

The conclusions of this biological opinion are based on full implementation of the project as presented in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined (50 CFR § 17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. “Harass” is defined (50 CFR § 17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. “Incidental take” is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the NPS so that they become binding conditions of any grant or permit issued to the contractor, as appropriate, for the exemption in section 7(o)(2) to apply. The NPS has a continuing duty to regulate the activity covered by this incidental take statement. If NPS (1) fails to assume and implement the terms and conditions or (2) fails to require the contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, NPS must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

The decision that adopts this proposed framework also includes decisions authorizing actions that will not be subject to further section 7 consultation and are reasonably certain to result in incidental take of razorback suckers. We have provided an incidental take statement for actions outlined in the NPS amended LMP that are reasonably certain to result in take.

AMOUNT OR EXTENT OF TAKE

Razorback sucker

The Service believes there is a potential for the take of individual razorback suckers from the implementation of the proposed action. This take would be in the form of harassment, harm, and possibly, killing of individuals.

The harassment and harm come from the recreational use of shorelines used by razorback for spawning and nursery areas as described in the Effects of the Action section of the biological opinion. The existence of the 100-foot no wake zone around the shoreline of the lakes, and the timing of highest recreational use during the period when fish are not heavily utilizing the shallows for breeding does reduce the risk somewhat.

Las Vegas Bay and Echo Bay are in immediate proximity to known spawning areas for the razorback in Lake Mead. Potential mortality, especially for razorback sucker due to the close proximity of spawning areas to marinas, could occur from spills or chronic releases of toxic materials (petroleum products) at existing marinas. Dispersal of petroleum products into heavily used portions of the lakes by outboard motors, personal watercraft and illegal refueling activities also poses a risk to individual fish in the area of the boating activity. As described earlier, known razorback sucker habitats are in proximity to several high use areas, including areas where the proposed action would increase recreational use through additional facilities.

The Service anticipates that any incidental take of razorback sucker from the risk factors discussed above and in the Effects of the Action section of the biological opinion will be difficult to detect under normal circumstances. Take from anglers may or may not be reported. Unless there is a catastrophic spill of toxic materials, finding a dead or impaired individual is highly unlikely, especially in the case of affected eggs or newly hatched larvae or fry being affected. At the current levels of toxic pollution being introduced, mortality or impairment has not been observed; however, no monitoring program exists to document this conclusion. Efforts to control the introduction of pollutants included in the proposed action may, over the long-term, reduce some of these risks. Monitoring of pollutants included in the proposed action may determine if problems exist, and future consultation may be needed if effects are documented.

For Lake Mead, the razorback population is estimated at approximately 500 individuals. Those individuals are seasonally concentrated near Las Vegas Bay and Echo Bay. Protective measures will be in place to reduce boat traffic in sensitive areas during the spawning season. Because the population is so small and finding affected individuals very difficult, the incidental take level is provided both in terms of a number of razorbacks and a surrogate measure based on total number of fish killed or injured based on a pollution event. The level of incidental take provides for an annual loss of one razorback to activities covered under the LMP. Consistent with the 2002 and 2005 BOs, for pollution related incidents that affect areas known to be frequented by razorbacks, if a fish kill involving more than 100 individuals of all fish species occurs, the level of incidental take will be exceeded. If razorback suckers are found among the dead or injured fish, the incidental take will be exceeded if more than one razorback is found. Additionally, for all other actions summarized as part of this action, should there be a reduction of the razorback sucker population by 5% as estimated by annual surveys then incidental take will be exceeded. This additional take parameter is added because there is new technologies in survey and greater effort to monitor this population, compared to efforts in 2005.

EFFECT OF THE TAKE

In this biological opinion, the Service determines that this level of anticipated take is not likely to result in jeopardy to razorback suckers for the reasons stated in the Conclusions section.

REASONABLE AND PRUDENT MEASURES AND IMPLEMENTING TERMS AND CONDITIONS

We determine that the 2002 and 2005 BOs in conjunction with the proposed amended action incorporates sufficient measures that reasonably and prudently minimize the effects of incidental take of razorback sucker. All reasonable measures to minimize take have been incorporated into the project description. Thus, no Reasonable and Prudent Measures, nor additional Terms and Conditions, are included in this incidental take statement.

If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the Reasonable and Prudent Measures provided. The NPS must immediately report and provide an explanation of the causes of the taking and review with the AESO the need for possible modification of this BO.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the Service's Law Enforcement Office, 4901 Paseo del Norte NE, Suite D, Albuquerque, NM 87113; 505-248-7889) and the Arizona Ecological Services Field Office within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that your agency coordinates all projects activities and resulting monitoring with the Native Fish Work Group and LCR MSCP.

2. Please consider contacting our office to design and implement further educational information that will be placed created as part of your conservation measures.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation for the Lake Mead LMP amendment project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Certain project activities may also affect species protected under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. sec. 703-712) and/or bald and golden eagles protected under the Bald and Golden Eagle Protection Act (Eagle Act). The MBTA prohibits the intentional taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by the Service. The Eagle Act prohibits anyone, without a Service permit, from taking (including disturbing) eagles, and including their parts, nests, or eggs. If you think migratory birds and/or eagles will be affected by this project, we recommend seeking our Technical Assistance to identify available conservation measures that you may be able to incorporate into your project.

For more information regarding the MBTA and Eagle Act, please visit the following websites. More information on the MBTA and available permits can be retrieved from [Service Migratory Bird Program web page](#) and [Service Permits Application Forms](#). For information on protections for bald eagles, please refer to the Service's National Bald Eagle Management Guidelines (72 FR 31156) and regulatory definition of the term "disturb" (72 FR 31132) published in the Federal Register on June 5, 2007, as well as the Conservation Assessment and Strategy for the Bald Eagle in Arizona ([Southwestern Bald Eagle Management Committee website](#)).

In keeping with our trust responsibilities to American Indian Tribes, we encourage you to continue to coordinate with the Bureau of Indian Affairs in the implementation of this consultation and, by copy of this biological opinion, are notifying the following Tribes of its completion; Chemehuevi Tribe, Colorado River Indian Tribes, Fort Mojave Tribe, Hopi Tribe, and Hualapai Tribe. We also encourage you to coordinate the review of this project with the Arizona Game and Fish Department.

We appreciate the Lake Mead National Park Service's efforts to identify and minimize effects to listed species from this project. Please refer to the consultation numbers, 02-21-01F-0263-R and 1-5-05-F-417-R in future correspondence concerning this project. Should you require further assistance or if you have any questions, please contact Jessica Gwinn or the Arizona Ecological Services' Field Supervisor (602) 242-0210.

cc: Matthew Leivas, Director, Chemehuevi Cultural Resources Center, Havasu Lake, CA
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Attachment 7:

- NHPA Compliance Letter



Letter of Compliance Completion

To: Justin Pattison

From: Sarah Creachbaum, Acting Superintendent

Subject: NEPA and NHPA Clearance: Extend Launch Ramps at Hemenway Harbor, Callville Bay, Temple Bar, and Echo Bay (Pipe mat temporary extensions and Concrete Construction)

NEPA and NHPA Compliance Complete. For complete compliance information see PEPC Project 52509 and 2005 Lake Mead GMP Amendment/Low Water Plan EA/FONSI.

The Superintendent and Interdisciplinary team have reviewed the scope of work and supporting documentation provided in the Planning, Environment, and Public Comment (PEPC) system, and all applicable associated compliance documentation and consultation (e.g. National Environmental Policy Act, National Historic Preservation Act, Endangered Species Act, Clean Water Act, Clean Air Act, Wilderness Act, Tribal consultation under EO13175, and other related laws and policies).

The Section 106 component of compliance has been completed under the 2008 Programmatic Agreement Eligible Undertaking 2. Rehabilitation and/or minor relocation of existing trails, walks, paths, and sidewalk. The boat launch ramps are not contributing structures to the historic districts of Echo Bay, Callville Bay, Hemenway Harbor, or Temple Bar. Previously conducted survey (CRP 14-048, CRP16-029, and CRP 21-010) in and around the Area of Proposed Effect (APE) did not locate any archeological sites. Additionally, underwater surveys were conducted using dive teams and side-scan sonar in April 2021 to confirm previous underwater surveys which also did not detect any presence of archaeological or cultural sites in the APE.

All NEPA and ESA requirements are covered in the Lake Mead N.R.A 2005 General Management Plan Amendment/Low Water Plan EA/FONSI (2005). Project plans and specifications are approved, project funds may be released, and construction and/or project implementation can commence with the following mitigations and conditions/stipulations. The subject proposed project, therefore, is now cleared for all compliance requirements.

Required Mitigations - For the proposed project actions to be within compliance requirements during construction and/or project implementation, applicable mitigations can be found in the respective NEPA, NHPA, and ESA documents and must be adhered to. Archaeological monitoring will be conducted as cultural resources not yet identified may be affected during any ground disturbing activities.



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Attachment 8:

- P26 FEIS Executive Summary



— BUREAU OF —
RECLAMATION

Final Environmental Impact Statement

Post-2026 Operational
Guidelines and
Strategies for Lake
Powell and Lake Mead

Executive Summary

July 2026
U.S. Department of the Interior
Bureau of Reclamation
Upper and Lower Colorado Basins
Interior Regions 7 and 8





— BUREAU OF —
RECLAMATION

Mission Statements

The **Department of the Interior** protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the **Bureau of Reclamation** is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Executive Summary

ES.1 Background

The Colorado River Basin (Basin) provides essential water supplies to approximately 40 million people, nearly 5.5 million acres of agricultural lands, and habitat for ecological resources across seven states which includes broad areas in the Southwestern United States (U.S.) and Northwestern United Mexican States (Mexico) (**Map ES-1**). Prudent management of the Basin is critically important because the Colorado River is the foundation for diverse resources across a large geographic region and faces exceptional challenges from prolonged drought and future uncertainty. States, tribes, and Mexico rely on the Colorado River to support essential municipal, agricultural, environmental, cultural, and hydropower needs. These resources are now at significant risk: since the onset of the current drought in 2000, the Basin's primary reservoirs, Lake Powell and Lake Mead, have fallen to historically low elevations. Several of the major reservoir- and water-management documents and agreements developed to guide Colorado River operations through the persistently dry conditions expire in 2026, including the [2007 Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead](#) (2007 Interim Guidelines; Reclamation 2007), the [2019 Colorado River Drought Contingency Plans](#) (Reclamation 2019), and key international agreements between the U.S. and Mexico. Despite the significance of these agreements, actions taken over the past two decades have not been sufficiently robust to prevent continued decline of the reservoirs through the prolonged drought.

