal and state laws pertaining to the protection of cultural resources. Due to current water levels, the required cultural resource investigations and a full assessment of effects are not feasible. As such, Lake Mead National Recreation Area is consulting with Tribal Nations, the Arizona State Historic Preservation Office, and the Nevada State Historic Preservation Office to draft a programmatic agreement. This programmatic agreement will lay out the steps that Lake Mead National Recreation Area will take to complete the required identification, evaluation, and documentation of historic properties and appropriate consultations during the implementation of the selected alternative of this plan.

The Echo Bay Developed Area Historic District and the Temple Bar Developed Area Historic District are two of the five historic districts at the park. Both districts are eligible for inclusion in the National Register of Historic Places. Multiple buildings and structures at Echo Bay and Temple Bar are unoccupied and not used. These buildings and structures are at risk of adverse impacts from degradation from human-caused stressors, such as unauthorized entry and vandalism and threats from vegetation and wildlife. Lack of use could have an adverse impact on the condition of the contributing buildings and structures, as well as the historic district as a whole. Any rehabilitation of historic buildings and structures would be undertaken in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties (1995), and materials removed during rehabilitation efforts would be evaluated to determine their value to the

park's museum collections and/or for their comparative use in future preservation work at the sites.

Hemenway Harbor

As part of the construction of the Hoover Dam in the 1930s, 30 miles of railroad were built to connect Boulder City, Nevada, with the facilities to support building the dam. The railroad tracks were removed in 1952, and several sections of the railroad were subsequently submerged. The submerged railroad grade may be close to the launch ramp at Hemenway Harbor.

Hemenway Harbor also contains cultural resources associated with the park's development. The area offers multiple facilities for park visitors. The marina and other modern facilities were evaluated for inclusion in the National Register of Historic Places and have been determined to not be eligible for listing. The historic sites and features associated with the construction of Hoover Dam at Hemenway Harbor have not yet been fully evaluated for inclusion in the National Register of Historic Places and may be eligible for listing as an historic district or as individual historic sites or structures.

Callville Bay

The town of Callville was established by Mormon Bishop Anson Call in 1864. The settlement lay approximately 15 miles upstream from the present-day Hoover Dam. Several houses and a warehouse were built before the town was abandoned in 1869. The completion of the Hoover Dam in the 1930s submerged the ruins of the town. Archeological resources associated with the settlement continue to lie beneath Lake Mead's waters.

Echo Bay

The Echo Bay Developed Area Historic District includes 18 contributing resources. The district contains elements of a NPS Mission 66 developed area, including a ranger office and information station, employee housing, two campgrounds, a utility area, and a circulation system, as well as concession facilities such as a motel, marina, and trailer village. The buildings, sites, and structures in the Echo Bay Developed Area Historic District are younger than those at Temple Bar, with the oldest dating to 1957. Archeological sites do exist in this area, although none contribute to the significance of the Echo Bay Developed Area Historic District.

Temple Bar

The Temple Bar Developed Area Historic District is an example of NPS Mission 66 development and is one of the most intact examples of a Mission 66 developed area in Lake Mead National Recreation Area. Largely constructed between 1947 and 1967, the district includes 26 contributing resources. The district contains the elements of a Mission 66 developed area, including a visitor center, employee housing, a utility area, and a campground, as well as concession facilities such as a trailer village, motel complex, and restaurant/store. Archeological sites do exist in this area, although none contribute to significance of the Temple Bar Developed Area Historic District.

Environmental Trends and Planned Actions

Historic structures and buildings are currently abandoned and unmaintained, falling into disrepair and conditions are trending downward.

Cultural resources at the park are affected by construction activity of relocating and extending launch ramps as a result of changing water levels. As water levels recede, visitors may encounter previously concealed archeological resources as they attempt to access the lake. These archeological resources are vulnerable to surface disturbance due to damage from natural causes, such as wave action or erosion, and anthropogenic causes, such as looting, unauthorized driving off approved roads, or launching boats from visitor-created access points. Other cultural resources may also exist in areas that have not yet been surveyed.

The potential for previously unidentified cultural resources to be affected depends on a variety of environmental factors, including recently deposited river sediment, topography, wave action, and erosion. Recently deposited sediments may be protecting cultural resources, as well as potentially concealing their locations. Natural processes, such as wave action and pre-impoundment erosion, may have affected unknown cultural resources that have been submerged.

If actions planned under current management are carried out, the launch ramp and marina extensions and relocations and access road development would require construction, and disturbance in areas that may have unidentified cultural resources that could be affected. Similarly, actions planned under current management call for the evaluation of abandoned infrastructure for operational and financial feasibility and safety. Infrastructure would then be removed where appropriate. These actions may affect the buildings and structures that are part of the Echo Bay and Temple Bar historic districts. Prior to the demolition of any contributing building or structure in the Echo Bay or Temple Bar historic districts, the National Park Service would consult with the State Historic Preservation Office to develop appropriate mitigation measures (see appendix D).

Impact Analysis

Alternative 1 (NPS Preferred)

The continuation of current management, with some new actions, results in impacts on cultural resources that would be the same or similar to what is described above in the environmental trends and planned actions section, which describes the current and expected future conditions of this resource.

Should any of the historic buildings structures that contribute to the significance of the Echo Bay or Temple Bar historic districts be identified for demolition, their removal would constitute an adverse effect under section 106 but not a significant impact under NEPA due to the districts possessing significance at the state level, not the national level. The removal of select buildings and structures from the historic districts would, however, result in a change to the district's eligibility for listing in the National Register of Historic Places. In addition, removal of select buildings and structures from the historic districts would not be detrimental to the park's purpose and significance.

Cumulative Impacts – Under alternative 1, actions would continue, and trends for cultural resources would be similar to what is described in the affected environment section. The impacts from new actions on cultural resources, such as launch ramp and marina extensions, would result in no new direct or indirect impacts beyond what is described in the environmental trends section. Overall, when impacts from alternative 1 are paired with impacts from past, present, and reasonably foreseeable future actions, this would result in adverse cumulative impacts on cultural resources, as described in the affected environment section, but the impacts would not be a

significant impact under NEPA due to the districts possessing significance at the state level, not the national level.

Alternative 2

Under alternative 2, the National Park service would not explore opportunities for future launch ramp extensions or relocations within the project area. Because there would be no new ground-disturbing activities associated with construction, there would be no adverse impact on archaeological resources that may be present.

Under alternative 2, the National Park Service would discontinue concession services, and all related infrastructure would remain in place until funding becomes available for removal. As a result, the condition of the buildings, structures, and other features of both the Echo Bay and Temple Bar historic districts could be adversely impacted due to a lack of maintenance. Should any of the historic buildings and structures that contribute to the significance of the Echo Bay or Temple Bar historic districts be identified for demolition, their removal would constitute an adverse effect under section 106 but not a significant impact under NEPA due to the districts possessing significance at the state level, not the national level. If or when funding does become available for infrastructure removal, buildings and structures could be demolished in these areas. Buildings and structures identified for demolition would require mitigation measures to be adopted and identified in future planning efforts (see appendix D).

Cumulative Impacts – Under alternative 2, the impacts from no future launch ramp extensions and relocations in the project area would provide some beneficial impacts, in addition to the possible adverse impacts associated with possible demolition, as described in the environmental trends section. Overall, when impacts from alternative 2 are paired with impacts from past, present, and reasonably foreseeable future actions, this would result in some beneficial and no significant adverse impacts on historic structures in the Echo Bay and Temple Bar historic districts due to a lack of extensions and relocations across the primary sites. Additionally, there would be no adverse impacts on archaeological resources that may be present because there would be no construction of launch ramp extensions and relocations.

Common to Alternatives 1 and 2

Under alternatives 1 and 2, cultural resource surveys would be conducted as required by law. These cultural resource surveys could include a terrestrial archeological survey of new areas, such as roads and parking lots, and a submerged resources survey (e.g., the historic railroad, Fort Callville), as needed. These surveys would provide information on the significance of cultural resources in an increased number of areas and allow NPS staff to perform required legal obligations under the National Historic Preservation Act, resulting in beneficial impacts on cultural resources. The surveys would also help fill in cultural resource information gaps resulting in minor beneficial impacts on cultural resources.

Cumulative Impacts – Under common to alternatives 1 and 2, actions to gain more knowledge about cultural resources results in beneficial impacts on cultural resources. When paired with past, present, and reasonably foreseeable actions, the actions common to alternatives 1 and 2 in this plan/EA would result in minor beneficial impacts on the amount of cultural resource information available to resource managers.

Alternative 3

As documented in the affected environment, currently unknown archeological sites exist throughout Lake Mead National Recreation Area.

Under the no-action alternative, marina and launch operations would be extended or relocated throughout the project area as feasible. The movement of these facilities would result in ground-disturbing activities associated with construction which have the potential to cause adverse impacts on archaeological resources that may be present.

Under alternative 3, the infeasible actions result in abandonment of buildings and structures eligible for the National Register of Historic Places resulting in adverse impacts on historic structures.

Cumulative Impacts – Under alternative 3, actions would continue, and trends for cultural resources would be similar to what is described in the affected environment section. Impacts from alternative 3 would not meaningfully affect the conditions of cultural resources. As described above and in chapter 2, some aspects of alternative 3 are infeasible for the National Park Service to implement; as a result, the actions to provide facilities and infrastructure to maintain launching access within the project area would result in impacts similar to those described under alternative 1, with no new direct and indirect impacts beyond those described in the affected environment section. Overall, when impacts from alternative 3 are paired with impacts from past, present, and reasonably foreseeable future actions, there would be no meaningful impact on cultural resource conditions, as described in the affected environment section. Mitigation measures and best practices would be taken as described in appendix D.

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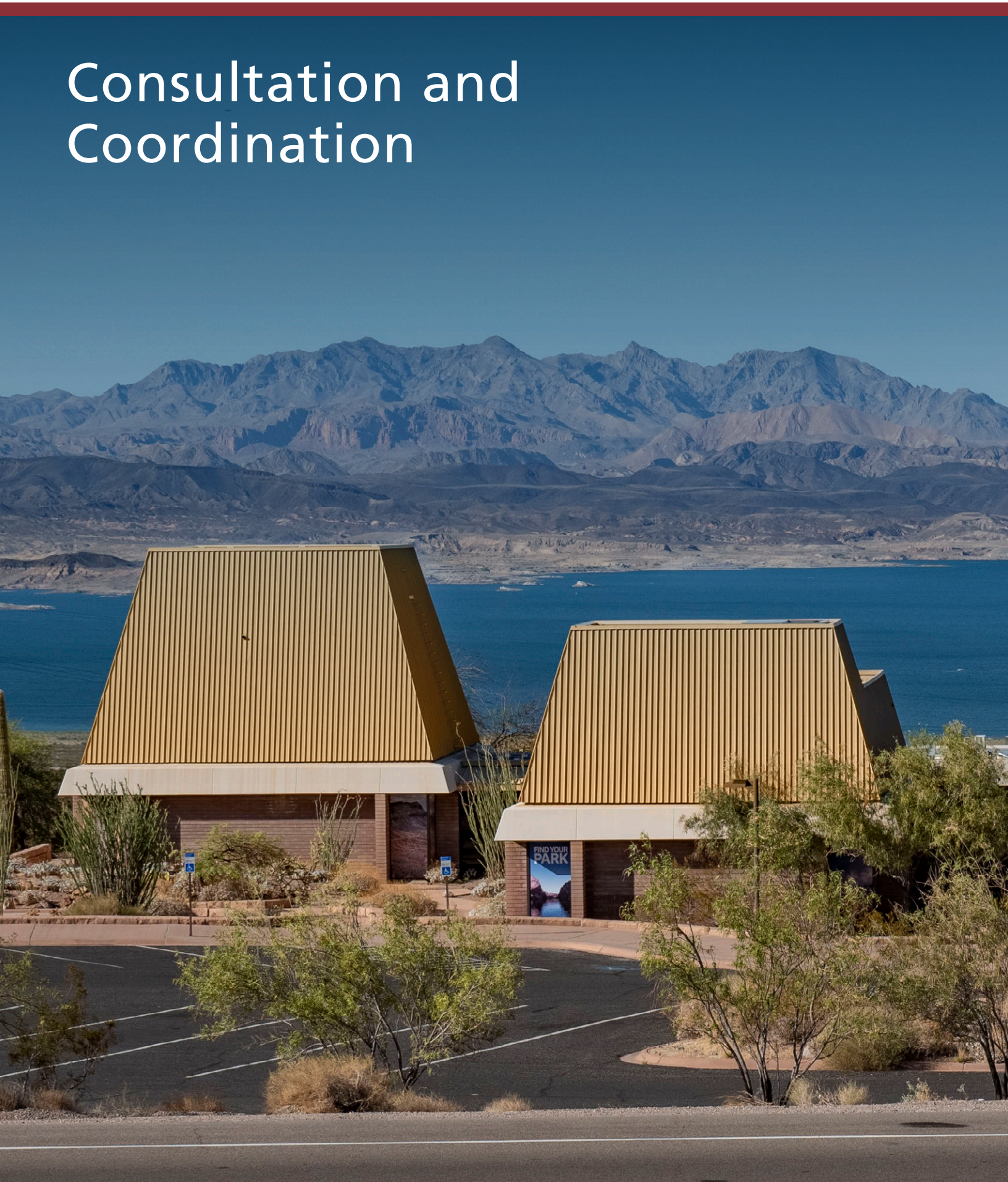
CHAPTER 4:

Consultation and Coordination



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CHAPTER 4: CONSULTATION AND COORDINATION

SECTION 7 CONSULTATION

The National Park Service initiated informal consultation in October 2022 with the US Fish and Wildlife Service (USFWS) Southern Nevada and Arizona Ecological Services Field Offices to discuss the plan/EA and potential impact on federally listed species and their critical habitats. The project area was reviewed for potential/suitable habitat for federally listed (threatened or endangered) species on July 7, 2022 (USFWS 2022a). A review of this list was completed on October 11, 2022, by USFWS staff and Lake Mead National Recreation Area natural resource managers. Accuracy of the list was verified on December 29, 2022 (USFWS 2022b). No change was made to the list at that time.

SECTION 106 CONSULTATION

In accordance with section 106 of the National Historic Preservation Act, park staff initiated consultation with the Nevada and Arizona State Historic Preservation Offices about the proposed plan/EA in letters dated November 10, 2022.

In response to the park (letter dated December 2, 2022), the Nevada State Historic Preservation Office concurred that the proposed project constitutes an undertaking with the potential to affect historic properties and agreed to further consult with the National Park Service as the undertaking became better defined and the effects on potential historic properties were identified. The Arizona State Historic Preservation Office never provided a formal response to Lake Mead National Recreation Area's initiation letter. The plan/EA was subsequently discussed in a virtual meeting on January 24, 2023. The Arizona State Historic Preservation Office agreed to further consultation as the project progressed.

National Park Service staff are working to develop an updated programmatic agreement. As presented in the plan/EA, some activities have the potential to affect the park's archeological resources and historic structures. As a result, NPS staff propose to take appropriate measures to preserve and protect the resources. Future consultation and assessment of effects will be conducted for implementation.

In accordance with section 106 of the National Historic Preservation Act, the National Park Service also sought public comments on potential cultural resources that could have been impacted at Echo Bay as a result of work proposed in the 2019 FONSI that would be carried forward under alternative 1 and 3. The public comment period was open from 8:00 a.m. on March 17, 2023, through 5:00 p.m. on March 31, 2023. A total of 96 correspondences from unaffiliated individuals were received during the 15-day comment period. Commenters did not mention any cultural resource concerns with the relocation of the launch ramp and were not concerned with the proposed location for the launch ramp relocation.

CONSULTATION WITH NATIVE AMERICAN INDIAN TRIBES

Lake Mead National Recreation Area initiated a tribal consultation for the plan/EA on October 25, 2022, by mailing letters to the Ak-Chin Indian Community, Chemehuevi Indian Tribe, Colorado River Indian Tribes, Fort McDowell Yavapai Nation, Fort Mojave Indian Tribe, Fort

Yuma Quechan Indian Tribe, Gila River Indian Community, Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Kaibab Band of Paiute Indians, Las Vegas Paiute Tribe, Moapa Band of Paiutes, Navajo Nation, Paiute Indian Tribe of Utah, Pueblo of Zuni, Salt River Pima-Maricopa Indian Community, Shivwits Band of Paiutes, Yavapai-Apache Nation, and Yavapai-Prescott Indian Tribe. Responses were received by the Navajo Nation (requested one-on-one presentation, December 28, 2022), Fort Yuma Quechan Tribe (responded with no comment, November 21, 2022), and Yavapai Prescott Indian Tribe (responded with a notice of receipt, November 2, 2022). An invitation for Tribal engagement meetings was extended in this initial consultation letter, as well as an invitation for one-on-one meetings with individual Tribal Nations and NPS staff. A virtual Tribal engagement meeting was held on November 29, 2022. The Moapa Band of Paiutes, Shivwits Band of Paiutes, and Chemehuevi Indian Tribe attended the virtual meeting and provided comments. National Park Service staff informed the Tribes in attendance that the plan/EA required regular consultation for individual actions as proposed to ensure compliance with section 106, as well as to fulfill the park's responsibilities to consult with the Tribal community. Consultation with Tribal Nations is ongoing.

National Park Service staff will continue consultation with Tribal Nations on the revised draft of the plan/EA. The consultation will include a copy of the draft plan/EA and the associated amended programmatic agreement for review and comment.

APPENDIX A:

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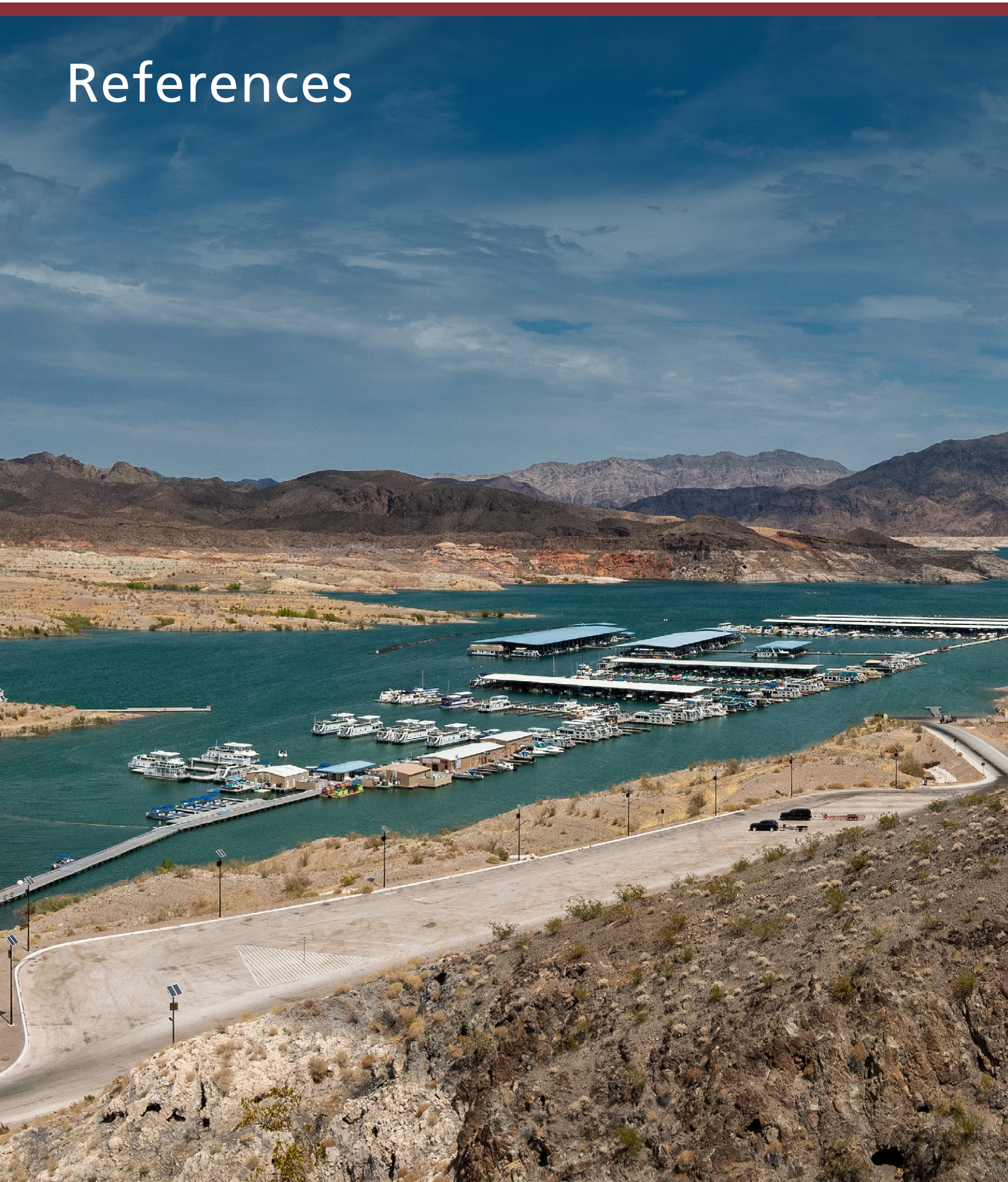

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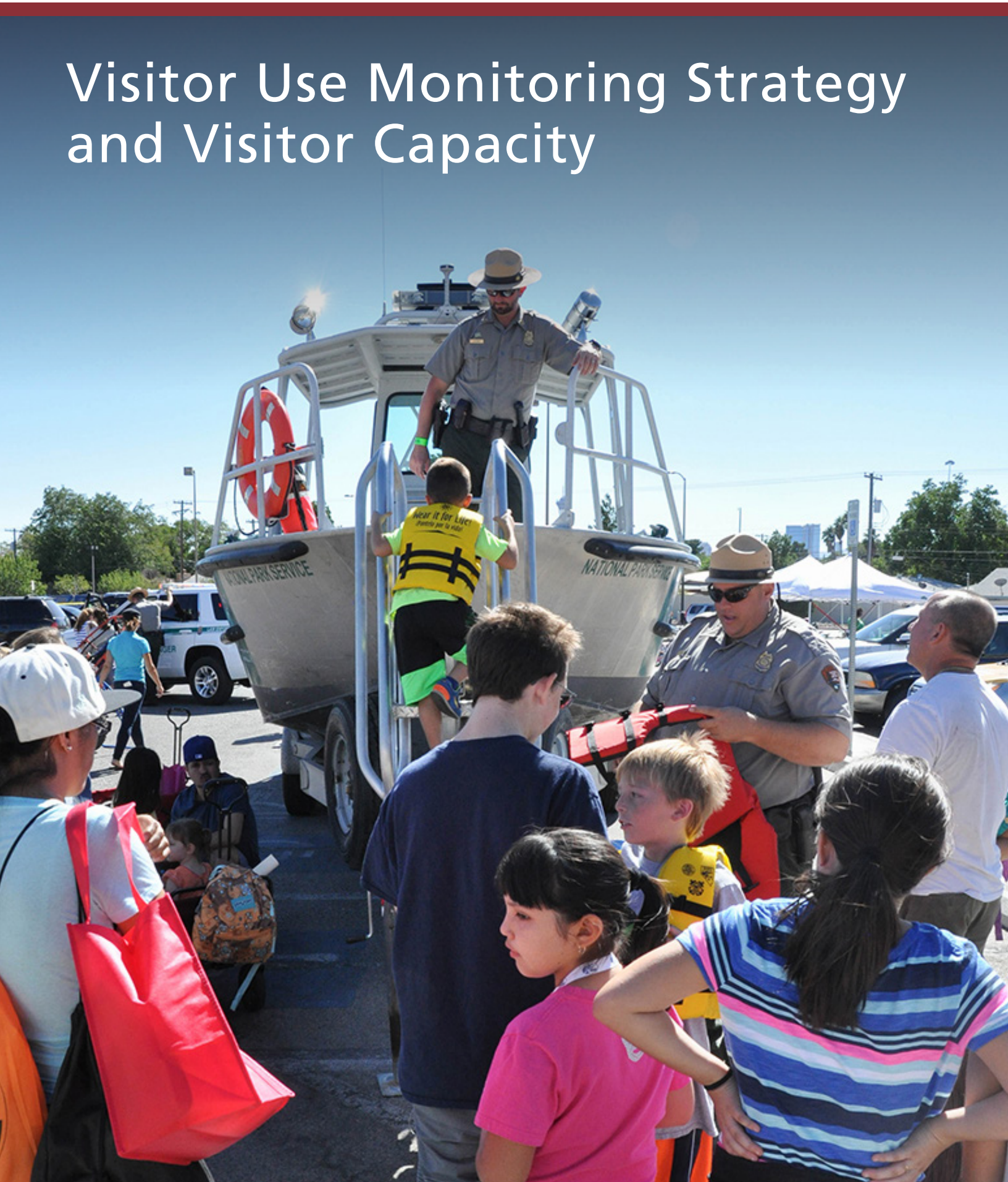
APPENDIX B:

Visitor Use Monitoring Strategy and Visitor Capacity



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APPENDIX B: VISITOR USE MONITORING STRATEGY AND VISITOR CAPACITY

INTRODUCTION

This appendix provides additional information about the monitoring strategy as it relates to the Lake Mead National Recreation Area Sustainable Low Water Access Plan (plan) and Environmental Assessment (EA). The development of these components follows the guidance of the Interagency Visitor Use Management Council's Visitor Use Management Framework (IVUMC 2016). For additional resources in the Visitor Use Management Framework, please visit https://visitorusemanagement.nps.gov/ for a full description of the Interagency Visitor Use Management Council and framework guidance (IVUMC).