The Secretary of the Interior (Secretary), acting through the Bureau of Reclamation (Reclamation), proposes adoption of new guidelines and coordinated management strategies to address Lake Powell and Lake Mead through their full operating ranges to take effect when the current agreements expire in 2026. Management strategies will primarily focus on the operation of Glen Canyon Dam and Hoover Dam but may include actions upstream and downstream of these facilities to protect critical reservoir elevations, such as releases from the Colorado River Storage Project (CRSP) Upper Initial Units to increase the elevation at Lake Powell, and approaches to enhance opportunities for Lower Colorado River Basin (Lower Basin) water users to reduce water use (see **Map ES-1**).

This Final Environmental Impact Statement (EIS) has been prepared to inform the Secretary's timely adoption of a new set of objective guidelines that improve predictability to all water users and managers in the Basin. Developing new guidelines is difficult in this complex Basin, where critically low storage in Lake Powell and Lake Mead, significant hydrologic variability, and the anticipation of drier future conditions amplify the central tradeoff: balancing the potentially profound impacts of water-delivery reductions with the need to maintain reservoir storage. The alternatives in this Final EIS capture a broad range of management strategies to address this tradeoff, and they demonstrate that there are multiple ways to find a balance if conditions improve. If conditions do not improve, achieving a balance is more difficult, and, under critically dry futures, even large and unprecedented reductions may be needed and may not be enough to stabilize storage.



— BUREAU OF —
RECLAMATION

Map ES-1 Colorado River Basin

Source: National Weather Service GIS 2023, Reclamation GIS 2025, USGS National Hydrography Dataset GIS 2023; Map production: U.S. Department of the Interior, Bureau of Reclamation, Upper and Lower Colorado Basin Regions; Date: June 30, 2026. Disclaimer: This map is intended for informational purposes only. Geographic features may have been compiled at varying scales and for different purposes. No representation is made as to the accuracy of this graphic.



- Major dam
- ★ Lee Ferry Compact Point
- ▲ Lees Ferry Gaging Station
- Colorado River
- Major Colorado River tributary
- Colorado River Basin, Upper and Lower Basins

States in the Colorado River Basin (Wyoming, Colorado, Utah, and New Mexico are Upper Division states, and Arizona, California, and Nevada are Lower Division states)

Consistent with the Department of the Interior's (Department) longstanding preference for consensus-based management of the Colorado River System, the Department and Reclamation engaged extensively with the Basin States,¹ Basin Tribes,² and other interested parties during development of successor operating guidelines over the course of 4 years. However, despite those efforts, the Basin States did not reach consensus on long-term guidelines prior to the completion of this EIS. Accordingly, rather than adopting long-term operating guidelines of the same duration as the 2007 Interim Guidelines, the Secretary proposes in the Preferred Alternative to adopt an operational strategy consisting of an adaptive decision framework to develop operating guidelines for Lake Powell and Lake Mead for operating years 2027 through 2036. This framework provides for more robust operational provisions than the current guidelines while preserving the flexibility to respond to changing hydrologic conditions and to incorporate future consensus recommendations, should they be reached.

Reclamation, as the agency designated to act on the Secretary's behalf with respect to operation of Glen Canyon Dam and Hoover Dam and managing the mainstream waters of the lower Colorado River in accordance with federal law, is the lead federal agency for the purposes of compliance pursuant to the National Environmental Policy Act of 1969 (NEPA), as amended, for the development and implementation of the proposed interim guidelines. Five federal agencies are cooperating for purposes of assisting with environmental analysis and preparation of this EIS. The cooperating agencies are the Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service, U.S. Section of the International Boundary and Water Commission (IBWC), and Western Area Power Administration. The Final EIS is organized into four volumes:

Volume I – EIS with the following chapters:

Chapter 1: Purpose and Need. Provides the background of Colorado River operations and describes why federal action is needed.

Chapter 2: Description of Alternatives. Describes the process of formulating alternatives, describes the Preferred Alternative, and presents a range of reservoir operation strategies and guidelines considered under each alternative. A summary of the performance tradeoffs between alternatives is provided at the end of Chapter 2.

Chapter 3: Affected Environment and Environmental Consequences. Describes the existing environmental conditions and evaluates potential impacts that could result from implementation of the alternatives.

Chapter 4: Consultation and Coordination. Describes public and stakeholder involvement process during the preparation of this Final EIS.

¹ Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming

² There are 30 federally recognized Native American tribes in the Basin: Ak-Chin Indian Community, Chemehuevi Indian Tribe, Cocopah Indian Tribe, Colorado River Indian Tribes, Fort McDowell Yavapai Nation, Fort Mojave Indian Tribe, Fort Yuma-Quechan Tribe, Gila River Indian Community, Havasupai Tribe, Hopi Tribe, Hualapai Tribe, Jicarilla Apache Nation, Kaibab Band of Paiute Indians, Las Vegas Paiute Tribe, Moapa Band of Paiute Indians, Navajo Nation, Pascua Yaqui Tribe, Pueblo of Zuni, Salt River Pima-Maricopa Indian Community, San Carlos Apache Tribe, San Juan Southern Paiute, Shivwits Band of Paiutes, Southern Ute Indian Tribe, Tohono O'odham Nation, Tonto Apache Tribe, Ute Indian Tribe of the Uintah and Ouray Reservation, Ute Mountain Ute Tribe, White Mountain Apache Tribe, Yavapai-Apache Nation, and Yavapai-Prescott Indian Tribe.

Volume II – Supporting appendices, primarily focused on modelling information, including modeling assumptions, analytical methods, and supporting calculations.

Volume III – Technical appendices for each of the environmental resources discussed in Chapter 3. These appendices provide supporting and more detailed information.

Volume IV – List of persons contributing to the preparation of this Final EIS, list of references cited in this Final EIS, glossary of commonly used terms, and index.

ES.1.1 Purpose and Need for Action

The proposed federal action is needed for the following reasons:

- *The Secretary is legally required to coordinate operations of Colorado River reservoirs:* The Colorado River Basin Project Act of 1968 directs the Secretary to adopt criteria for the coordinated long-range operation of Colorado River reservoirs. In compliance with this obligation, the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968 (Long-Range Operating Criteria [LROC]; Colorado River Basin Project Act of 1968 [CRBPA]; Reclamation 1970) were developed and adopted by the Secretary in 1970. The LROC provides general narrative guidance regarding Lake Powell and Lake Mead operations but does not contain specific, objective criteria to guide annual operations. To address this inadequacy, the 2007 Interim Guidelines were developed to provide objective criteria used by the Department to implement the LROC. The 2007 Interim Guidelines have provided the predictability needed by the entities that receive Colorado River water to better plan for and manage available water supplies from the Colorado River and other sources.
- *The 2007 Interim Guidelines are expiring:* Current operational guidelines expire during the 2026 operating year. The Department has determined that specific, objective operational guidelines are important to provide improved predictability and should be established for another interim period beyond 2026. Most of the federal and non-federal agreements associated with implementing provisions of the 2007 Interim Guidelines also expire after the 2026 operating year.
- *The 2007 Interim Guidelines have not sufficiently reduced risk:* Based on operational experience since 2007, the current guidelines are not robust enough to manage the system in a way that is sufficiently protective of the resources dependent on the Colorado River. Despite near-continuous drought-response actions in recent years, low reservoir conditions have persisted, and new infrastructure risks at Glen Canyon Dam have arisen. More robust and adaptive guidelines are needed for the efficient and sustainable management of the major mainstream Colorado River reservoirs and system resources.
- *Imbalance between water supply and demand will be exacerbated by increasingly likely low-runoff conditions:* The Basin is experiencing increased aridity due to climate variability, and long-term drought and low-runoff conditions are expected in the future. These conditions will exacerbate the now widely recognized imbalance between water supply and demand in the Basin. Robust and flexible guidelines are needed to manage the Colorado River system and its resources under a broad range of potential future hydrologic conditions.
- *Expanded and innovative use of conservation is needed:* Recognizing the anticipated future low-runoff conditions in the Basin, the Department has also determined a need for guidelines that provide

Colorado River water users, including Basin Tribes, expanded opportunities to conserve, store, exchange, and take subsequent delivery of water in and from Lake Mead and/or Lake Powell. The guidelines should also support and integrate future efficiency improvements and opportunities for augmentation.

- *Addressing tribal concerns regarding Basin management is needed:* Basin Tribes have expressed concern that the current approach to Colorado River water management is insufficient to address the range of interests, needs, and fundamental rights of the Basin Tribes. The Department has determined a need for guidelines that provide flexibility and predictability for Basin Tribes to remain able to benefit from their water rights and have opportunities to participate in voluntary conservation programs.

The purpose of the proposed federal action is to:

- Update and expand management guidelines for Colorado River reservoirs, particularly for the coordinated operation of Lake Powell and Lake Mead
- Provide Colorado River water users a greater degree of predictability with respect to annual water availability in future years under anticipated increasing variability, low runoff, and low reservoir conditions
- Provide additional mechanisms for the conservation, exchange, storage, and delivery of water supplies in Colorado River reservoirs to increase the flexibility to meet water use needs
- Provide new or enhanced opportunities for Basin Tribes to benefit from their water rights
- Provide flexibility to build resilience and accommodate future needs and growth that are supported by Colorado River water supplies, including the integration of unquantified tribal water rights once they are resolved

ES.1.2 Proposed Federal Action

Reclamation, acting on behalf of the Secretary, proposes to adopt guidelines and coordinated reservoir management strategies to address operations of Lake Powell and Lake Mead through their full operating ranges. This action would improve predictability to all water users and managers in the Basin by developing and adopting objective guidelines for the operation of Glen Canyon Dam and Hoover Dam to take effect when the current operating guidelines expire in 2026. This action is designed to provide for the sustainable management of the Colorado River system and its resources under a wide range of potential future system conditions.

The proposed federal action considers the following operational elements that are collectively designed to address the purpose and need for the proposed federal action:

- 1) Identification of circumstances under which the Secretary would allocate the annual amount of water available for consumptive use from Lake Mead to the Lower Division states (Arizona, California, and Nevada) at, below, or above 7.5 million acre-feet (maf), pursuant to the Supreme Court Decree in *Arizona v. California*, 376 U.S. 340 (1964) (Final Decree entered in 2006).
- 2) Coordinated operations of Lake Powell and Lake Mead, particularly under low reservoir conditions.
- 3) Storage and delivery of conserved water in Lake Mead and/or Lake Powell to increase the flexibility to meet water use needs from both reservoirs, including the storage and delivery of

non-system water; exchanges; and water conserved through extraordinary measures by or for tribal, agricultural, or municipal entities.

The proposed federal action allows for development of robust operating guidelines for Lake Powell and Lake Mead without precluding upstream or downstream actions needed to protect critical reservoir elevations at Lake Powell and Lake Mead, such as the following:

- Approaches that consider total system storage in all major Colorado River reservoirs and/or actual inflows to determine coordinated operations of Lake Powell and Lake Mead.
- Approaches that include opportunities for conservation, augmentation, demand management, or other water management strategies (such as exchanges or transfers).
- Modified operations at upstream CRSP Upper Initial Units³ to release additional water if needed to protect critical infrastructure at Glen Canyon Dam.

The Secretary intends that the guidelines be interim in nature and extend for the same duration as the 2007 Interim Guidelines (approximately 20 years). Adoption of new guidelines for an interim (or limited) period provides the opportunity to gain additional experience for operating the reservoirs, thereby informing future operational and water management decisions.

Recognizing additional authorities may be developed, the Department intends to adopt and implement the guidelines in a manner consistent with the Law of the River. The Department also intends that the guidelines be used to implement the LROC and applicable federal law through the issuance of the Annual Operating Plan for Colorado River Reservoirs.

ES.1.3 Geographic Scope

Consistent with the geographic scope analyzed in the 2007 Interim Guidelines Final EIS, the geographic scope that would be affected by the proposed federal action begins at full pool of Lake Powell at Gypsum Canyon and extends downstream along the mainstream Colorado River floodplain to the Southerly International Boundary (SIB) with Mexico. This proposed federal action would also potentially affect interests of water users in the Lower Division States in service areas that extend beyond the mainstream of the Colorado River.

Although the proposed federal action is focused on Lake Powell and Lake Mead operations, management strategies that include activities upstream of Lake Powell are being analyzed in this Final EIS. These activities include Upper Colorado River Basin (Upper Basin) conservation and, if warranted to protect critical reservoir elevations, coordinated operations of the CRSP Upper Initial Units to release additional water within their respective Records of Decision (RODs) to increase the elevation at Lake Powell. Operations at the CRSP Upper Initial Units specifically contemplated in this Final EIS are intended to remain within the scope of the existing RODs.⁴ Since those RODs are covered by their own NEPA, this Final EIS does not need to expand the geographic scope of analysis

³ CRSP Upper Initial Units include [Flaming Gorge](#), [Blue Mesa](#) (a component of the Aspinall Unit), and [Navajo](#) reservoirs. Current RODs governing operations of these units were signed in 2006, 2012, and 2006, respectively.

⁴ While the Secretary will consider and prioritize operations at these facilities that are consistent with existing RODs, the Secretary retains the authority to operate outside those RODs if necessary. The modeling assumptions regarding operation of the CRSP Upper Initial Units presented in this Final EIS are not intended to, and do not, limit the Secretary's ability to operate these facilities as necessary to respond to hydrologic conditions in accordance with applicable federal law, including operations for the authorized purposes as stated in the 1956 Colorado River Storage Project Act.

upstream of Lake Powell. With respect to Upper Basin conservation, the nexus to the proposed federal action is the storage and delivery of that conserved water in Lake Powell. The effects of this storage in and delivery from Lake Powell are within the scope of the EIS, while specific activities that may be undertaken in the Upper Basin to generate the conserved water are not within the scope of this EIS. Any such activities are unknown at this time and will not necessarily require federal decision making. Any federal decisions associated with these conservation activities will be assessed outside of this EIS.

ES.2 Alternatives

ES.2.1 Alternative Development

The process of developing the range of alternatives was informed by solicitation of input and extensive collaborative engagement with stakeholders throughout the Basin. This took place over a two-and-a-half-year period beginning with publication of the Scoping Report in October 2023 through publication of this Final EIS.

During the public involvement periods and the rest of the alternatives development process, Reclamation received considerable [input](#) from the Basin States, many Basin Tribes, conservation organizations, other federal agencies, other stakeholders, and members of the public. Input submitted ranged from detailed proposed alternatives to operational concepts and principles. Throughout the alternatives development phase, Reclamation met continuously with states, tribes, and other partners to review and discuss their input. For those proposals containing sufficient detail to be considered as a full alternative or a major component of an alternative, Reclamation worked extensively with these entities to not only understand and gather additional information, but also to model and perform preliminary analyses of their proposals to facilitate refinements. Additionally, Reclamation developed an online platform, the Post-2026 Operations Exploration Web Tool, allowing stakeholders, interested parties, and the public to independently or collaboratively design operational strategies to inform their input to the NEPA process.

On January 9, 2026, the Environmental Protection Agency published a notice in the *Federal Register* ([91 Federal Register 2131](#)) announcing the availability of the Draft EIS and beginning a public comment period that ran through March 2, 2026. Since Draft EIS publication, the Department has also continued to work with the Basin States and Basin Tribes to facilitate development of a consensus agreement. Despite this extensive engagement, a long-term consensus-based approach to Basin reservoir operations has not yet been achieved.

This Final EIS analyzes a No Action alternative and five action alternatives that incorporate over 4 years of input provided by stakeholders and the public and received through consultations with the Basin States and Basin Tribes. These alternatives capture a broad range of operational concepts and potential environmental impacts:

- Preferred Alternative (added since publication of the Draft EIS)
- No Action Alternative
- Basic Coordination Alternative
- Enhanced Coordination Alternative

- Maximum Operational Flexibility Alternative
- Supply Driven Alternative

ES.2.2 The Preferred Alternative

In the absence of a long-term consensus-based approach, Reclamation has developed a Preferred Alternative and analyzed it in this Final EIS. The Preferred Alternative is a 10-year decision framework. The decision framework establishes operational principles, sideboards (key thresholds and ranges for operational elements), and a process that would govern development and issuance of operating guidelines covering anticipated 2-year intervals, unless consensus-based agreements provide for a longer duration. The framework does not establish specific operating guidelines; rather, it provides the structure within which operating guidelines would be developed, reviewed, and periodically updated through 2036.

The decision framework in the Preferred Alternative offers a vehicle for continued work toward sustainable management in the Basin. It provides continuity following the expiration of the 2007 Interim Guidelines; establishes transparency and predictability for future decision making; preserves flexibility to respond to changing hydrology and evolving Basin circumstances; facilitates incorporation of future Basin consensus recommendations; and is consistent with applicable federal law. The framework (principles, sideboards, and process) would remain constant through 2036, unless modified through future federal action and appropriate environmental compliance.

ES.2.2.1 Operating Guidelines

Operating guidelines are the objective criteria that determine the operations of Lake Powell and Lake Mead for the anticipated 2-year interval. For each interval, the framework process would be carried out to develop and issue operating guidelines in accordance with the principles and sideboards described below. The operating guidelines would be adopted through the issuance of a decision document published in the *Federal Register*. Once issued, the operating guidelines would be implemented through Annual Operating Plans.

ES.2.2.2 Operational Principles

The operational principles are designed to ensure that operating guidelines adopted under the framework adhere to fundamental management priorities and provide a basis for review and reflection as new operating guidelines are developed.

The operational principles are listed below:

1. ***Operations should be responsive to hydrology.*** Annual operations and mid-year adjustments that account for evolving supply conditions should be adopted to ensure a flexible, adaptive approach to management.
2. ***Critical federal infrastructure must be protected through practical and deliberate operations.*** When Lake Powell is projected to fall below elevation 3,500 feet or when Lake Mead is projected to fall below elevation of 1,000 feet, processes and tools will be used to manage risks to infrastructure and prevent damage to federal facilities of regional and national importance. These elevations reflect current understanding of these facilities but do not preclude the identification of alternate or additional critical elevations.

3. ***Operating guidelines should implement the LROC while also providing directions to address extraordinary circumstances.*** Operating guidelines will provide objective criteria for operating under low reservoir conditions within the bounds of the LROC but may also provide for temporary operational actions that are not otherwise provided for under the LROC when necessary to protect critical federal infrastructure in accordance with applicable federal law.
4. ***Operating guidelines should prioritize consensus-based recommendations.*** The Department will support efforts to achieve consensus agreements that appropriately provide benefits to multiple parties, that offer innovative, inclusive solutions to operational and management challenges, and that are sufficiently protective of the system. Should such agreements arise, they will be prioritized as new operating guidelines are developed and adopted. In the absence of consensus-based arrangements, the Secretary will take the necessary management actions, consistent with applicable federal law.

ES.2.2.3 Operational Sideboards

The decision framework's operational sideboards are key thresholds and ranges for the four operational elements (described below) that create boundaries for the development of each set of operating guidelines and provide a basis for environmental compliance for the duration of the decision framework. The sideboards defined in **Table ES-1** were chosen to appropriately balance tradeoffs among resources and ensure that the Department would have the flexibility and environmental compliance to operate in accordance with the operational principles given future hydrologic uncertainty.