Monitoring is the process of routinely and systematically gathering information or making observations to assess the status of specific resource conditions and visitor experiences (IVUMC 2019). Monitoring is designed and implemented to provide usable data for periodically comparing existing and desired conditions, assessing the need for management actions, and evaluating the efficacy of management actions. Monitoring is an integral component of resource and visitor use management at Lake Mead National Recreation Area and allows managers to objectively and effectively evaluate whether desired conditions are being achieved and maintained. Monitoring also reveals how conditions change over time, including the rate and magnitude of change. A well-planned monitoring strategy provides for transparency, communication, and potential cost savings through efficiencies and possibly cost sharing.

A monitoring strategy includes the selection of indicators, along with establishment of thresholds or objectives, and any needed triggers. The strategy also includes routine, systematic observations or data collection of the indicators over time, as well as associated documentation and analysis of the observations or data in relation to thresholds, triggers, or objectives.

Indicators translate desired conditions of the sustainable low water access plan and environmental assessment into measurable attributes (e.g., wait time to access/leave the water) that, when tracked over time, evaluate change in resource or experiential conditions from visitor use. Indicators are critical components of monitoring the success of the plan/EA and are considered common to all action alternatives. The interdisciplinary planning team considered the central issues driving the need for the plan/EA and developed related indicators that would help identify when the level of impact becomes cause for concern and management action may be needed. The indicators described below were considered the most critical, given the importance and vulnerability of the resource or visitor experience affected. The planning team also reviewed the experiences of other park units with similar issues to help identify meaningful indicators.

Thresholds represent the minimum acceptable condition for each indicator and were established by considering the desired conditions (see chapter 1), data on existing conditions, relevant research studies, professional judgment of NPS staff from management experience, and scoping on public preferences. Although defined as "minimally acceptable," thresholds still represent acceptable conditions. Establishing thresholds does not imply that no action would be taken before reaching the threshold. Thresholds identify when conditions approach unacceptable levels and serve as mechanisms to alert managers and the public that corrective action must be taken to keep conditions acceptable. Indicators and thresholds can be tracked over time and

ultimately form the foundation of good monitoring protocols that would allow managers to maintain and achieve desired conditions for resources and visitor experiences.

Indicators, thresholds, monitoring protocols, management strategies, and potential future management strategies would be implemented as a result of this plan/EA and are described below. The indicators identified in this plan/EA do not represent an exhaustive list of all monitoring that is currently and will continue to be conducted at Lake Mead National Recreation Area. The four indicators identified in the plan/EA were selected to evaluate changes in conditions related to changing visitor access and visitor use due to low water levels and associated facility and infrastructure needs.

Not all the strategies related to the indicators, thresholds, and visitor capacity would be implemented immediately but rather as thresholds are approached or exceeded. Those strategies identified for use as needed are labeled as potential future management strategies.

Methodology for Visitor Use Statistics

One method NPS staff use to estimate visitor use statistics is analyzing data collected from traffic counters. Traffic counters are located at several entrance lanes throughout the Mead District, Canyon District, and Mohave District of the recreation area. For the Mead District, traffic counts are reduced for the number of buses at Boulder Beach, Lake Mead Boulevard, Lake Mead Parkway, and Northshore Road. The reduced traffic count is multiplied by 2.5 persons per vehicle, and total visits are reduced by 2,834 nonreportable visits per month. For the Canyon District, traffic counts are reduced for the number of buses at Willow Beach and Temple Bar. The reduced traffic count is multiplied by 2.5 persons per vehicle, and total visits are reduced by 2,138 nonreportable visits per month. Lastly, the Mohave District traffic counts are reduced for the number of buses at Katherine and Cottonwood Cove. The reduced traffic count is multiplied by 2.5 persons per vehicle, and total visits are reduced by 1,250 nonreportable visits per month.

Total recreation visits are the sum of traffic count numbers described above, in addition to the following:

- Number of bus passengers in the Mead, Canyon, and Mohave Districts
- Number of visitors on the Desert Princess tours (Mead District)
- Number of recreation visitors to the headquarters building (Mead District)
- Number of airplanes at Echo Bay (multiplied by 2.5 persons per aircraft) (Mead District)
- Number of paddlecraft passengers as reported by the concessioner (Canyon District)
- Number of visitors on raft tours as reported by the concessioner (Canyon District)
- Number of airplanes at Temple Bar (multiplied by 2.5 persons per aircraft) (Canyon District)
- Number of visitors on the Colorado River (Canyon District)

Recreation visits are estimated by multiplying the sum of the above numbers (recreation visits) by 0.965. Non-recreation visits are estimated as 0.035% of total visits. Recreation visitor hours are estimated by reducing the total recreation visits by the number of overnight stays, divided by 2.6 and then multiplied by 6 hours. Non-recreation visits are multiplied by 6 hours.

INDICATORS AND THRESHOLDS

Indicator Topic: Visitor Safety and Visitor Conflict Incidents

Indicator

Number and types of incidents that require a law enforcement response per year

Objective

Gain a better understanding of the number and types of incidences (e.g., emergency medical services, search and rescue) that require a law enforcement response to better predict and proactively manage conditions to decrease the number of incidences that occur.

Unlike a threshold, an objective is defined as a specific result that a bureau aims to achieve; objectives are markers to help ensure positive progress toward achieving and maintaining desired conditions. Objectives are typically stated as goals, compared to thresholds, which are typically based on physical, biological, or social conditions.

Rationale

The number and types of instances requiring a law enforcement response, specifically the increase in occurrences at the five priority locations, is a key issue at Lake Mead National Recreation Area. As water levels decline and the topography and bathymetry of the area forces the indefinite closure of (now) formally operational launch ramps, and as visitor services and amenities close in conjunction with ramp closures, recreational use increasingly transitions to unlawful activity in these areas. Additionally, the closure of launch areas has condensed use to the launches that remain open, concentrating more people in fewer areas. This situation can lead to increased visitor conflict, safety concerns, and compliance issues requiring response from emergency medical services, search and rescue, or other law enforcement. Visitor injuries and safety-related concerns are mitigated as much as possible but can occur due to any number of instances, as millions of visitors recreate in the recreation area's natural, unpredictable landscape.

This indicator would monitor desired conditions for visitor-caused impacts on natural and cultural resources, as well as visitor experience. This indicator and objective support the desired condition to provide visitors opportunities for nonmotorized water-based recreational experiences that are safe and enjoyable. Monitoring for this indicator will allow NPS staff to establish baseline data for future comparative analysis.

This indicator would help NPS staff understand, through monitoring, the number and types of incidences (e.g., emergency medical services, search and rescue) that require a law enforcement response to better predict and proactively management conditions to decrease the number of incidences that occur (the objective). There would be a range of acceptance, depending on the sites, available visitor services and amenities, operational facilities and infrastructure, and the impact on natural and cultural resources. National Park Service staff would use data to identify transitions in recreational use by the number and types of incidences occurring at locations, as

formally operational launch areas become vacant and/or lose visitor services and supporting facilities and infrastructure.

This indicator is also related to the access indicator below, as NPS staff have observed relationships with long waits and incidences requiring response. Long wait lines can result in cars running out of fuel, dehydration and health concerns, and increased irritability or frustration among visitors.

Monitoring

National Park Service staff would monitor annually through the Incident Management, Analysis, and Reporting system (IMARS), and emergency medical services reports.

Management Strategies

- Optimize real-time communication via the park's website, social media, and the NPS app to help manage visitor expectations about conditions.
- Manage sites with barriers and/or signs.
- Monitor trails, launch ramps, and other areas for safety related concerns.
- Increase visitor contacts.
- Increase visitor education about hazards and risks.
- Design and implement signage related to specific safety concerns in specific locations.
- Design new recreation emphasis for these areas to promote nonmotorized and safe recreational opportunities (evaluate nonmotorized recreational opportunities such as fishing).

Potential Future Management Strategies

In addition to the management strategies identified above, NPS staff identified the following potential future management strategies. Based on monitoring of conditions, these strategies would only be implemented when desired conditions are not being achieved.

- Require mandatory safety education training or orientation.
- Increase patrolling of risk-aware areas.
- Increase visitor contacts.
- Reevaluate key areas and identify safety hazards, risks, and mitigations.
- Close areas (temporarily or permanently) with hazards, followed by a risk assessment, to determine acceptability of reopening the area.

Indicator Topic: Access

Indicator

Number of documented incidents of downgraded archeological site conditions, as recorded in the NPS Cultural Resources Inventory System, due to visitor use impacts, including new visitor-created access points/routes/roads and the evaluation of disturbance to natural and cultural resources

Threshold

No more than one documented incident of downgraded archeological site condition, as recorded in the NPS Cultural Resources Inventory System, due to visitor use impacts from new visitor-created access points/routes/roads and the evaluation of disturbance to natural and cultural resources

Rationale

Access to the water for recreation is a key issue at Lake Mead National Recreation Area. As visitor wait times for launching personal motorized watercraft have increased in recent years, so too have the number of unauthorized visitor-created access points, routes, and roads. Receding water levels expose more land, which has led to further proliferation of social trails and impacts along the shoreline. Unauthorized access points, often located near existing launch ramps, pose a risk to visitor safety due to the challenging topography in these areas. Unauthorized access threatens cultural resources, particularly archeological resources, which can be damaged through both intentional and unintentional visitor actions. Vulnerable natural resources, such as sensitive gypsum soils and rare plant communities, are impacted by trampling and erosion from unauthorized access. Unauthorized access can also introduce invasive plant infestations, garbage, and human waste to shoreline areas.

This indicator would help determine the frequency (evaluated as the number of documented incidents) with which visitor-created access points, routes, and roads are being established and whether some of the routes are more widely used than others. The threshold is based on the sensitivity of the affected resources, the amount of visitor use taking place, and the extent to which these impacts could be tolerated. There would be a range of acceptance, depending on the sites, areas, or zones in which these access points are created. National Park Service staff would document damage that occurs below the high-water mark monthly and convene an interdisciplinary team, including natural and cultural resource specialists, to determine appropriate restoration methods. In addition, this indicator would include a long-term monitoring strategy to document changes to archeological site condition (poor, fair, good, excellent, destroyed, cannot be found) due to visitor use.

This indicator supports both the natural resource and cultural resource desired conditions for natural and cultural resources to be protected and preserved as much as possible from recreational pressure, including the landscape around the shoreline.

Monitoring

Evaluate the number of new visitor-created access points, routes, and roads leaving the formalized trail system. A monitoring protocol will be established in which mechanisms and standard procedures for monitoring with be evaluated monthly by an interdisciplinary team.