Table ES-1
Operational Sideboards for the Preferred Alternative

Operational Element	Operational Ranges
Lower Basin Shortage Guidelines	Up to 3.0 maf to provide protection of critical infrastructure at Hoover Dam in dry hydrologic conditions The allocation of shortages would be based on applicable law, including the Consolidated Decree. Deviation from applicable law would occur only if water entitlement holders have reached voluntary arrangements Consultation would occur if projected Lake Mead elevation < 1,000 ft to determine potential additional reductions to Lower Basin water deliveries
Coordinated Reservoir Operations	5.0 maf to 12.0 maf Lake Powell WY releases to provide protection for critical infrastructure at Glen Canyon Dam and sufficiently high releases necessary to prevent spill avoidance releases Consultation would occur if projected Lake Powell elevation < 3,500 ft to determine potential additional actions
Storage and Delivery of Conserved System and Non-system Water	Lake Powell: up to 3.0 maf Lake Mead: up to 8.0 maf (supports existing ICS, new ICS-type program, conservation pools, and exchange mechanisms)
Lower Basin Surplus Guidelines	Up to 500 kaf in addition to Flood Control and Quantified Surplus

Operational Element	Operational Ranges
Additional Activities Above Lake Powell	Potential for maximum use of CRSP Upper Initial Units within their respective RODs to release additional water if needed to protect critical infrastructure Voluntary Upper Basin contributions up to 200 kaf per year subject to hydrologic conditions

In contrast to the specified operations under the other alternatives analyzed in this Final EIS, the Preferred Alternative is designed to create the opportunity for subsequent decision making; because of this distinction, it is appropriate to include a modeling representation of operating guidelines that may be developed under the Preferred Alternative. The sideboards provide a basis for understanding the range of potential impacts, and analyzing these potential impacts provides a necessary and instructive comparison to the other alternatives included in this Final EIS. Taken together, the representation of the operational elements described below is referred to and analyzed in this Final EIS as the “Representative Preferred Alternative.” The Representative Preferred Alternative is a set of modeling assumptions designed around the Preferred Alternative sideboards to approximate the range of operating guidelines that may be adopted for each interval during the 10-year framework. The specifications in the operational elements reflect how the Representative Preferred Alternative was modeled; exact operations would be subject to the guidelines in place during each interval and would adhere to consultation triggers.

ES.2.2.4 Process

Each set of operating guidelines would be implemented and evaluated through a process during which Reclamation would work with stakeholders to seek consensus, align with operational principles and sideboards, and account for system conditions, hydrology, and other Basin developments.

ES.2.3 Summary of Alternatives

Each alternative is comprised of four operational elements: (1) Guidelines to Reduce or Increase Deliveries from Lake Mead, (2) Coordinated Reservoir Operations (Lake Powell and Lake Mead), (3) Storage and Delivery of Conserved System and Non-System Water, and (4) Additional Activities Above Lake Powell. Each element is varied across the alternatives providing a reasonably broad range of Colorado River operations that capture an appropriate range of potential environmental impacts. **Table ES-2** summarizes the representation of these elements in the No Action Alternative and the five action alternatives considered and evaluated in this Final EIS.

Table ES-2
Summary Comparison of Alternatives

Preferred Alternative (Including Representative of Operational Elements)	The Preferred Alternative is a multi-year decision framework that establishes the process and criteria that would govern development and adoption of operating guidelines through 2036. The decision framework is anticipated to be implemented in two-year operating intervals, unless consensus-based agreements provide for a longer duration. Unlike other alternatives, the operating guidelines for each interval are not specified in this Final EIS, and each set of guidelines would be developed based on operational principles and fit within the framework's defined operational sideboards (thresholds and ranges for operational elements). The sideboards provide a basis for assumptions included in the Representative Preferred Alternative summarized in this table, which captures the range of operating guidelines that may be adopted during each interval. Lake Powell releases range from 5.0 maf to 12.0 maf depending primarily on Lake Powell elevation. Lower Basin shortages up to 3.6 maf (including assumptions about reductions to Mexico) are distributed using a combination of LB Priority (up to 1.5 maf, 2027-2028) and priority.				
	Shortage Guidelines to Reduce Deliveries from Lake Mead ^{3, 4}	Coordinated Reservoir Operations (Lake Powell and Lake Mead)	Storage and Delivery of Conserved System and Non-system Water ³	Surplus Guidelines to Increase Deliveries/ Releases from Lake Mead ³	Additional Activities Above Lake Powell
	- Shortages up to 3.6 maf (including assumptions about reductions to Mexico) - In 2027-2028, shortages up to 1.5 maf are distributed based on the distribution developed by the Lower Division States and shortages exceeding 1.5 maf are distributed based on priority (Approach 1 of the Supply Driven Alternative) - After 2028, shortages are distributed based on priority, unless agreements are reached - Consultation to determine additional reductions if projected Lake Mead elevation is less than 1,000 feet	- Lake Powell releases determined based on Lake Powell elevation unless equalization releases are required - Releases range from 5.0 to 12.0 maf, unless more is required for equalization releases - Consultation to determine additional actions if projected Lake Powell elevation is less than 3,500 feet	- Storage up to 7.0 maf in Lake Mead with additional 1.0 maf Federally Managed Water Resources Pool; included for purposes of determining Lower Basin surplus and Shortage Conditions, as well as equalization releases from Lake Powell - Storage up to 3.0 maf at Lake Powell; included for purposes of determining Lake Powell releases - Existing ICS converted to new mechanism immediately - Expanded flexibilities: interstate exchanges within each basin, new tribal mechanism	Surplus determinations based on Lake Mead elevation at or above 1,165 feet, 70R (spill avoidance strategy) or Flood Control conditions	- Potential maximum use of CRSP Upper Initial Units within their respective RODs to release additional water if needed to protect critical infrastructure at Glen Canyon Dam contingent on hydrologic conditions - Trigger additional releases when projected Lake Powell elevation is less than 3,525 feet - Voluntary Upper Basin contributions up to 200.0 kaf per year subject to hydrologic conditions

³ These operational elements contain modeling assumptions for water deliveries to Mexico. Shortage volumes include assumptions related to reductions in water deliveries to Mexico. Lake Mead storage volumes for the Storage and Delivery of Conserved System and Non-system Water include assumptions related to storage available to Mexico. Surplus Guidelines include assumptions related to increased deliveries to Mexico. **Appendix A** provides additional detail. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

⁴ As noted in **Section 2.4**, the anticipated guidelines for the first operating interval as of publication of this Final EIS are preliminary. Modeling assumptions for 2027–2028 regarding shortage distribution reflect the May 1, 2026, Lower Division States proposal. As described in **Table 2-1**, Operational Sideboards, absent voluntary arrangements, the distribution of shortages would be based on applicable law (i.e., the priority system). This distribution is modeled in the Representative Preferred Alternative for years 2029 and beyond. Both distribution methods are documented and analyzed in **Appendix C**, Shortage Allocation Model, and **Chapter 3**. Regarding maximum shortage volume, modeling assumptions provide for reductions above the 1.25 maf maximum if needed to avoid critically low elevations at Lake Mead.

No Action Alternative

The No Action Alternative is included as a requirement of NEPA. Operations would revert to annual determinations announced through the Annual Operating Plan. Pursuant to the LROC, the objective is to maintain a minimum release of water from Lake Powell of 8.23 maf, therefore Lake Powell releases are assumed to be 8.23 maf¹ unless a higher release is required for equalization or a lower release occurs due to Glen Canyon Dam infrastructure limitations.² Shortages to the Lower Basin would be based on priority and reach a maximum of 600.0 thousand acre-feet (kaf). This would not represent a continuation of current operations but is generally based on the operating guidance that was in place before the adoption of the 2007 Interim Guidelines. While the authority to use CRSP Upper Initial Units to respond to exigent and emergency conditions was recognized at that time, no specific framework for such activities had been developed, so no defined activities are included in this alternative. Existing Intentionally Created Surplus (ICS) would be delivered in accordance with existing agreements, but there would be no new storage and delivery mechanisms.

Shortage Guidelines to Reduce Deliveries from Lake Mead ³	Coordinated Reservoir Operations (Lake Powell and Lake Mead)	Storage and Delivery of Conserved System and Non-system Water ³	Surplus Guidelines to Increase Deliveries/ Releases from Lake Mead ³	Additional Activities Above Lake Powell
- Shortages determined based on Lake Mead elevation - Shortage volume of 400.0, 500.0, and 600.0 kaf at elevations 1,075, 1,050, and 1,025 feet, respectively - Shortages distributed based on priority	- Lake Powell release of 8.23 maf unless more is required for equalization releases - Releases less than 8.23 maf below elevation 3,490 feet due to Glen Canyon Dam infrastructure limitations	- No new storage and delivery mechanism to replace ICS - Delivery of existing ICS in accordance with existing agreements	Surplus determinations limited to 70R (spill avoidance strategy) and Flood Control conditions	No specific additional activities above Lake Powell defined

¹ Article II(2) of the LROC states the "objective shall be to maintain a minimum release of water from Lake Powell of 8.23 [maf]." Reclamation recognizes that entities in the Basin have different legal positions regarding how this LROC statement incorporates other Law of the River elements to determine annual releases. Reclamation also recognizes that variation in releases of water above and below the minimum objective release of 8.23 maf can, in appropriate circumstances, be adopted.

² Releases from Glen Canyon Dam may be unable to achieve the specified annual release volume when Lake Powell is below elevation 3,490 feet due to infrastructure constraints.

Modeling assumptions for all alternatives reflect this constraint (see **Appendix A**).

³ These operational elements contain modeling assumptions for water deliveries to Mexico. Shortage volumes include assumptions related to reductions in water deliveries to Mexico. Lake Mead storage volumes for the Storage and Delivery of Conserved System and Non-system Water include assumptions related to storage available to Mexico. Surplus Guidelines include assumptions related to increased deliveries to Mexico. **Appendix A** provides additional detail. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

Basic Coordination Alternative	This alternative is designed to be implementable absent new agreements among Basin water users. Lake Powell releases would primarily be 8.23 maf, with some releases above and below 8.23 maf, and minimum releases of 7.0 maf. Lake Powell elevations could be increased by releases from CRSP Upper Initial Units within their respective RODs to protect infrastructure at Glen Canyon Dam. Reclamation would identify triggers for when additional Upper Basin actions are needed to protect critical infrastructure. Lower Basin shortages up to 1.48 maf would be triggered based on Lake Mead elevation and distributed consistent with priority system. Existing ICS would be delivered in accordance with existing agreements, but there would be no new delivery and storage mechanisms.				
	Shortage Guidelines to Reduce Deliveries from Lake Mead ³	Coordinated Reservoir Operations (Lake Powell and Lake Mead)	Storage and Delivery of Conserved System and Non-system Water ³	Surplus Guidelines to Increase Deliveries/ Releases from Lake Mead ³	Additional Activities Above Lake Powell
	- Shortages based on Lake Mead elevation up to 1.48 maf - Shortages distributed based on priority - Identify conditions when additional reductions may be needed to avoid reaching critically low elevations	- Lake Powell releases are determined based on Lake Powell elevation unless equalization releases are required - Releases range from 7.0 to 9.5 maf, unless more is required for equalization releases - Identify conditions when additional action may be needed for infrastructure protection	- No new storage and delivery mechanism to replace ICS - Delivery of existing ICS in accordance with existing agreements	Surplus determinations limited to 70R (spill avoidance strategy) and Flood Control conditions	- Releases from CRSP Upper Initial Units within their respective RODs and contingent on hydrologic conditions to protect infrastructure at Glen Canyon Dam - Identify conditions when additional Upper Basin actions may be needed for infrastructure protection

³ These operational elements contain modeling assumptions for water deliveries to Mexico. Shortage volumes include assumptions related to reductions in water deliveries to Mexico. Lake Mead storage volumes for the Storage and Delivery of Conserved System and Non-system Water include assumptions related to storage available to Mexico. Surplus Guidelines include assumptions related to increased deliveries to Mexico. **Appendix A** provides additional detail. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

Enhanced Coordination Alternative	This alternative is based on concepts from Basin Tribes, federal agencies, and other stakeholders to achieve protection of critical infrastructure while benefitting key resources (e.g., natural, hydropower and recreation) through an approach to distributing storage between Lake Powell and Lake Mead. Lake Powell releases would be determined based on a combination of Lake Powell and Lake Mead elevations, 10-year running-average hydrology, and Lower Basin deliveries. This alternative would include storage and delivery mechanisms for Lake Powell and Lake Mead and extensive flexibilities for all users. The operations incorporate Basin-wide shared contributions to the system, including Upper Basin conservation that would be stored in Lake Powell and Lower Basin shortages starting at 1.3 maf, approximately the average annual evaporative and system losses at and below Lake Mead, and reaching a maximum of 3.0 maf. Shortages would be triggered based on combined storage in Lake Powell and Lake Mead and distributed pro rata.				
	Shortage Guidelines to Reduce Deliveries from Lake Mead ³	Coordinated Reservoir Operations (Lake Powell and Lake Mead)	Storage and Delivery of Conserved System and Non-system Water ³	Surplus Guidelines to Increase Deliveries/Releases from Lake Mead ³	Additional Activities Above Lake Powell
	- Shortages determined based on combined storage in Lake Powell and Lake Mead - Shortages begin at 60% full at a volume of 1.3 maf, then increase linearly, reaching a maximum of 3.0 maf at 30% full and below - Shortages distributed pro rata	- Lake Powell releases determined based on a combination of Lake Powell and Lake Mead elevations, 10-year running-average hydrology, and Lower Basin deliveries - Releases range from 4.7 to 10.8 maf	- Storage up to 5.0 maf in Lake Mead with additional 2.0 maf Protection Pool; included for purposes of determining Lake Powell releases and shortages - Storage up to 2.0 maf in Lake Powell; included for purposes of determining Lake Powell releases but excluded from shortage determinations - Existing ICS converted to new mechanism immediately - Extensive flexibilities for all users: intra- and interstate transactions within each basin - Tribal water (both conserved consumptive use and unused) including in Lake Powell conservation pool and Lake Mead Protection Pool	Surplus determinations limited to 70R (spill avoidance strategy) and Flood Control conditions	Upper Basin conservation contributed to the Lake Powell conservation pool based on hydrologic conditions: up to 200.0 kaf per year for first 5 years, up to 275.0 kaf per year for second 5 years, up to 350.0 kaf starting in year 11

³These operational elements contain modeling assumptions for water deliveries to Mexico. Shortage volumes include assumptions related to reductions in water deliveries to Mexico. Lake Mead storage volumes for the Storage and Delivery of Conserved System and Non-system Water include assumptions related to storage available to Mexico. Surplus Guidelines include assumptions related to increased deliveries to Mexico. **Appendix A** provides additional detail. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

Maximum Operational Flexibility Alternative	This alternative is informed by a proposal submitted by a consortium of conservation organizations and incorporates proactive responses, targeted reservoir management strategies, and innovative and flexible tools to address an increasingly variable set of future hydrologic conditions. Lake Powell releases would range from 5.0 to 11.0 maf and would be determined by total CRSP system storage and recent hydrology. Releases would switch to “run-of-river” when Lake Powell is at 3,510 feet or lower. The operations incorporate Basin-wide shared contributions, including up to 4.0 maf of shortages in the Lower Basin triggered by combined seven-reservoir storage (CRSP Upper Initial Units, Lake Mead, Lake Mohave, and Lake Havasu) and recent hydrology and voluntary water contributions from both basins.				
	Shortage Guidelines to Reduce Deliveries from Lake Mead ³	Coordinated Reservoir Operations (Lake Powell and Lake Mead) ³	Storage and Delivery of Conserved System and Non-system Water	Surplus Guidelines to Increase Deliveries/ Releases from Lake Mead ³	Additional Activities Above Lake Powell
	- Shortages determined based on combined seven-reservoir storage and recent hydrology - Shortages start at 80% full and increase linearly, subject to upward adjustment based on hydrology, reaching a maximum of 4.0 maf - Shortages distributed based on priority, as described in Approach 1 of the Supply Driven Alternative	- Lake Powell releases determined based on total Upper Basin system storage and recent hydrology - Releases subject to downward adjustment based on hydrology and range from 5.0 to 11.0 maf - Releases switch to “run-of-river” when Lake Powell is at elevation 3,510 feet or lower	- Storage up to 8.0 maf in either Lake Powell or Lake Mead; excluded for purposes of determining Lake Powell releases and shortages - Existing ICS converted to new mechanism over 5 years - Extensive flexibilities for all users: transactions within and across basins, including interstate and inter-basin	Surplus determinations limited to Flood Control conditions	Average of 200.0 kaf of Upper Basin annual conservation based on hydrologic conditions contributed to the Lake Powell conservation pool

³These operational elements contain modeling assumptions for water deliveries to Mexico. Shortage volumes include assumptions related to reductions in water deliveries to Mexico. Lake Mead storage volumes for the Storage and Delivery of Conserved System and Non-system Water include assumptions related to storage available to Mexico. Surplus Guidelines include assumptions related to increased deliveries to Mexico. **Appendix A** provides additional detail. Reclamation’s modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

Supply Driven Alternative	Annual Lake Powell releases are determined based on a 65 percent of 3-year-average natural flow at Lees Ferry. Lake Powell elevations could be increased by releases from CRSP Upper Initial Units within their respective RODs to protect infrastructure at Glen Canyon Dam. This alternative would include new delivery and storage mechanisms for Lake Powell and Lake Mead. Lower Basin shortages up to 2.1 maf would be triggered based on Lake Mead elevation. This alternative analyzes two approaches to shortage distribution: state-based combined with Lower Basin-wide priority and state-based combined with Lower Basin-wide pro rata.				
	Shortage Guidelines to Reduce Deliveries from Lake Mead ³	Coordinated Reservoir Operations (Lake Powell and Lake Mead)	Storage and Delivery of Conserved System and Non-system Water ³	Surplus Guidelines to Increase Deliveries/Releases from Lake Mead ³	Additional Activities Above Lake Powell
	- Shortages determined based on Lake Mead elevation - Shortages start at 1,145 feet and reach a maximum of 2.1 maf at 1,000 feet and below - Shortages distributed using two approaches: LB Priority and LB Pro Rata	- Lake Powell releases determined primarily based on 65% of 3-year natural flows at Lees Ferry - Releases range from 4.7 to 12.0 maf	- Storage up to 8.0 maf in Lake Mead; excluded for purposes of determining shortages - Storage up to 3.0 maf at Lake Powell; included for purposes of determining Lake Powell releases - Existing ICS converted to new mechanism over 10 years - Expanded flexibilities: interstate exchanges within each basin	Surplus determinations based on Lake Mead elevation at or above 1,165 feet, 70R (spill avoidance strategy) or Flood Control conditions	- Increased releases from CRSP Upper Initial Units by up to 500.0 kaf per year within their respective RODs and contingent on hydrologic conditions to protect infrastructure at Glen Canyon Dam - Up to 200.0 kaf of Upper Basin annual conservation based on hydrologic conditions contributed to the Lake Powell conservation pool - In years when Lake Powell cannot meet its required water year release because of low elevation, additional “gap water” is introduced into the system and tracked to be released in subsequent years

³These operational elements contain modeling assumptions for water deliveries to Mexico. Shortage volumes include assumptions related to reductions in water deliveries to Mexico. Lake Mead storage volumes for the Storage and Delivery of Conserved System and Non-system Water include assumptions related to storage available to Mexico. Surplus Guidelines include assumptions related to increased deliveries to Mexico. **Appendix A** provides additional detail. Reclamation's modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

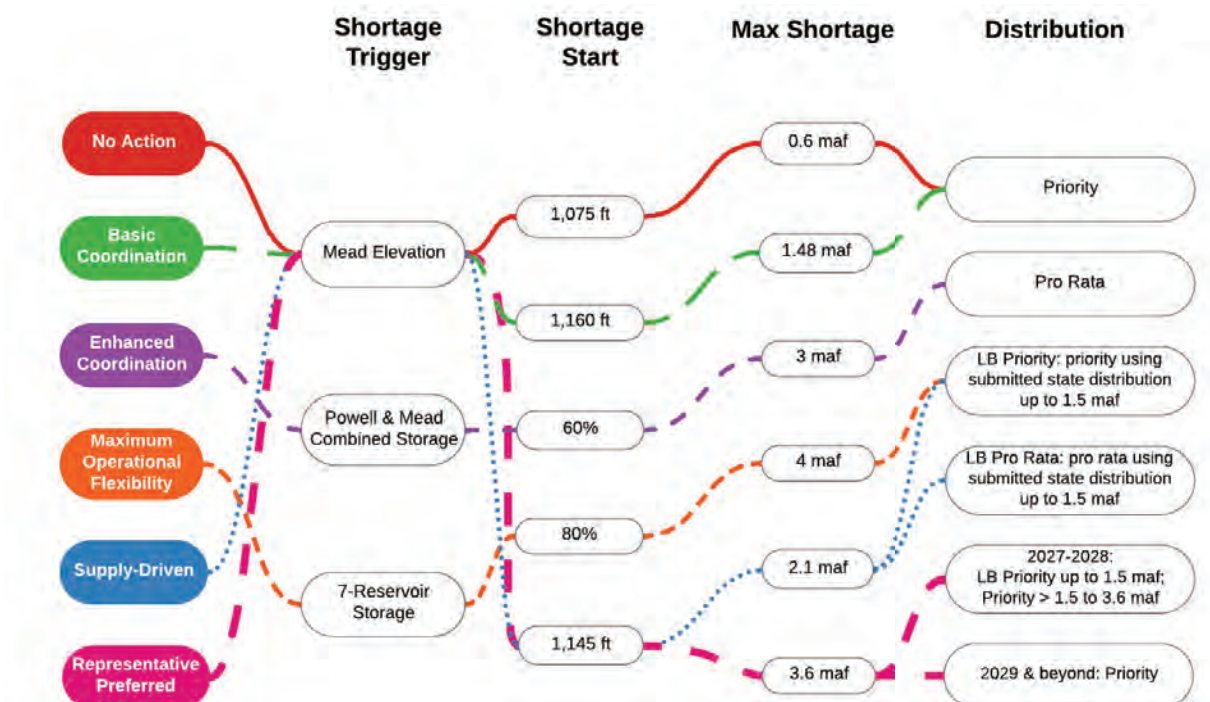
ES.2.4 Range of Alternatives

The Final EIS incorporates a reasonable and broad range of alternatives in accordance with NEPA. The figures below demonstrate the broad range of operational approaches incorporated into the alternatives by summarizing them across the following categories: Lower Basin Shortage Guidelines, Coordinated Reservoir Operations, Lake Mead Storage and Delivery of Conserved Water, and Activities above Lake Powell. For each figure below, the individual lines connect each alternative with the approach(es) that Reclamation has analyzed within that alternative.