National Park Service staff will continue to record law enforcement incidents, which usually include larger incidents with severe damage; however, NPS staff will also review incidents not requiring law enforcement response to evaluate resource damage by evaluating the depth, width, severity, and impact of the visitor-created access point.

Management Strategies

- Close and rehabilitate unacceptable routes using signage and brushing visible portions of visitor-created trails.
- Educate visitors about sensitive resources and staying on trails and promote trail stewardship.
- Create physical barriers to separate visitors from sensitive resources.
- Conduct archeological surveys and/or condition assessments and implement recommendations for monitoring and stabilizing sites.
- Encourage visitors report and help monitor any harmful activities, theft, or damage to archeological sites.
- Educate visitors with social media messaging that trails could be dangerous and promote resource protection.

Indicator Topic: Visitor Use and Experience

Indicator

Percentage of staffed hours (24) during summer weekend days that Willow Beach entrance station is closed as a result of parking demand filling

Threshold

Willow Beach entrance station is closed as a result of parking demand, filling less than 20% of staffed hours (24) during summer weekend days.

Rationale

National Park Service staff seek to provide visitors with clear and compelling messaging and to ensure that visitors participate in a variety of recreational experiences on water. During previous years, NPS staff have reported wait times for launching at key locations, such as Hemenway Harbor, of up to four hours during peak visitation hours. These wait times can degrade the visitor experience and cause visitor safety and potential conflict among users due to waiting in the hot summer temperatures. These long wait times likely occurred due to launch ramp closures at other locations that resulted in visitor displacement and concentrated use at the few open launch ramps.

With increased communication and messaging about long wait times at Hemenway Harbor, NPS staff noticed changes in visitation patterns to other locations, namely Willow Beach. Although Willow Beach is not within the scope of this planning effort, monitoring visitor use patterns at this location improves the understanding of visitor displacement and dispersion within Lake Mead National Recreation Area. Willow Beach and the associated launch ramp sit along the Colorado

River that drains from Lake Mead. The entrance station is an approximately 30-minute drive by vehicle south of Hemenway Harbor, making it the closest open launch ramp to visitors who arrive at Hemenway and are displaced due to launch ramp closures or long wait times. During peak visitation in the summers of 2021 and 2022, this area received concentrated visitor use that led to NPS staff closing the entrance station to Willow Beach to preserve the visitor experience and protect resources. Closing the entrance station degrades the visitor experience, particularly for those who have been displaced from other locations with long wait times and drive to this location to be told they cannot access the beach.

National Park Service staff noted that they typically close Willow Beach entrance station to visitors when the parking lot is at least 90% capacity, and there is no more beach space for visitors to recreate. When this occurs, park rangers notify entrance station staff, who then close the entrance. During summer 2022, this situation typically occurred during weekends and holidays from 10:00 a.m. to 2:00 p.m. The entrance station is generally staffed daily during the summer from 6:00 a.m. to 6:00 p.m.

This indicator allows for flexibility in monitoring (e.g., style, process, topic) to better understand visitor displacement and impacts on visitor experience. Depending on trends, NPS staff may choose to monitor the percentage of staffed hours/number of hours per day that the Willow Beach entrance station is closed to visitors or wait times at key launch ramp destinations. By monitoring these indicators and adapting, NPS staff will have a clear understanding of visitor use patterns and visitor displacement and help ensure that the park is providing quality visitor experiences.

Monitoring

Monitoring will occur primarily at the Willow Beach entrance station, as this location is indicative of visitor displacement from other launching locations in Lake Mead National Recreation Area. During summer weekend days and holidays, NPS staff working at the entrance station will record the times of day when law enforcement rangers notify them the parking area is at capacity and the entrance station is closed. National Park Service staff will also record the time of day the entrance station reopens to visitors. This information will be held in a database and analyzed monthly during peak summer months (May to September). National Park Service staff can simultaneously monitor the number of vehicles that are turned away due to the entrance station being closed. The monitoring system will be designed so that NPS staff may shift monitoring efforts to wait times at key launch ramp locations, depending on visitor use patterns.

Management Strategies

- Communicate with visitors at various locations (e.g., Hemenway Harbor) that the Willow Beach entrance station is currently closed.
- Employ a forecasting tool to inform visitors of when the Willow Beach entrance station typically closes and encourage visitors to arrive earlier or later.

Potential Future Management Strategies

In addition to the management strategies identified above, NPS staff identified the following potential future management strategies. Based on the monitoring of conditions, these strategies would only be implemented as thresholds are approached and/or when desired conditions are not being achieved.

- Implement a reservation or timed-entry permit system to access Willow Beach.

Indicator Topic: Financial Feasibility and Sustainability

Indicator

Amount of NPS financial increases in dollars spent on current operations and maintenance of facilities and infrastructure

Threshold

No dollar increases to NPS current operations and maintenance

Rationale

National Park Service staff will use this indicator to monitor increases in costs to operation and maintenance and implement management strategies as necessary to ensure financial feasibility and sustainability. This indicator supports the facilities and infrastructure's desired conditions to continue to be well maintained at a sustainable level and have proper sizing to address visitor needs. The indicator assists NPS staff to holistically consider existing facilities as a unit and weigh the costs of long-term operation and maintenance. The indicator also supports the visitor experience desired condition for visitors to be provided with opportunities for nonmotorized water-based experiences that are safe and enjoyable.

The threshold allows NPS staff to strategically prioritize high-priority sites, safety needs, efficiency, and sustainability across all facilities to effectively meet visitor trends/needs in a more sustainable manner. This indicator specifically connects the desired conditions that facilities and infrastructure be at a level that is sustainability designed, feasibly managed, and sustainably managed and sized to address visitor needs and be improved efficiently. These desired conditions aim to prioritize actions at key locations by minimizing increases to operations and maintenance.

Monitoring

National Park Service staff will implement a strategic approach to track and review routine operation and maintenance monthly to document and evaluate where park resources are being allocated and determine management strategies to improve efficiency. The strategic approach includes an internal monthly meeting with park supervisors to document and evaluate expenditures in the park, resulting in an average percentage of dollars spent at each location once a month. National Park Service staff will review each work order submitted during the month and evaluate the number of staff, work performed, and type of equipment used, including rental fees. National Park Service staff will average this information annually and use it as a comparison for future years. The indicator will also serve the level of sustainability of facilities and infrastructure.

Management Strategies

- Restore, repurpose, deactivate and preserve, or remove facilities simultaneously as boat launches are consolidated to avoid further maintenance costs.
- Review trends in operation and maintenance requests and determine alternative sustainable solutions.

Potential Future Management Strategies

In addition to the management strategies identified above, NPS staff identified the following potential future management strategies. Based on monitoring of conditions, these strategies would only be implemented as thresholds are approached and/or when desired conditions are not being achieved.

- Close sites temporarily on case-by-case basis.

VISITOR CAPACITY IDENTIFICATION

Overview

This section provides additional information about the visitor capacity identification as it relates to the Lake Mead National Recreation Area Sustainable Low Water Access Plan and Environmental Assessment. Visitor capacity is the maximum amounts and types of visitor use that 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 (IVUMC 2016) (https://visitorusemanagement.nps.gov/). Visitor capacities were identified using best practices and examples from other plans and projects across the National Park Service. Based on these best practices, NPS staff used the following guidelines to identify capacity: (1) determine the analysis area, (2) review existing direction and knowledge, (3) identify the limiting attribute, and (4) identify visitor capacity and strategies to manage the capacity.

Analysis Areas

This guideline has far-reaching effects on identifying visitor capacity because it involved recognizing (1) where geographically the visitor capacity will be implemented, (2) displacement or other unintended effects of managing visitor use levels, and (3) the effect of managing allocation(s) of visitor use withing the analysis area(s). To determine the appropriate analysis area(s), NPS staff sought to understand the relationship between existing and potential visitor use patterns and desired conditions.

The analysis areas were identified as the five priority locations that are the focus of the plan/EA.

1. Hemenway Harbor
2. Echo Bay
3. Callville Bay
4. South Cove
5. Temple Bar

To fulfill the requirements of the 1978 National Parks and Recreation Act (54 USC 100502), visitor capacity identifications are legally required for all destinations and areas that this planning effort addresses plan/EA (IVUMC 2016). Future monitoring of use levels and indicators would inform the National Park Service if use levels were at or near visitor capacities. If so, future potential management strategies, as outlined above in the “Indicators and Thresholds” section, would be taken. For each location, an overview of the analysis is included below.

Review Existing Direction and Knowledge

The sustainable low water access plan/environmental assessment updates previous planning efforts by identifying the visitor capacities and strategies necessary to implement the visitor capacity at the five priority launch locations. The following is a summary of prior planning and guidance related to visitor capacity.

The 2003 Lake Management Plan/Final Environmental Impact Statement identified capacities based on the limits of acceptable change and visitor impact management. These frameworks used the concepts of indicators and standards of quality to approach carrying capacity and identified the three indicators as safety, shoreline accessibility, and social carrying capacity. Under alternative C, the (NPS preferred), the capacities for boats at one time (BAOT) in a recreational setting on Lake Mead were identified as 330 boats at one time at Hemenway Harbor (zone 10), 460 boats at one time at Echo Bay (zone 17), 578 boats at one time at Callville Bay (zone 12), 100 boats at one time at South Cove (zone 22), and 376 boats at one time at Temple Bar (zone 20). The BAOT capacity values represent the most limiting factor (or smallest boating capacity) from the safety, shoreline accessibility, and social carrying capacity analyses and reflects the recommended maximum number of boats on the water at any one time. The preferred alternative allowed for expanding the boating capacity from a previously identified (previous planning effort) capacity of 4,437 boats to 5,055 boats at any one time while maintaining a more diverse range of recreational opportunities within the recreation area. Note that 5,055 boats at one time is the total number of boats on both Lake Mohave and Lake Mead, with a lake BAOT capacity of 1,760 boats at one time and 3,295 boats at one time on each lake, respectively.

The 2005 general management plan (GMP) amendment/environmental assessment was needed, as the 2003 plan did not foresee the current (2005) and predicted drought conditions and did not fully consider the effects of greater fluctuation in the lake's water levels. To ensure the protection of park resources while allowing a range of recreational opportunities, the 2005 GMP amendment/environmental assessment provides for an increase in boating capacity targeted at areas where growth can be accommodated within the physical, environmental, and social carrying capacity of the lakes (Lake Mohave and Lake Mead). Under alternative B (NPS preferred), and to accommodate for Overton Beach Marina operation discontinuing at water levels below approximately 1,100 feet, authorized bating capacity and marina services were increased at Echo Bay to allow the overall boating capacity on the Overton Arm to be maintained. Similarly, under the preferred alternative, the capacity of the new ramp at Government Wash was expanded to accommodate the launching capacity displaced with the loss of the Las Vegas Bay ramp.

The sustainable low water access plan/environmental assessment builds on the qualitative descriptions and quantitative attributes for visitor capacities included in the above previous planning efforts and identifies visitor capacity based on potential changes in site operations and associated strategies identified in each alternative needed to manage visitor use. Each analysis area has an overview of previously identified visitor capacities.

National Park Service staff reviewed desired conditions, indicators, and thresholds, with detailed consideration of the park values that must be protected and are most related to visitor use levels. For each key area described below, relevant indicators, thresholds, and associated monitoring strategies are listed.

The following descriptions of each analysis area explain current conditions and visitor use patterns for each area. The amount, timing, and distribution of visitor use in the project area for the park influences both resource conditions and visitor experiences. Visitor impacts influence the ability of the National Park Service to maintain desired conditions. Appropriate management strategies can be selected and implemented to maintain desired resource conditions and visitor experiences consistent with the purposes for which the park was established. Visitor capacities vary by alternatives.

Identify the Limiting Attribute

This step requires identifying the attribute(s) that most constrain the analysis area's ability to accommodate visitor use. The limiting or constraining attribute(s) may vary across the analysis area and is described under each key analysis location. This step is important, given that an analysis location could experience a variety of needs for the best tools to provide quality experiences and protect resources.