ES.2.4.1 Lower Basin Shortage Guidelines

Figure ES-1, Lower Basin Shortage Guidelines, shows the range of approaches considered for factors that would trigger Lower Basin shortage, the level at which shortages would start, the maximum Lower Basin shortage amount, and the method(s) by which shortages would be distributed among Lower Basin water users.

Figure ES-1
Lower Basin Shortage Guidelines



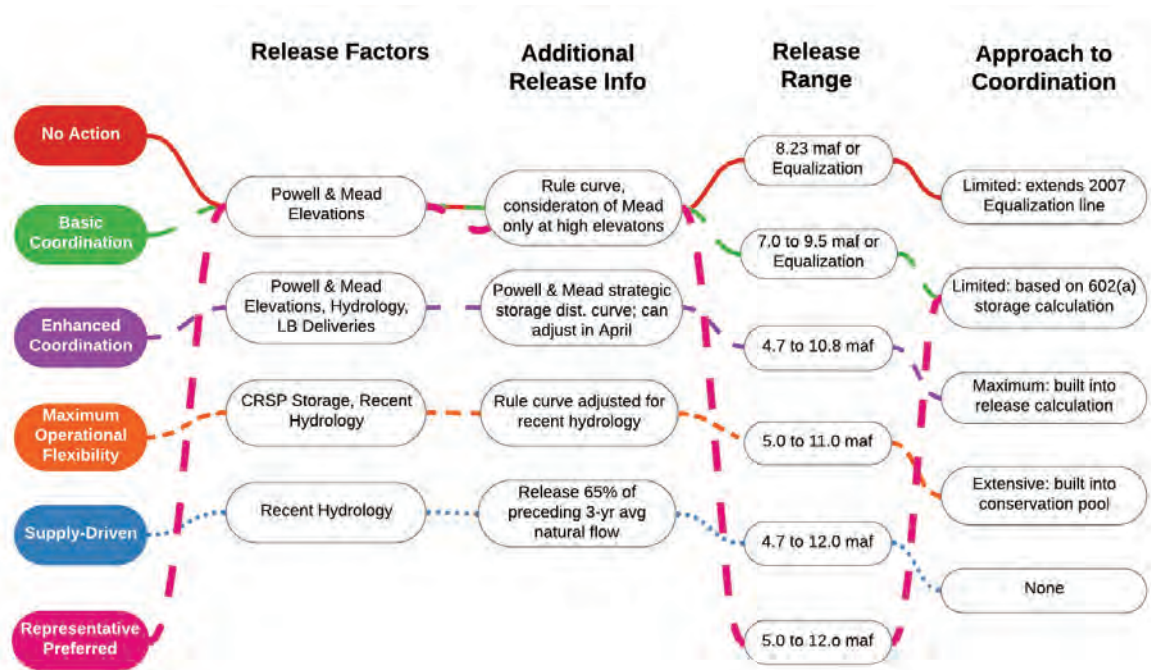
Notes: Additional restrictions in water deliveries will occur when Lake Mead is near dead pool, resulting in large reductions (referred to as “dead pool-related reductions”). These are not considered an operational element of the alternatives. The “Representative Preferred Alternative” is a set of modeling assumptions designed around the Preferred Alternative sideboards. The specific operating guidelines for each operating interval during the term of the Preferred Alternative may differ.

Shortage volumes include modeling assumptions for reductions in water deliveries to Mexico. Reclamation’s modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

ES.2.4.2 Coordinated Reservoir Operations

Figure ES-2, Coordinated Reservoir Operations, shows the range of approaches considered for the factors that would determine Lake Powell water year release volumes, additional information about the structure of operations, the range of water year release volumes that could occur based on those factors, and the approach to coordination of operations between Lake Powell and Lake Mead (that is, how dependent operations of Lake Powell would be on conditions at Lake Mead).

Figure ES-2
Coordinated Reservoir Operations

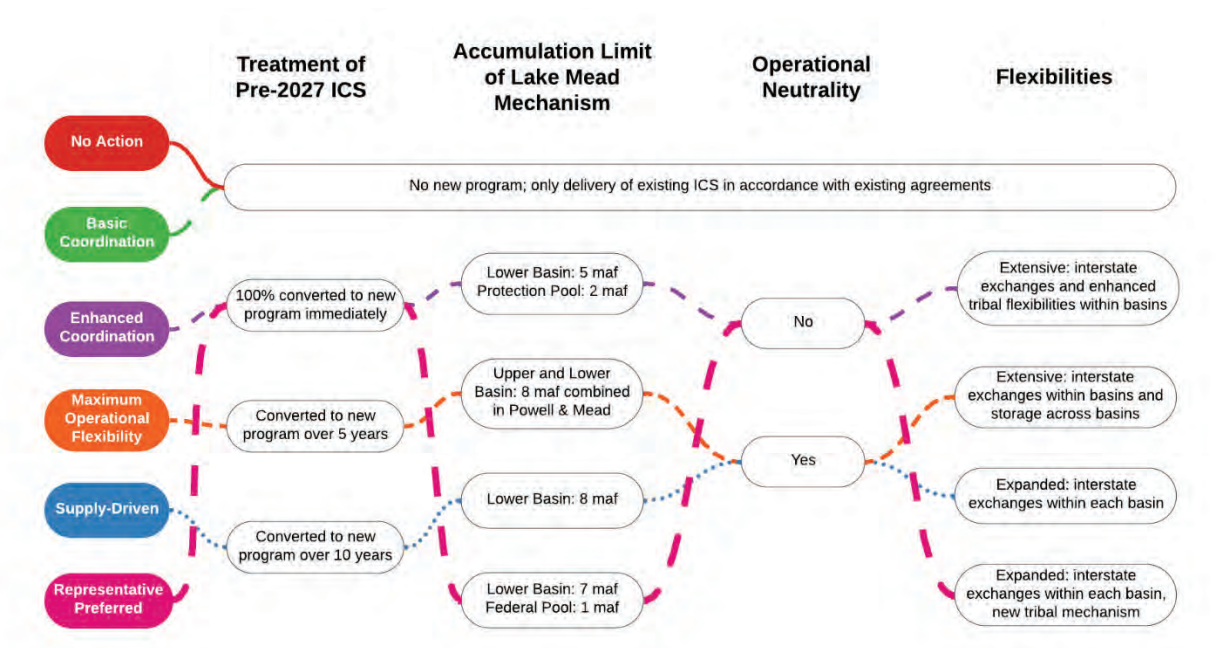


Note: The “Representative Preferred Alternative” is a set of modeling assumptions designed around the Preferred Alternative sideboards. The specific operating guidelines for each operating interval during the term of the Preferred Alternative may differ.

ES.2.4.3 Lake Mead Storage and Delivery of Conserved Water

Figure ES-3, Lake Mead Storage and Delivery of Conserved System Water, shows the range of approaches considered to incorporate this mechanism, including how Intentionally Created Surplus created prior to 2027 is converted into a new mechanism, the maximum amount of conserved water that could be stored in Lake Mead, whether stored conserved water is excluded from determinations of Lake Powell releases and shortage volumes (“operational neutrality”), and the level of flexibilities for transactions of stored conserved water between users.

Figure ES-3
Lake Mead Storage and Delivery of Conserved System Water

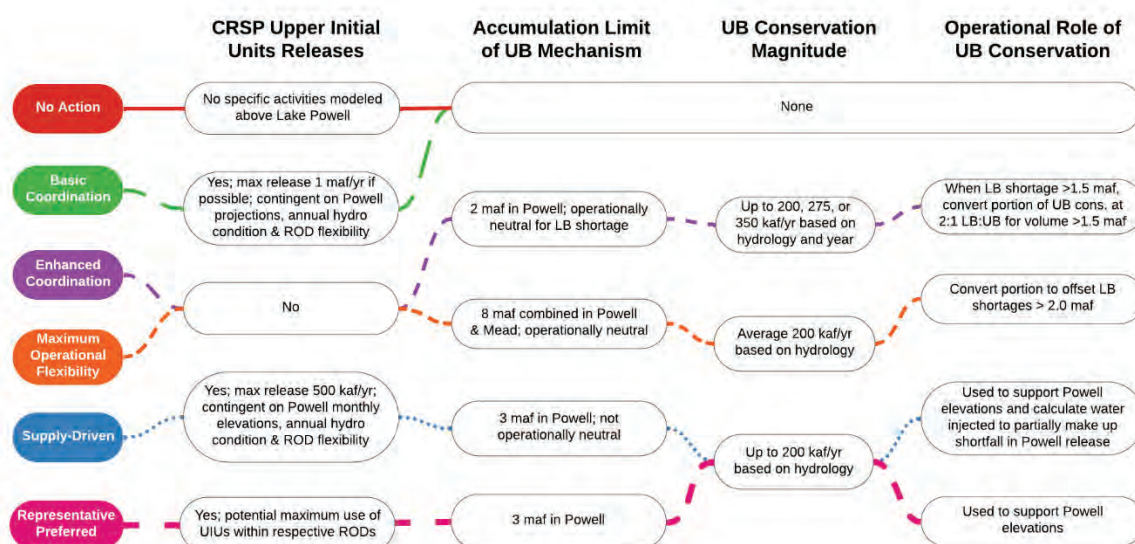


Notes: Accumulation limits include modeling assumptions for storage available to Mexico. Reclamation’s modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State. The “Representative Preferred Alternative” is a set of modeling assumptions designed around the Preferred Alternative sideboards. The specific operating guidelines for each operating interval during the term of the Preferred Alternative may differ.