In the location descriptions below, the limiting attribute(s) is identified. The limiting attribute in some locations is different by alternative, and there could be more than one limiting attribute for identifying the amounts and types of use that the analysis locations can accommodate.

Identify Visitor Capacity and Implementation Strategies

To identify the appropriate amount of use at key analysis locations, the planning team reviewed outputs from previous steps to understand current conditions compared to desired conditions for the area. The team used visitation data that is collected annually to track levels of visitor use parkwide and by location as a data source.

Visitor use is quantified using various parameters in the subsequent sections. People per day can be calculated based on the number of boats per day using a people per vessel (PPV) multiplier (calculated based on average persons per vessel). Similarly, people at one time can be used to calculate capacity for boats at one time using a PPV multiplier.

The action alternatives were assessed for primary differences related to the amounts, timing, and distribution and types of use. In combination with the desired conditions and indicators and thresholds, the opportunities and related strategies for visitor use in each area would influence the amounts and types of use that can be accommodated in the analysis areas. Therefore, the visitor capacity varies by alternatives and is described below. Visitor capacity also varies within alternatives dependent on water-level scenarios with varying levels of visitor facilities and services available to support different amounts and types of visitor use.

Implementation strategies are also identified to manage use levels to the visitor capacities.

Visitor Capacity Implementation Strategies Common to All Locations

- Deploy communications and messaging to the public to encourage visitors to visit during less-busy times.

ANALYSIS LOCATION: HEMENWAY HARBOR

Review Existing Direction and Knowledge

Under current conditions and management, NPS staff and contractors relocate/extend the launch ramp multiple times per week, sometimes daily, to accommodate motorized boating access with rapidly declining water levels. National Park Service staff and contractors coordinate to move all associated launch ramp components, including pipe mats, utilities, and at times, storage tanks, to provide continued access for launching motorized vessels. Each time the launch ramp is extended, one launch lane is closed for launching, temporarily limiting the opportunity to launch motorized vessels even further and degrading the visitor experience. Current launch relocation and extension operations will accommodate water levels down to 1,000 feet. In addition to providing lake access for motorized vessels, NPS staff and partners are maintaining concession operations and utility corridors to provide ongoing visitor services that support water-based recreational opportunities at Hemenway Harbor and the marina.

The extreme low water levels have led to concentrated visitor use at Hemenway Harbor because it is the only NPS concrete launch ramp that remains accessible and functional for recreational motorized boat access to Lake Mead at this time. In 2005, traffic counters recorded just over 10,000 cars on Hemenway Road for the month of June. In June 2021, traffic counters recorded nearly 25,000 cars on Hemenway Road, an increase of nearly 15,000 vehicles. This concentrated use results in longer wait times for visitors to launch their motorized vessels. Furthermore, minimal facilities, such as portable restrooms, are available for visitors to use while waiting in line at the launch ramp.

The concentrated use, congestion, longer wait times, extreme temperatures, and lack of facilities available while waiting to launch motorized vessels at Hemenway Harbor lead to an increase in visitor conflicts and compromises visitor and employee safety/well-being. The concentrated use and increased vehicles in line waiting to launch correlates with the length of time visitors need to wait for water access. The average boat launch, observed anecdotally, takes approximately 15 minutes. For an average 12-hour summer day, Hemenway Harbor can accommodate about 50 motorized boat launches. Motorized boaters often waited up to 4 hours to launch their vessel at Hemenway Harbor in the 2021 and 2022 summer months; however, wait times are heavily dependent on the availability of other launch areas.

Visitor capacity was previously identified in the 2005 general management plan as 875 boats in the Lake Mead marina. The 2003 lake management plan identified visitor capacity to be 330 boats at one time in this area on Lake Mead.

Identify the Limiting Attribute(s)

Alternative 1

The limiting attribute that most constrains the amounts of use and types of use at Hemenway Harbor under alternative 1 is the quality of visitor experience. The quality of visitor experience is affected by concentrated use that leads to congestion and longer wait times, exacerbated by a lack of available facilities while waiting to launch and extreme temperatures; the relocation of facilities, which will lead to physically less space for launching with lowering water and challenging topography; and the changing circulation and congestion both on land and on water. The limiting attribute of quality of visitor experience is directly related to desired conditions at

Hemenway Harbor to have opportunities for water-based recreation experiences that are safe and enjoyable.

Alternative 2

The limiting attribute that most constrains the amounts of use is the quality of visitor experience and the protection of cultural resources. With the absence of formalized extensions and the relocations and up-to-date facilities, coupled with lower water levels, the quality of the experience will most constrain the analysis area's ability to accommodate visitor use. Specifically, mud, and the ability to launch motorized or nonmotorized vessels will be questionable, and providing safe and enjoyable experiences in alignment with desired conditions will be important. Protection of cultural resources, specifically where aggregate piles are 24 feet below the surface, will constrain the area's ability to accommodate launching vessels. The aggregate piles of rock were part of the construction of the Hoover Dam and are part of the overall Aggregate Classification Plant Facility and therefore are a cultural resource. These two limiting attributes are directly connected to desired conditions at Hemenway Harbor for facilities and infrastructure to be improved through innovative design that supports visitor enjoyment of the resources and by protecting and preserving cultural resources while balancing and sustaining recreational enjoyment and exploration, including the landscape around the shoreline.

The most relevant indicator to monitor changes in these conditions is the amount of NPS financial increases in dollars spent on the current operations and maintenance of facilities and infrastructure, the percentage of staffed hours (24) during summer weekend days that Willow Beach entrance station is closed, and the number of documented incidents of downgraded archeological site conditions, as recorded in the NPS Cultural Resources Inventory System, due to visitor use impacts, including new visitor-created access points/routes/roads and the evaluation of disturbance to natural and cultural resources.

Visitor Capacity and Implementation Strategies

Alternative 1

Under alternative 1, the extension of the launch ramp in its existing location to a water level of approximately 1,000 feet and the relocation of the launch ramp with 2 launch lanes each when water levels are below approximately 1,000 feet, will increase the ability of the area to accommodate use and provides an opportunity to ease crowding and congestion during launching. The visitor capacity was identified with an understanding of the limiting attributes and assumes a 12-hour launch day based on average summer visitation, with 4 boats launching in each lane per hour, resulting in a visitor capacity of 192 boats per day launching from this location. The use levels were calculated using a 2.5-person per vessel multiplier, which yields a capacity of 500 people per day at Hemenway Harbor's relocated launch ramp. This amount of use allows the desired condition for visitor access to water-based recreation activities to be achieved in a sustainable manner and ensures that visitors will have opportunities for nonmotorized water-based recreational experiences that are safe and enjoyable.

Potential Future Management Strategies May Include:

- Reservation system

Alternative 2

The actions under alternative 2, with no future concrete launch ramp extensions or relocations and the discontinuation of concession services, result in a changes in the amounts and types of use that can be accommodated while ensuring quality experiences.

The limiting attribute that most constrains the analysis area's ability to accommodate visitor use is the quality of visitor experience and the protection of cultural resources. The identified visitor capacity under this alternative would be 150 people per day, allowing visitors to launch nonmotorized boats efficiently and safely from a designated location to fulfill desired conditions. Although less than current use levels, the nonmotorized recreational use would increase under this alternative. This amount of use allows desired conditions for visitors to have access to water-based recreation activities to be achieved in a sustainable manner and ensures opportunities for nonmotorized water-based recreational experiences that are safe and enjoyable.

Management Strategies

- Consider area for commercial use.
- Increase the law enforcement presence.
- Communicate and promote visitor opportunities to embrace desert landscape.
- Define recreational use areas at Hemenway Harbor and the surrounding area.
- Add interpretive signs, fencing, and wayfinding.

Potential Future Management Strategies

- Increase visitor services (e.g., restrooms, trash services).

ANALYSIS LOCATION: ECHO BAY

Review Existing Direction and Knowledge

Under current conditions and management, the Echo Bay concrete launch ramp is under an indefinite closure beginning May 11, 2022, and is not in use. Before the closure, the area had two launch ramps that provided lake access for visitors. The original launch ramp, formally located at the end of the bay, closed in 2014. The opportunity for launching at Echo Bay has been reduced to a primitive launching experience for water access. Visitor services provided by the concessioner include a convenience store for snacks and drinks and a courtesy dock on-site for launch watercraft.

Many of the visitors to this previously operational launch ramp were from Utah, reported anecdotally, as the location is most convenient geographically. Still, Echo Bay is relatively remote to access, requiring a 30–45-minute drive from Overton or Logandale, Nevada, the two closest towns. The indefinite closure of this launch ramp has decreased recreational access, and opportunities on the water and have led to an increase in traffic on the road to Hemenway Harbor by visitors who had consistently launched motorized vessels at the concrete launch ramp at Echo Bay.

Day use, which accounts for approximately 80%–90% of current recreational use at this location, includes fishing, swimming, and paddlecraft use via nonmotorized launching. Weekends see higher use levels than weekdays, with some runover from Valley of Fire State Park during the winter months.

Historically, visitors who launched motorized vessels at Echo Bay would navigate north to the Overton Arm area of Lake Mead. However, due to the rapidly declining water levels of Lake Mead, the Overton Arm area is less desirable for water-based recreational experiences, and it's been observed that visitation to this part of the lake has decreased, with an increase in visitors navigating south from Echo Bay. To access the Lower Narrows and other more southern parts of Lake Mead, visitors must navigate through a narrow part of the canyon near Ramshead Island. The topography of the narrow canyon causes a chokepoint for motorized vessels, causing congestion that increases with higher levels of use and degrading the visitor experience.

Visitor capacity was previously identified in the 2005 general management plan as 530 boats in the Echo Bay marina. The 2003 lake management plan identified visitor capacity to be 460 boats at one time in this Lake Mead area (zone 17 in the plan).

Identify the Limiting Attribute(s)

Alternative 1

The limiting attributes that most constrain the amounts and types of use at Echo Bay is the topography of the canyon, the quality of visitor experience, and resource protection. The topography in the Ramshead Island area constrains the area's ability to accommodate the concentrated launching of motorized vessels at the ramp while still maintaining desired conditions for sustainable water-based recreation. The quality of visitor experience would be a limiting attribute as NPS staff seek to achieve desired conditions to provide high-quality natural sounds and primitive experience opportunities to enjoy the area and water-based activities. In addition, visitors would have opportunities to experience the natural resources of the area, such as native wildlife and the dark night sky. Resources would be exposed due to water elevation decline, becoming more sensitive to visitor impacts.

Alternative 2

Under alternative 2, the launch ramp at Echo Bay would not be maintained and/or extended, limiting the opportunity for motorized vessel launching at Echo Bay. The limiting attribute is resource protection from visitor use, as these resources are exposed due to water elevation decline. The quality of visitor experience would be a limiting attribute as NPS staff seek to achieve desired conditions to provide high-quality natural sounds and primitive experience opportunities to enjoy the area and water-based activities. In addition, visitors would have opportunities to experience the natural resources in the area such as native wildlife and the dark night sky.

The most relevant indicators to monitor changes in these conditions are the amount of NPS financial increases in dollars spent on the current operations and maintenance of facilities and infrastructure, the number and types of incidents that require a law enforcement response per year, and the number of documented incidents of downgraded archeological site conditions, as recorded in the NPS Cultural Resources Inventory System, due to visitor use impacts, including new visitor-created access points/routes/roads and the evaluation of disturbance to natural and cultural resources.

Visitor Capacity and Implementation Strategies

Alternative 1

Actions under alternative 1 would continue to providing opportunities for water-based activities above 1,000 feet. The National Park Service identified the visitor capacity, with an understanding of the limiting attributes of topography, the quality of visitor experience, and resource protection. The capacity identification assumes an 8-hour launch day, with 4 boats launching per hour in 1 lane, resulting in a visitor capacity of 32 boats launching per day at Echo Bay. The use levels were calculated using a 2.5 person per vessel multiplier, which yields a capacity of 80 people per day at Echo Bay's 1-lane primitive launch ramp. This amount of use allows for the achievement of the desired condition for visitors having primitive experience opportunities to enjoy the area and water-based activities. Since exact use levels are unknown at Echo Bay, this is a reasonable estimate used to identify visitor capacity.

Management Strategies

- Provide educational opportunities and signage that focus on permitted and safe recreational use.
- Add Federal Aids to Navigation (ATON) on the lake to help direct visitors and reduce confusion.

Alternative 2

Under alternative 2, the launch ramp at Echo Bay would not be maintained and/or extended, limiting the opportunity for motorized vessel launching at Echo Bay. The limiting attributes of resource protection and quality of visitor experience were considered to achieve desired conditions. The identified visitor capacity for nonmotorized mixed use is 60 people at one time.

Management Strategies

- Provide educational opportunities and signage that focus on permitted and safe recreational use.
- Consider the area for commercial use authorizations.

Potential Future Management Strategies May Include:

- Consider options for backcountry permits.

ANALYSIS LOCATION: CALLVILLE BAY

Review Existing Direction and Knowledge

Under current conditions and management, visitor services are provided by the Callville Bay marina concessioner, both on land and at the marina. Marina operations provide visitors with opportunities to lease slips and rent houseboats, small boats, pontoons, and personal watercraft. The marina also sells boat fuel. A seasonal café and store at the marina sell food and beverages, while land-side operations include a giftshop and restaurant. The concrete launch ramp is under an indefinite closure since March 2022 and is not in use but continues to provide pedestrian access to the marina. Former operations and relocating the launch and marina are not feasible

with such extreme low water levels. A concessioner-maintained and -operated portable launch ramp, tested for launching and retrieval of vessels up to 40 feet, provides motorized launching opportunities at Callville Bay. Still, fewer motorized launching access opportunities are available at Callville Bay due to vessel size limitations and the portable launch ramp's smaller launch lane.

Recreational use at this location is highest between 6:00 a.m. and 2:00 p.m., with most of the congestion clearing around 11:00 a.m. With limited opportunities to launch motorized and nonmotorized vessels, nonmotorized recreation includes fishing outside of the marina area, hiking, and campground use. All other facilitates are operational, and the launch ramp closed to launching would continue to provide pedestrian access to the marina.

With the nexus of opportunities and support services for visitors, Callville Bay has remained one of the most popular developed areas on Lake Mead. In 2021, traffic counters recorded a total of 80,309 vehicles on Callville Bay Road in May through September, with a monthly average of 16,061 vehicles. Visitation has stayed consistent at Callville Bay; however, the quality of visitor experience has degraded with loss of motorized launching opportunities.

Callville Bay previously had two launch ramps that provided water access for visitors. The upper launch ramp, formally located at the west end of the bay, closed in 2014. The lower launch ramp, located on the south shore of the bay, was repeatedly extended down to an elevation of 1,060 feet. The former launch ramp had four lanes for launching, accommodating up to 200 boats per day, assuming a 15-minute launch time in a 12-hour day.

Visitor capacity was previously identified in the 2005 general management plan as 1,045 boats in the marina. The 2003 lake management plan identified visitor capacity to be 578 boats at one time in this area (zone 12 in the plan).

Identify the Limiting Attribute(s)

Desired conditions for Callville Bay include supporting desert ecosystems and habitats, with special concern for the state listed, critically endangered three-corner milkvetch (*Astragalus geyeri*) population found at Sandy Cove, with the opportunity for restoration of shoreline landscapes; supporting visitor access to the lake with facilities and infrastructure in a sustainable manner and providing access for water-based activities; and protecting and preserving natural resources and cultural resources as much as possible from recreational pressure, including the landscape around the shorelines.

Alternative 1

The limiting attributes that most constrain the amounts and types of use at Callville Bay under alternative 1 when water levels are below approximately 1,065 feet are natural and cultural resources. With new opportunities for motorized vessel launching via a concessioner operated Mobi Mat launch, visitor use and congestion would increase, increasing recreational pressure on the natural and cultural resources of the area, which continue to be exposed as water levels decline. As the limiting attribute, natural and cultural resources constrain the area's ability to accommodate high levels of use while maintaining desired conditions for restoring shoreline landscapes to support desert ecosystems and providing visitors with safe and reliable access to water-based recreation experiences.

Alternative 1 Below 950 Feet and Alternative 2

Quality of visitor experience and resource protection are the limiting attributes that most constrain the amounts of use and types of use at Callville Bay under alternative 1 when water levels are below approximately 950 feet and for alternative 2. The limiting attribute that most constrains the amounts of use is the quality of visitor experience and the protection of resources. The absence of formalized launch ramp extensions and relocations and up-to-date facilities, combined with lower water levels, make the ability to launch motorized and nonmotorized vessels questionable. Providing safe and enjoyable experiences in alignment with desired conditions will be important.

The limiting attribute of resource protection is about resources exposed due to water level decline. Resource protection is important as NPS staff seek to achieve desired conditions to protect and preserve cultural resources while balancing and sustaining recreational enjoyment and exploration, including the landscape around the shoreline. Similarly, for natural resources, desired conditions seek to be enhanced from changes in infrastructure to preserve water quality and aquatic habitats that support aquatic ecosystems.

The most relevant indicators to monitor changes in these conditions are the amount of NPS financial increases in dollars spent on the current operations and maintenance of facilities and infrastructure, the number and types of incidents that require a law enforcement response per year, and the number of documented incidents of downgraded archeological site conditions, as recorded in the NPS Cultural Resources Inventory System, due to visitor use impacts, including new visitor-created access points/routes/roads and the evaluation of disturbance to natural and cultural resources.

Visitor Capacity and Implementation Strategies

Alternative 1

Under alternative 1, extending the launch ramp and marina operations further into the lake provides 4 lanes for motorized vessel launching. Given limiting attributes and desired conditions assuming a 12-hour launch day based on average summer visitation with 4 boats launching in each of the 4 launch lanes per hour, results in a visitor capacity of 190 boats launching per day. The use levels were calculated using a 2.5 people per vessel multiplier, which yields a capacity of 475 people per day at Callville Bay, which would align with resource protection needs in the area.

At water levels above approximately 1,065 feet, the existing concrete launch ramp would resume operations, and the capacity would be the same as below 1,065 feet unless the number of lanes for launching changed, at which point the visitor capacity would need to be reevaluated.

Potential Future Management Strategies May Include:

- Consider expanding the parking lot.
- Consider using a reservation system during peak times with associated staff support to monitor reservations.

Alternative 1 Below 950 Feet and Alternative 2

Considering the limiting attributes, if launch operations were to close when water levels are below 950 feet due to a loss of potable water, no visitor services would be available to support visitor use.

Motorized access would be removed. National Park Service staff identified that the visitor capacity for Callville Bay should be very low-to-no use due to the lack of visitor services and recreation opportunities and to achieve and maintain the desired condition that natural resources and cultural resources would be protected and preserved as much as possible from recreational pressure, including the landscape around the shorelines. As overnight use is evaluated and considered for the future, the visitor capacity for this area would be updated, as needed, upon completion of that evaluation.

Under alternative 2, the launch ramp(s) at Callville Bay would not be maintained and/or extended and no visitor services would be available, limiting the opportunity for motorized vessel launching and recreation at Callville Bay. Considering the limiting attributes of resource protection, NPS staff identified that the visitor capacity for Callville Bay should be low-to-no use based on the lack of visitor services and recreation opportunities and to achieve and maintain the desired condition that natural resources and cultural resources would be protected and preserved as much as possible from recreational pressure, including the landscape around the shorelines. As the longevity of overnight use is reevaluated, given the lack of potable water, visitor capacity for this area would be updated, as needed, upon completion of that evaluation.

Management Strategies

ANALYSIS LOCATION: SOUTH COVE

Review Existing Direction and Knowledge

Under current conditions and management, the South Cove concrete launch ramp is under an indefinite closure, beginning June 17, 2021, and is not in use. An undeveloped launching experience for both motorized and nonmotorized boats is available, at the visitor's own risk, off the primitive, NPS-approved dirt road 0.5 miles south of the built concrete launch ramp, with four-wheel drive highly recommended for visitors who wish to launch from this road. As such, motorized vessel launching mostly consists of small fishing vessels and others such as jet skis.

The indefinite closure of the concrete launch ramp has constrained recreational access and opportunities on the water and has therefore degraded the quality of visitor experience. With limited access to the launch area and undefined parking, the area can accommodate parking for no more than 10 vehicles with trailers. Other types of visitor use at South Cove includes picnicking in a natural setting with scenic viewscapes of a dynamic landscape, and as such, South Cove is known to the public as being a more remote location where nonmotorized use occurs. South Cove has grown popular with visitors coming from Temple Bar to experience the viewshed of the Colorado River.

South Cove previously had one concrete launch ramp that provided water access for visitors, with no additional visitor services.

Visitor capacity was previously identified in the 2003 lake management plan as 100 boats at one time.

Identify the Limiting Attribute(s)

Alternative 1 and 2

The limiting attributes are resource protection from visitor use, as these resources are exposed due to water elevation decline. The quality of visitor experience would be a limiting attribute as NPS staff seek to achieve desired conditions to provide high-quality natural sounds and primitive experience opportunities to enjoy the area and water-based activities. In addition, visitors would have opportunities for primitive experiences and to enjoy the area where the Colorado River meets Lake Mead and embrace the desert in these far stretches. Natural resource desired conditions seek to provide a scenic experience, and natural resources would be protected and preserved as much as possible from recreational pressure, including the landscape around the shorelines.

The most relevant indicators to monitor changes in these conditions are the number and types of incidents that require a law enforcement response per year and the number of documented incidents of downgraded archeological site conditions, as recorded in the NPS Cultural Resources Inventory System, due to visitor use impacts, including new visitor-created access points/routes/roads and the evaluation of disturbance to natural and cultural resources.

Visitor Capacity and Implementation Strategies

The visitor capacity at South Cove does not vary by alternative, given the already primitive nature of the National Park Service-approved road.

Considering the review of existing direction and knowledge and the limiting attributes related to achieving desired conditions for visitors to have a primitive experience with natural resources being preserved from recreational pressure, NPS staff identified visitor capacity as 50 people at one time for mixed visitor use. As overnight use in a primitive setting is evaluated and considered for the future, the visitor capacity for this area could be updated upon completion of that evaluation.

Management Strategies:

- Consider options for backcountry permits.

Potential Future Management Strategies May Include:

- Consider the area for commercial use authorizations.
- Install a gate for temporary closures.

ANALYSIS LOCATION: TEMPLE BAR

Review Existing Direction and Knowledge

Under current conditions and management, the Temple Bar concrete launch ramp is under an indefinite closure, beginning July 7, 2021, and is not in use. A concessioner is providing and maintaining visitor services, including leased slip and watercraft rentals, and a portable launch ramp. Operating and relocating the concrete launch ramp are not feasible with such extreme low water levels. The indefinite closure of the concrete launch ramp has decreased

recreational access and opportunities on the water and has therefore degraded the quality of visitor experience.

Approximately 200 boats remain at the marina and trailer village, with little-to-no nonmotorized recreational use, such as paddleboarding, swimming, or fishing. Though a picnic area and campground are available for visitors to use, the picnic area is rarely used, and the campground has not had any reservations since switching to rec.gov.

Temple Bar previously had one concrete launch ramp that provided water access for visitors, with no additional visitor services.

Visitor capacity was previously identified in the general management plan as 950 boats in the marina. The 2003 lake management plan identified visitor capacity to be 376 boats at one time in this area on Lake Mead.

Identify the Limiting Attribute(s)

Desired conditions for Temple Bar include visitor opportunities for water-based recreational experiences that are safe and enjoyable; natural resources are maintained as a scenic viewshed; and natural and cultural resources are protected and preserved as much as possible from recreational pressure, including the landscape around the shorelines.

The limiting attributes that most constrains the amounts of use and types of use under both alternatives at Temple Bar is the protection of resources from visitor use as these resources are exposed due to water elevation decline, and the quality of visitor experience. With new opportunities for motorized vessel launching, visitor use and congestion would increase, which increases recreational pressure on the natural and cultural resources of the area, which continue to be exposed as water elevations decline. As the limiting attribute, natural and cultural resources constrain the area's ability to accommodate high levels of use while maintaining desired conditions for restoration of shoreline landscapes to support desert ecosystems while providing visitors with safe and reliable access to water-based recreation experiences. The quality of visitor experience, is affected by concentrated use that leads to congestion and longer wait times, exacerbated by lack of available facilities while waiting to launch and extreme temperatures.