ES.2.4.4 Activities Above Lake Powell

Figure ES-4, Activities Above Lake Powell, shows the range of approaches to releases from CRSP Upper Initial Units to protect Glen Canyon Dam infrastructure, the maximum amount of conserved water that could be stored, assumptions about the amount of annual Upper Basin conservation, and rules for when Upper Basin conserved water would be converted to system water.

Figure ES-4
Activities Above Lake Powell



Note: The "Representative Preferred Alternative" is a set of modeling assumptions designed around the Preferred Alternative sideboards. The specific operating guidelines for each operating interval during the term of the Preferred Alternative may differ.

ES.3 Potential Environmental Effects

ES.3.1 Analysis Methods

The analysis for this Final EIS uses a Decision Making under Deep Uncertainty (DMDU) approach, drawn from a well-established branch of decision science, that is designed to account for uncertainty in future Basin conditions. The most impactful and largest source of uncertainty is future hydrology. Since 2000, hydrologic conditions drier than those in the previously observed record have continued to occur, confounding ongoing efforts to manage system risk. Reclamation began significant investments in research to improve hydrologic predictions and understanding of long-term supply outlooks in 2004, but there have been only limited improvements in prediction skill and long-term hydrologic projections continue to show a wide range of possibilities around the overall likelihood of a drier future. Therefore, long-term planning in the Basin must account for conditions of *deep uncertainty*, which occur when it is not possible to confidently assign probabilities to specific future conditions. Population growth and changes in water use in the Basin also contribute to the challenge of planning for a deeply uncertain future.

Alongside research into understanding hydrologic uncertainty, Reclamation has also invested in decision science research through the development of DMDU methods that allow for reliable analysis despite the uncertainty. Development of DMDU applications in the Basin stems from a collaboration with the RAND Corporation during the 2012 Colorado River Basin Water Supply and Demand Study, when the methods were introduced into Reclamation's long-term planning. The DMDU framework used here enhances the ability to evaluate the robustness of the alternatives – that is, their ability to meet important performance objectives in a wide range of futures. It also supports the identification of future conditions that could cause vulnerability to critical system conditions. A focus on robustness and vulnerability prevent overreliance on the types of probabilistic risk projections that, in previous planning efforts, did not convey the actual risks facing the system and contributed to insufficient protection against the ongoing drought.

The hydrologic modeling performed for this analysis employs DMDU by testing the system in 400 potential futures that cover a wide range of hydrologic conditions. This hydrologic modeling generated projections of future Colorado River system conditions (such as reservoir elevations, reservoir releases, and river flows) for the alternatives. These system projections serve as the basis for analyzing potential effects on other environmental resources (e.g., recreation, biological resources, and energy) and any associated resource specific models. For each resource, the analysis describes robustness across this wide range, identifies specific conditions that could cause vulnerability, and provides important context for interpreting those findings without overconfidently predicting system outcomes. This aligns with the guidance provided in Executive Order “Restoring Gold Standard Science” from May 2025, and provides a sound basis for comparing the alternatives’ ability to meet key performance thresholds for resources throughout the Basin.

ES.3.2 Summary of Environmental Consequences

The analysis focuses on specific issues identified during internal and public scoping for all affected environmental resources (e.g., hydrologic, biologic, and socioeconomic). Resources considered but determined to not be significantly impacted by the action include transportation, noise, light, and minerals.

A summary of environmental consequences is provided in **Table ES-7**, Summary of Potential Effects of the Alternatives, located at the end of this Executive Summary. Performance indicators were developed to address the specific issues raised during scoping. Throughout, a higher percentage reflects better performance. Where quantitative or DMDU results are not possible, a qualitative description of potential impacts is provided. The affected environment and environmental consequences are discussed in detail in Chapter 3 and the associated resource appendices.

ES.4 Synthesis of Performance in Key Metrics

The action alternatives together capture a wide range of concepts across the operational elements that make up an alternative; this operational variety produces a wide range of potential system outcomes. The following sections provide an overview of performance and vulnerability over the period 2027-2036, which is significant because the Preferred Alternative is a 10-year decision framework. The Preferred Alternative, as analyzed in the Representative Preferred Alternative, is compared to the other

action alternatives, the No Action Alternative, and the Continued Current Strategies Comparative Baseline below.

ES.4.1 Performance Tradeoffs among Key System Metrics

ES.4.1.1 Introduction

Operations at Lake Powell and Lake Mead inherently involve tradeoffs among resources that benefit from different fundamental system elements: storage in each reservoir, dam releases, river flows, and water deliveries. For example, it is not possible for a set of operating guidelines to have the most robust performance with respect to maximizing protection of critical elevations, minimizing reductions in water deliveries, and maximizing hydropower generation all at once. With the extended period of dry hydrologic conditions since 2000 and the resulting depletion of storage, these tradeoffs have become more stark, and achieving a broadly acceptable balance between resources is now more difficult than ever before.

ES.4.1.2 Tradeoff Analysis

While there are many important metrics across Basin resources, it is instructive to summarize the high-level system impacts through five metrics related to Lake Powell and Lake Mead elevations, Lower Basin deliveries, and releases from Glen Canyon Dam. Analyzing tradeoffs among the metrics described in **Table ES-3** also provides important insight into the tradeoffs among other resources.

Table ES-3
High Level Performance Metrics Included in Figure ES-5

Metric Name	Description
Percent of months in which Lake Powell stays above elevation 3,500 feet	Elevation 3,500 feet provides a buffer above 3,490 feet, below which the reliability of infrastructure to meet critical downstream water supply needs may be compromised and hydropower cannot be produced at Glen Canyon Dam
Percent of months in which Lake Mead stays above elevation 975 feet	Elevation 975 feet provides a buffer above 950 feet, below which infrastructure may be critically impacted and hydropower cannot be produced at Hoover Dam
Percent of years in which Lake Mead dead pool-related reductions ⁵ are avoided	Delivery reductions due to Lake Mead being near dead pool (elevation 895 feet) resulting in large magnitudes of reductions to Lower Basin water users
Average annual shortage	The average annual shortage that occurs under each alternative provides important summary information for Lower Basin water users and context for reservoir-based performance
Average water year releases from Glen Canyon Dam	The average water year release from Glen Canyon Dam that occurs under each alternative provides important context for reservoir-based performance

⁵ Dead pool and Hoover Dam infrastructure can start to impact Lake Mead's ability to make deliveries to the Lower Basin at elevation 950 feet. Restrictions in water deliveries will occur when Lake Mead is near dead pool, resulting in large reductions (referred to as "dead pool-related reductions"). Although not considered an operational element of the alternatives, accounting for such reductions is an important performance metric.

The elevations described in **Table ES-3** have operational relevance, and comparing alternative performance relative to these elevations provides meaningful insight. In practice, operational implementation would include identifying elevations above critical thresholds (i.e., 3,490 feet and 950 feet) at which additional responsive actions could be taken in advance to avoid reaching those critical elevations. The “buffer” elevations shown in **Table ES-3** (i.e., 3,500 feet and 975 feet) may or may not correspond to operational decision for actual implementation; here, they are used for analytical purposes in this Final EIS.

Figure ES-5 summarizes how the alternatives and the Continued Current Strategies Comparative Baseline⁶ (labeled “Cont. Current”) perform over the next 10 years in five vertical axes that correspond to the five key metrics described in **Table ES-3**. The performance of each alternative is captured by a colored, segmented line that crosses the axes at different vertical positions, where the height denotes performance. Crossing lines are a visual cue that there is a tradeoff between different performance metrics. The five-metric performance summary is divided into four categories of potential 2027-2036 future hydrologic conditions that get increasingly dry from top to bottom.⁷ The hydrologic categories are summarized in **Table ES-4**. Results are divided into these categories to demonstrate how the alternatives respond under different assumptions about future hydrologic conditions and to explore the impacts of hydrology on performance tradeoffs.