The most relevant indicators to monitor changes in these conditions are measure of amount of NPS financial increases in dollars spent on current operations and maintenance of facilities and infrastructure, and number and types of incidents that require a law enforcement response per year.

Visitor Capacity and Implementation Strategies

Alternative 1

Under alternative 1 to achieve desired conditions for visitors to have opportunities for water-based recreational experiences, for natural resources to be maintained as a scenic viewshed, and for natural and cultural resources to be protected and preserved as much as possible from recreational pressure, including the landscape around the shorelines, NPS staff identified visitor capacity as 80 people at one time for mixed recreational use.

Management Strategies:

- Promote visitor opportunities to embrace the desert landscape.
- Consider options for backcountry permits.

Potential Future Management Strategies May Include:

- Consider the area for commercial use authorizations.

Alternative 2

Under alternative 2, the closure of the existing launch ramp and concession services would be maintained, with no future launch ramp extensions or relocations. To achieve desired conditions for visitors to have opportunities for water-based recreational experiences, for natural resources to be maintained as a scenic viewshed, and for natural and cultural resources to be protected and preserved as much as possible from recreational pressure, including the landscape around the shorelines, NPS staff identified visitor capacity as 80 people at one time for mixed recreational use.

Potential Future Management Strategies:

- Install a pipe gate for permanent closure, as needed.
- Increase the law enforcement presence in this area.

APPENDIX C:

Relationship to Other Planning Efforts

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APPENDIX C: RELATIONSHIP TO OTHER PLANNING EFFORTS

GENERAL MANAGEMENT PLAN AND FINAL ENVIRONMENTAL IMPACT STATEMENT (1986)

The 1986 Lake Mead General Management Plan (GMP)/Final Environmental Impact Statement provided the overall management direction for the recreation area. The 1986 general management plan emphasized the long-term protection of park resources while accommodating increasing visitor use. It allowed for increasing use through a combination of providing new developed areas, improved access points, and acceptable levels of expansion in existing developed areas. The 1986 general management plan established land-based management zones and strategies for meeting the goals and general purposes of the recreation area, which are carried forward in this plan.

LAKE MANAGEMENT PLAN AND FINAL ENVIRONMENTAL IMPACT STATEMENT (2003)

The Lake Mead National Recreation Area Lake Management Plan and Final Environmental Impact Statement tiered from the 1986 Lake Mead General Management Plan/Final Environmental Impact Statement. The plan provided additional and more specific guidance for the long-term management of Lakes Mead and Mohave, the associated shoreline, and the development areas within Lake Mead National Recreation Area to ensure the protection of park resources while allowing a range of recreational opportunities. The 2003 Lake Mead Lake Management Plan/Final Environmental Impact Statement provided for an increase in boating capacity targeted at areas where growth can be accommodated within the physical, environmental, and social carrying capacity of the lakes. It identified facility improvements, capacities, locations, and expansions for the developments that control access on Lake Mead, with facility development based on the lake's carrying capacity. The 2003 Lake Mead Lake Management Plan/Final Environmental Impact Statement called for the continued operation of the six existing marinas on Lake Mead, with authorized expansion of facilities at Callville Bay, Echo Bay, Overton Beach, and Temple Bar. The plan/EIS also identified the continued operation of the nine existing public launch ramps and approved the addition of another public boat ramp at Stewarts Point.

GENERAL MANAGEMENT PLAN AMENDMENT/ENVIRONMENTAL ASSESSMENT (2005)

The 2005 GMP amendment/EA assessment included decisions regarding the suitability of the continued use of existing marinas, launch ramps, and other visitor facilities and identifies the steps necessary for the continued operation to include the relocation of launch ramps and, where necessary, marinas and associated utilities at lake access sites. Although elements of the 2005 Lake Mead GMP Amendment/Environmental Assessment are still valid, that plan—like the 1986 Lake Mead General Management Plan/Final Environmental Impact Statement and the 2003 Lake Mead Lake Management Plan/Final Environmental Impact Statement—did not foresee the continued drop and fluctuations in lake levels and current and predicted drought. Once the lake level drops below 1,050 feet, none of the 2005 Lake Mead GMP Amendment/Environmental

Assessment will be applicable. The 2005 GMP amendment/environmental assessment included launch ramps and landings to be extended at Hemenway Harbor, Lake Mead Marina, Temple Bar, and Echo Bay at their existing locations and for new launch ramps at lower lake levels at Callville Bay, South Cove, Echo Bay, and Government Wash near the existing ramps. A new ramp at Stewarts Point was proposed to maintain capacity lost at Overton Beach due to low water ramp closure. The plan/EA included closure of the Overton Beach marina in anticipation of lower lake levels and expansion of boating capacity and marina services at Echo Bay. In addition, part of the Lake Mead marina was to be moved to Hemenway Harbor. (All of the marina was subsequently moved after the 2005 Lake Mead GMP Amendment/Environmental Assessment was completed.) Backcountry roads were proposed to be extended to maintain access to the lake shoreline.

FOUNDATION DOCUMENT (2015)

The 2015 foundation document stated the purpose of Lake Mead National Recreation Area is to provide diverse public recreation, benefit, and use on Lakes Mead and Mohave and surrounding lands in a manner that preserves the ecological, geological, cultural, historical, scenic, scientific, and wilderness resources of the park. The foundation document identified the need to plan for lowering and fluctuating lake levels and the impact on resources, concessions, and gateway communities.

GENERAL MANAGEMENT PLAN AMENDMENT/LOW WATER PLAN/ENVIRONMENTAL ASSESSMENT (2018)

The 2018 Lake Mead National Recreation Area General Management Plan Amendment/Low Water Plan/Environmental Assessment and subsequent 2019 finding of no significant impact covered four major areas of the lake where NPS visitor shoreline facilities were threatened by low water at Hemenway Harbor, Callville Bay, Echo Bay, and Temple Bar. The 2018 GMP amendment provided a long-term strategy for addressing operational needs to maintain lake access and provide safe and diverse recreational opportunities at lake elevations above 950 feet. The amendment included reconfiguring existing marina operations and launch ramps to extend farther into the lake, as site conditions allow, at or near their existing locations on the lake. The amendment provided compliance for keeping current marina capacity, maintained with associated roads, parking, and utilities spread across those locations.

RAPID ASSESSMENT AND RESPONSE (2021)

The 2021 Rapid Assessment and Response focused on the selected alternative from the 2018 GMP amendment to respond to the rapidly declining water levels for near-term planning to support decision making related to adapting affected operations for fiscal year 2023. The process is used to address dynamic events when there is an urgent need to evaluate how to respond and to make decisions quickly while considering a full range of critical factors. The rapid assessment and response report provided analysis to address near-term needs with current planning and compliance. The rapid assessment and response used a value-based and cost benefit analysis decision-making process to inform decision making related to priorities for investments in the sustainable low water access plan focusing on near-term needs through fiscal year (FY) 2023. The value analysis (VA) of the rapid assessment and response report focused on the selected alternative illustrated in the 2018 GMP amendment and selected actions and prioritized the sites

based on an evaluation of the advantages compared with estimated costs for FY 2022 and FY 2023, resulting in the following priority order: Hemenway Harbor, Echo Bay, Callville Bay, South Cove, and Temple Bar. The National Park Service used the outcomes of this internal process to inform this plan/EA. The VA process considered as part of this process also aligned with desired conditions for visitor use and resource protection, including maintaining or improving the condition of natural and cultural resources; enhancing visitor enjoyment of the park through better service and recreational opportunities; protecting health, safety, and welfare of all NPS staff, volunteers, and visitors; improving the efficiency and sustainability of park operations and maintenance; and supporting park partners, concession operations, and communities in the surrounding region. These recommendations identified the steps necessary for the continued operation of marinas, boat launches, and other visitor facilities to complete relocation, including the necessary utilities and infrastructure extensions. The VA process prioritized the sites based on an evaluation of the primary factors and related advantages compared with estimated costs.

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APPENDIX D:

Mitigation Measures and Best Management Practices

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APPENDIX D: MITIGATION MEASURES AND BEST MANAGEMENT PRACTICES

CULTURAL RESOURCES

The National Park Service (NPS) would apply best management practices according to NPS 2006 Management Policies, specifically with reference to 5.3.1 – Protection and Preservation of Cultural Resources; 5.3.1.6 Visitor Carrying Capacity; 5.3.4 Stewardship of Human Remains and Burials; and 5.3.5.1 Archaeological Resources, and other sections that would apply.

- Prior to any construction (e.g., extension or relocation of a launch ramp), the National Park Service would conduct cultural resource surveys to mitigate potential impacts on resources. These surveys include the following:
    - terrestrial archeological survey of new areas such as roads and parking lots
    - submerged resources survey (e.g., plane, railroad)
- Prior to any demolition of any contributing building or structure in the Echo Bay or Temple Bar historic districts, the National Park Service would consult with the State Historic Preservation Office to develop appropriate mitigation. Examples of potential mitigation measures include but are not limited to the following:
    - Document the affected buildings or structures to appropriate Historic American Building Survey standards.
    - Create and make publicly available a park web page devoted to the history of the affected historic district.
    - Revise the National Register of Historic Places nomination form for the affected historic district to address changes resulting from the demolition of the district's contributing features.
- In addition to consulting with the State Historic Preservation Office to develop mitigation, a survey for archeological resources in the general vicinity of the affected property would be designed and conducted prior to the demolition of any national register-listed or -eligible building or structure. This survey would be completed in consultation with the appropriate State Historic Preservation Office and, as necessary, Native American Tribes traditionally associated with park lands. The documentation of any important cultural remains would be completed prior to demolition to ensure that important archeological data that otherwise would be lost is recovered and documented.
- Ground-disturbing activities associated with construction, such as clearing, trenching, and grading, have the potential to damage or destroy archaeological resources that may be present on or below the ground surface, particularly in areas that have not previously been developed. Archeological surveys would precede ground-disturbing activities, and national register-eligible or listed archeological resources would be avoided during construction activities. If significant archeological resources were discovered during construction, all work in the immediate vicinity of the discovery would be halted until the

resources could be identified and documented and, if the resources cannot be preserved *in situ*, an appropriate mitigation strategy developed in consultation with the State Historic Preservation Office and as necessary, Native American Tribes.

NATURAL RESOURCES

The National Park Service would apply best management practices according to NPS *2006 Management Policies 2006*, specifically with reference to 4.4.2 – Management of Native Plants and Animals; 4.4.2.3 – Management of Threatened or Endangered Species; and 4.4.4 – Management of Exotic Species, and other sections that would apply. For the purposes of the plan's scope, implementation of the following mitigation measures or best management practices will help to avoid or minimize impacts on threatened, endangered, proposed, and candidate species.

Given the number of projects that the NPS staff must manage, there is a steady, ongoing dialogue between the National Park Service and the relevant US Fish and Wildlife Service field offices, which has considerably aided in developing the conservation measures described in this document. The US Fish and Wildlife Service field office staff are aware that NPS staff will undertake actions described in the conservation measures here (e.g., relocation of tortoises) and do not require that NPS staff make contact before taking conservation measures. The following actions are possible conservation measures NPS staff could take to minimize impacts on resources:

- Natural resources will be protected and preserved as much as possible from recreational pressure due to lack of boat launch areas, including the landscape around the shorelines and opportunities for restoration of shoreline landscapes to support desert ecosystems and habitats.
- Natural resources will be enhanced by reductions in infrastructure, including terrestrial or upland resources, as well as water quality and aquatic habitats supporting aquatic ecosystems.
- Natural resources will benefit from visitors' increased knowledge and stewardship and preserved as much as possible from recreational pressure, including the landscape around the shorelines.
- Facilities and infrastructure will be designed to support visitor access to the lake and land-based recreation activities in a sustainable manner and efforts to size them efficiently to address visitor needs, as well as to a level that is maintainable (e.g., restrooms, marinas), which supports resource protection.

Mitigation Measures or Best Management Practices to Protect Special Status Species and Habitats in General

- Implementing the following conservation measures or best management practices will help avoid or minimize impacts on threatened, endangered, proposed, and candidate species. Several of these conservation measures are drawn from the biological opinion issued by the US Fish and Wildlife Service on May 27, 2005 (USFWS 2005) in response to the actions proposed as part of the Lake Mead National Recreation Area General Management Plan Amendment/Environmental Assessment (NPS 2005).

- All marinas will operate under "Lake Mead NRA Best Management Practices, Watercraft and Marina Operations and Dry Boat Storage and Boat Repair Services" or subsequent revised versions of the existing document. This document provides for management that reduces the risk of toxic spills into the lakes by fueling or other marina operations.

- Educate and inform staff about the potential for special status species in or near the project area. Work will cease if a special status species is discovered in the project area, until NPS staff reevaluates the project. Protective measures, including the potential modification of the work or the work schedule, could be determined necessary.

- Ensure that all mitigations/conservation measures determined through Endangered Species Act Section 7 consultation with the US Fish and Wildlife Service are followed.

- The National Park Service requires that both contractors and concessioners practice refuse management (food, trash, and litter control). Refuse management is monitored by a park-authorized biologist and mitigated when infractions are observed and/or reported. The purpose of the program is to reduce the attractiveness of the area to opportunistic and subsidized predators such as desert kit foxes, coyotes, badgers, and common ravens. Trash and food items would be disposed of properly in wind and predator-proof containers with resealing lids. Trash containers would be emptied, and construction waste would be removed daily from the project area and disposed of in an approved landfill, recycling, or compost facility.

- In circumstances when it is deemed necessary to conduct activities near sites known to support threatened or endangered species, such work will be performed in a manner that is specified by the park biologist to minimize impacts on the listed species (e.g., working quietly on-site or minimizing time in or near habitats while en route to work sites).

- Should it be necessary to perform herbicide applications, to the extent possible, conformity to best management practices for wildlife will be followed. This includes following safety data sheets and label instructions and avoiding sensitive times/areas for wildlife (e.g., aquatic plant and animal species, bird nesting and foraging, bloom periods for pollinators).

- Fencing, if needed (including temporary fencing for construction projects and permanent fencing), will comply with wildlife-friendly fencing standards. Consult with the park biologist for assistance with specifications and appropriate design.

- All wildlife-vehicle collisions must be reported to Lake Mead dispatch as soon as possible (24-hour center).

    - Non-emergency: (702) 293-8998

    - Emergency: (702) 293-8932

Mitigation Measures or Best Management Practices To Control for Sedimentation and Erosion and Loss of Soil Structure

- Identify staging areas in advance of project implementation that will minimize soil compaction, road access, and project site access.

- Use existing roads. Cross-country travel or initiation of new roads may require additional compliance to be completed before this activity would be authorized.
- Route alignments for any planned construction to avoid specific areas known to be occupied by sensitive species and known habitat features of sensitive species such as burrows or nests.
- Minimize upland soil compaction during construction activities by selecting the location and timing of the access to minimize compaction (i.e., avoid periods when soil is wet, especially clay and silt soils).
- Use existing stream crossings for equipment access during construction activities.
- Minimize soil and vegetation disturbance during construction activities; avoid total removal of vegetation to allow regrowth by only removing targeted species and leaving the native herbaceous layer as undisturbed as possible.
- Leave adequate vegetation buffer and install silt fences and/or silt curtains along down slope edge of project area to prevent disturbed ground sediment runoff from entering aquatic habitats. Use the proper placement for fencing, adequate amounts of fencing, and the appropriate materials for the most effective use.
- Schedule construction activities to reduce spread of nonnative plants by implementing the activities during the dormant season.

Mitigation Measures or Best Management Practices related to the Razorback Sucker

- Depending on lake levels, razorback sucker (*Xyrauchen texanus*) spawning areas may be at a different location from those spawning areas known in the past. Reevaluating where best management practices are implemented and where construction efforts are initiated may need to occur.
- The placement of silt curtains is required for razorback sucker.
- The Echo Bay razorback spawning occurs between December 1 and May 1. To protect this species and the spawning habitat from disturbance, it is recommended to limit construction at this site from May through November. Alternatively, NPS divers could survey the area before scheduled construction begins.
- Razorback sucker surveys will continue at the known congregation areas in Lake Mead.
- Boat use during the spawning period in coves identified as native fish spawning areas will be monitored. If boat use increases dramatically or if fish monitoring biologists recommend action, closures of the coves to boat use during the period will be implemented.

Mitigation Measures or Best Management Practices related to the Desert Tortoise

- For protection of the desert tortoise (*Gopherus agassizii*), construction personnel would be informed of the occurrence and status of the desert tortoise and would be advised of the potential impacts on desert tortoises and potential penalties for taking a threatened

species. Following the training of project staff, each trained individual would sign a completion sheet to be placed on file with NPS staff.

- National Park Service staff require that the contractor must have a park-approved biologist on site to monitor for desert tortoises. If there is not an approved biologist on the project site, the contractor must contact NPS staff to have the desert tortoise removed unless there is imminent danger at the project site.
- Qualified and authorized biologists would be employed to monitor all activities. An individual will be designated the field contact representative to oversee project compliance and coordination.
- The project area would be surveyed by a qualified biologist for desert tortoises and their burrows and dens, immediately prior (within 24 hours) to the onset of construction in any given area. The results of the surveys would be to remove all desert tortoises currently on the project site and identify all burrows that may be avoided during construction. All desert tortoise surveys, handling of desert tortoises, and burrow excavation would be performed by a qualified or authorized biologist.
- If a desert tortoise is found within the project area, all work in the site must cease until the desert tortoise moves outside the project area or is relocated outside the project by an authorized biologist. Tortoises manually relocated will be placed in the direction they were heading to minimize the possibility that the desert tortoise will reenter the project site.
- For the protection of the desert tortoise, the clearing limits (construction limits) would be clearly marked or flagged prior to construction. All construction activities, including staging areas, would be located within previously disturbed areas and fenced if necessary. Construction sites would be surveyed for desert tortoise presence, including burrows, prior to use.
- Desert tortoise burrows found within the project area would be avoided if possible. They would be protected with desert tortoise-proof fence, placed at a minimum of 20 feet from the burrow on sides bordered by construction, to prevent crushing of underground portions of the burrow. The fencing would remain in place until construction in the vicinity was completed. The placement, inspection, and removal of fencing would occur under the direction of a qualified biologist. Burrows found in line with planned work that could not be avoided without redesigning the project would be excavated by hand. If the burrows are occupied, the tortoises would then be relocated in reconstructed burrows outside of the project footprint.
- Desert tortoise burrows found within the project area that could not be avoided during construction would be excavated by hand to determine if the burrows were occupied and to remove any desert tortoises present. All desert tortoises found within the project area, whether above ground or in excavated burrows, would be placed 300 to 1,000 feet outside the clearing limits in the direction of undisturbed habitat. The handling and placement of desert tortoises would be performed in accordance with procedures identified in consultation with the National Park Service (e.g., placed in the direction a given tortoise was already heading). National Park Service biologists, in consultation with the US Fish

and Wildlife Service, would be consulted before determining the best time of year for excavating burrows and relocating desert tortoises.

- The contractor would protect against intrusion by the desert tortoise at sites with potential hazards (e.g., auger holes, steep-sided depressions). No holes with the potential to trap or kill wildlife would remain. A biologist who is authorized by the National Park Service would ensure that any hole left behind during work would be covered or that a wildlife escape ramp exists. Those holes that are very deep would be backfilled.
- A litter control program would be implemented during construction to eliminate the accumulation of trash and to avoid attracting common ravens that may prey on juvenile desert tortoise. Trash would be removed to trash containers following the close of each workday and disposed outside of park lands in a sanitary landfill at the end of each workweek.
- Areas disturbed by construction would be revegetated, and surface reclamation of the disturbed areas would be performed to advance recovery of the habitat.

Mitigation Measures or Best Management Practices related to Migratory Birds

To best meet its agency obligations to protect these species under these acts, the National Park Service would incorporate guidance from the US Fish and Wildlife Service's Nationwide Standard Conservation Measures to reduce impacts on birds and their habitats during project implementation (USFWS and NPS 2015), US Fish and Wildlife Service Director's Order 224 (2021), and additional National Park Service-developed measures (FWS-NPS Memorandum of Understanding, signed 2010). These measures include, but are not limited to the following:

- Surveys would be timed to maximize potential to detect nesting migratory birds and should be repeated within five days of the start of project-related activity.
- The project would be implemented over the shortest time frame feasible.
- To the extent feasible, if necessary, tree disturbance or felling would be conducted outside the nesting season (all birds: February 1–August 1; raptors: February 1–August 1).
- If tree felling is to occur during this time, nesting surveys would be conducted before any activity occurring within 500 feet of suitable nesting habitat.
- A minimum 500-foot buffer would be implemented around any active special-status species nest.
- If an active bird nest of other bird species is found, an appropriate no-disturbance buffer would be determined by a National Park Service-authorized biologist based on site-specific conditions, the species of nesting bird, nature of the project activity, noise level of the project activity, visibility of the disturbance from the nest site, and other relevant circumstances.
- If establishing a buffer zone is not feasible, the US Fish and Wildlife Service would be contacted for guidance to minimize impacts on migratory birds associated with the proposed project.

APPENDIX E:

Public Involvement

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APPENDIX E: PUBLIC INVOLVEMENT

As part of the planning effort, the National Park Service initiated public scoping to seek feedback from the public during the National Environmental Policy Act (NEPA) initiation phase of the project. As part of public scoping, NPS staff developed a public web page to share progress on the plan and seek feedback through the NPS Planning, Environment, and Public Comment (PEPC) website at https://parkplanning.nps.gov/projectHome.cfm?projectID=111766.

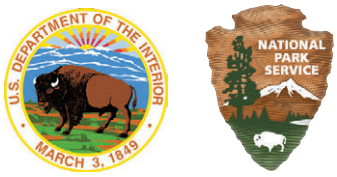
National Park Service staff released a newsletter in November 2022 providing background on the plan/EA, its purpose, and a summary of management concepts. The newsletter was published on the PEPC website at https://parkplanning.nps.gov/document.cfm?documentID=124787. The newsletter solicited comments and participation from the public pertaining to the plan/EA.

With the release of the newsletter, the National Park Service held a public comment period that began on November 14, 2022. The comment period was originally scheduled to end on December 23, 2022, but was extended to January 22, 2023, following requests from the public. The National Park Service held four public meetings during this period. Three meetings were hosted in person, and one was held virtually. Dates, locations, and times of the public meetings follow:

- Meadview, Arizona
    - Meadview Civic Association Building, 247 East Meadview Boulevard
    - Tuesday, December 6, 2022
    - 5:00 p.m. – 7:00 p.m. MST
- Boulder City, Nevada
    - Bureau of Reclamation Conference and Training Center, 500 Date Street, Building 100
    - Wednesday, December 7, 2022
    - 12:00 p.m. – 2:00 p.m. PST
- Kingman, Arizona
    - Kingman Office of Tourism, 120 West Andy Devine Avenue
    - Thursday, December 8, 2022
    - 5:00 p.m. – 7:00 p.m. MST
- Virtual meeting
    - Wednesday, December 14, 2022
    - 4:00 p.m. – 6:00 p.m. PST

All comments received (entered into PEPC by the public, e-mails sent to NPS staff, and written comments mailed to the park headquarters) were considered and included in the overall project record and are summarized here. A total of 1,049 pieces of correspondence were received during the public comment period.

This public scoping comment summary report summarizes the concerns expressed during the public comment period. The report first discusses comments related to general topics of interest, then addresses comments related to the proposed management concepts presented in the newsletter. Common topics included visitor experience, socioeconomics, and the management of marinas and associated concessions, launch ramps, and landing sites. The full comment summary report can be found on PEPC at https://parkplanning.nps.gov/document.cfm?parkID=317&projectID=111766&documentID=128019.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historic places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

LAKE 602/189663
July 2023

Lake Mead National Recreation Area

SUSTAINABLE LOW WATER ACCESS PLAN / ENVIRONMENTAL ASSESSMENT

JULY 2023