Table ES-4
Hydrologic Categories Included in Figure ES-5

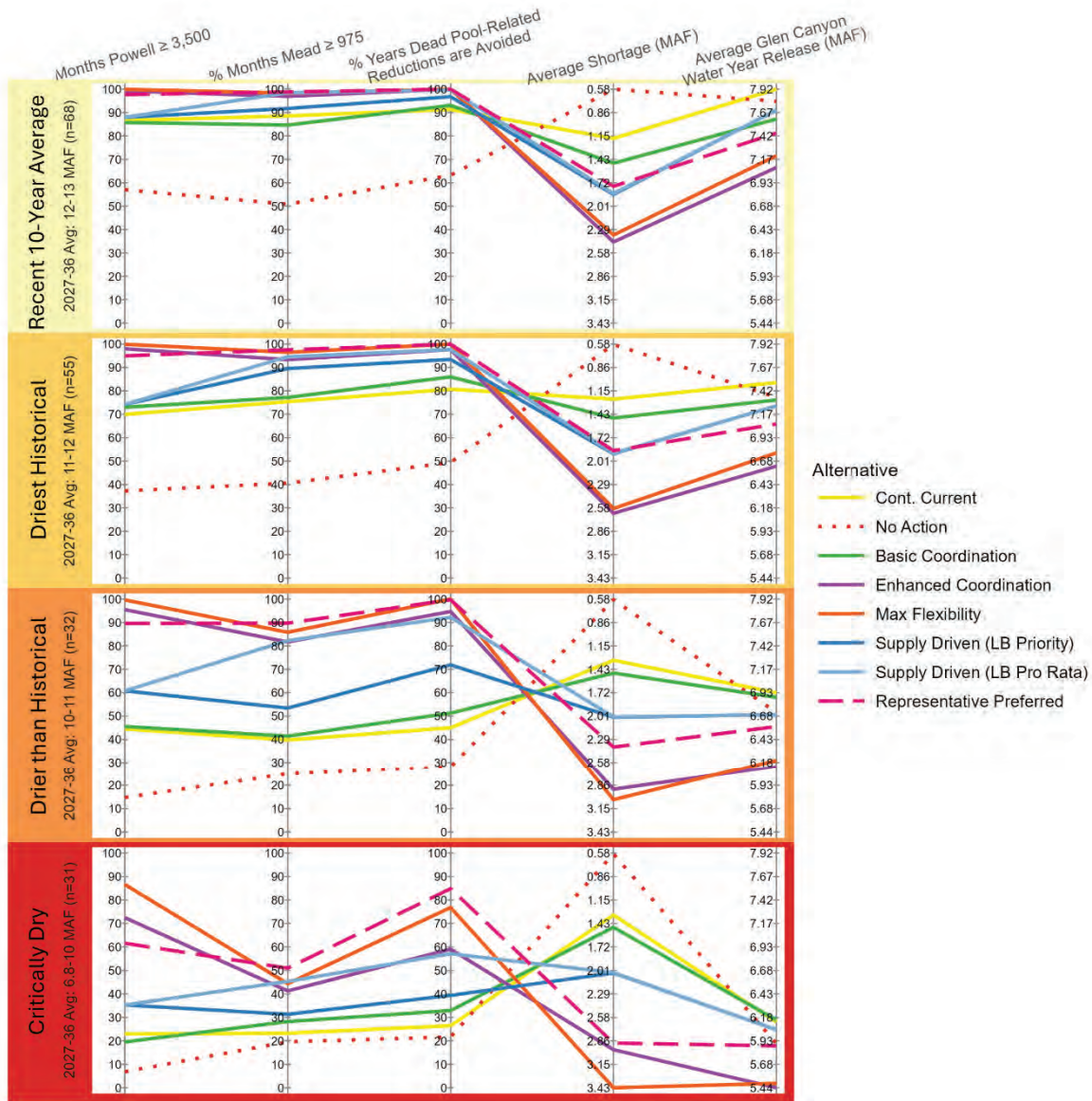
Hydrologic Category	Average Annual Simulated Lees Ferry Flow, 2027-2036 (maf)	Description
Recent 10-Year Average	12-13	Hydrologic conditions in this category are similar to the historical average from 2016-2025 (12.1 maf) ⁸
Driest Historical	11-12	Hydrologic conditions in this category are similar to the driest 10-year period in the historical record (11.8 maf, 2012-2021)
Drier than Historical	10-11	Hydrologic conditions in this category are 7-15% (0.8 to 1.8 maf) drier than the driest 10-year period in the historical record
Critically Dry	<10	Hydrologic conditions in this category are 15-42% (1.8-5.0 maf) drier than the driest 10-year period in the historical record

⁶ This scenario represents no changes from current operations and relies on strategies and agreements that expire in 2026. It is provided as a comparative baseline to inform an understanding of how the alternatives perform relative to current operations.

⁷ Wetter futures were also tested and are included in the impact analysis; however, for this analysis the hydrologic categories shown are most informative.

⁸ The 10-year average for 2014-2023 (12.8 maf), 2015-2024 (12.6 maf), and 2016-2025 (12.1 maf) are all between 12 and 13 maf.

Figure ES-5
Key Performance Tradeoffs in Different Hydrologic Conditions



Note: Differences in Lake Mead performance between Supply Driven (Lower Basin [LB] Priority) and the Supply Driven (LB Pro Rata) Alternatives reflect how different shortage distributions interact with assumptions regarding the use of the storage and delivery mechanism for conserved water.

A key performance tradeoff demonstrated by **Figure ES-5** is the tradeoff between percent of time in which critical reservoir elevations and dead pool-related reductions are avoided (first three axes from left) and average shortage (fourth axis from left). In the Recent 10-Year Average hydrologic category, this stands out as a difference between the No Action Alternative and the action alternatives, but in the drier hydrologic categories (especially Drier than Historical and Critically Dry), the performance differences between the action alternatives becomes clearer and the tradeoffs (indicated by the crossing lines) become steeper: the Maximum Operational Flexibility and Enhanced Coordination Alternatives incorporate large shortages and better protect the reservoirs, the Supply Driven Alternatives and the Basic Coordination Alternative have lower volumes of shortage and lower reservoir protection, and the No Action Alternative provides minimal protection and results in a high frequency of dead pool-related reductions while imposing minimal shortage. Across hydrologic categories, the Representative Preferred Alternative balances tradeoffs differently than other action alternatives. This is evident beginning in the Driest Historical hydrologic category, where it provides protection of Lake Powell and Lake Mead elevations similar to the most protective alternatives, while the average shortage volumes are similar to the Supply Driven Alternatives.

In Drier than Historical hydrologic futures, the Maximum Operational Flexibility and Enhanced Coordination Alternatives show that lower water year releases from Glen Canyon Dam provide more protection to keep Lake Powell above 3,500 feet, while the higher water year releases in Basic Coordination and Supply Driven result in significantly higher frequencies of Lake Powell falling below 3,500 feet. The Representative Preferred Alternative falls in between Supply Driven and Enhanced Coordination Alternatives: it releases less from Glen Canyon on average than the Supply Driven Alternative and better protects elevation 3,500 feet, but it releases more and offers less protection compared to the Enhanced Coordination Alternative. In the Critically Dry hydrologic category, water year releases are low across all alternatives, but only the Representative Preferred (62 percent of months), Enhanced Coordination (72 percent of months) and Maximum Operational Flexibility (87 percent of months) Alternatives protect 3,500 feet more than half of the time. The Supply Driven Alternatives and Basic Coordination Alternative maintain elevations above 3,500 feet in 35 percent and 20 percent of months, respectively.

The effectiveness of large shortages at preventing dead pool-related delivery reductions is clearest in the Critically Dry hydrologic category, where the Representative Preferred, Maximum Operational Flexibility, and Enhanced Coordination Alternatives rely on large average shortages to significantly outperform the other alternatives in avoiding dead pool-related reductions. However, in Critically Dry conditions, even these more protective alternatives result in Lake Mead elevations below 975 feet in 49, 56, and 59 percent of months, respectively.

Figure ES-1 is a quantitative representation of system tradeoffs and shows how those tradeoffs are exacerbated by drying hydrologic conditions. The analysis in this figure demonstrates how the sideboards of the Preferred Alternative, as analyzed in the Representative Preferred Alternative, appropriately balance the tradeoffs across key system metrics and provide protection in conditions drier than the ongoing, unprecedented drought. The Representative Preferred Alternative achieves good performance across key system metrics related to critical infrastructure in the driest hydrologic conditions the Basin has experienced (Driest Historical Hydrology) but imposes lower average shortages and enables higher Glen Canyon Dam releases than other similarly protective alternatives. In

conditions that are slightly drier than observed history (Drier than Historical Hydrology), the Representative Preferred Alternative maintains this moderate balance of performance between reservoir elevations, shortages, and Glen Canyon Dam releases. In the driest hydrologic conditions modeled (Critically Dry Hydrology), the ability of any set of operations to achieve good performance in these metrics is significantly diminished, but the Representative Preferred Alternative shows that the Preferred Alternative sideboards can protect critical infrastructure in the majority of these conditions while considering adverse impacts to Lower Basin water users.

ES.4.2 Vulnerability Analysis for Key Reservoir Elevations

The analysis related to **Figure ES-5** examines tradeoffs and the influence of different hydrologic scenarios on the alternatives' performance in important metrics. **Table ES-5** and **Table ES-6**, below, provide insight into what specific hydrology is likely to cause the system to be vulnerable to critical conditions under different alternatives and whether those conditions are similar to anything from the observed record. This context is helpful in understanding whether the conditions leading to vulnerability could be reasonably expected based on history.⁹ Based on analysis of 400 modeled hydrologic futures, an average-flow threshold was identified for each alternative that skillfully predicted the occurrence of a critical system condition at least once within 10 years of implementation (between 2027 and 2036).

Table ES-5
Vulnerability to Lake Powell Falling Below Elevation 3,500 Feet at Least Once in the First 10 Years and Comparison to Historical Conditions

Alternative	Water Year 2027-2036 Average Natural Flow that Could Cause Vulnerability (maf/year)	Number of Years Below Threshold 2000-2025 (Historical Data)	Number of Years Below Threshold 1906-2025 (Historical Data)
Cont. Current	≤12.1	3	4
No Action	≤19.6	26	111
Basic Coordination	≤11.9	1	1
Enhanced Coordination	≤9.3	0	0
Max Flexibility	≤8.1	0	0
Supply Driven (LB Priority)	≤12.5	7	9
Supply Driven (LB Pro Rata)	≤12.5	7	9
Representative Preferred	≤10.1	0	0

⁹ Information about how the vulnerability thresholds compare to projections of future conditions, which include the potential for a drier future, can be found in **Technical Appendix 3**, Hydrologic Resources.

Table ES-6
Vulnerability to Lake Mead Falling Below Elevation 975 Feet at Least Once in the First 10 Years and Comparison to Historical Conditions

Alternative	Water Year 2027-2036 Average Natural Flow that Could Cause Vulnerability (maf/year)	Number of Years Below Threshold 2000-2025 (Historical Data)	Number of Years Below Threshold 1906-2025 (Historical Data)
Cont. Current	≤11.6	0	0
No Action	≤14.5	23	67
Basic Coordination	≤11.3	0	0
Enhanced Coordination	≤9.7	0	0
Max Flexibility	≤10.0	0	0
Supply Driven (LB Priority)	≤11.1	0	0
Supply Driven (LB Pro Rata)	≤9.7	0	0
Representative Preferred	≤10.0	0	0

With respect to Lake Powell falling below elevation 3,500 feet at least once in the next 10 years, the Supply Driven Alternative is the most vulnerable action alternative: under these operations, Lake Powell would likely fall to critical elevations if the 10-year average natural flow at Lees Ferry is 12.5 maf or lower. Hydrologic conditions this dry or drier occurred in 7 years since 2000. With respect to Lake Mead falling below elevation 975 feet at least once in the next 10 years, the flow thresholds indicating vulnerability are drier for all of the action alternatives than any observed historical conditions. However, conditions this dry do occur in the set of 400 hydrologic traces analyzed in this EIS, which includes the potential for a future drier than historical observations (see **Appendix F**, Approach to Hydrologic Uncertainty, for information about the 400 hydrologic traces).

Modeling indicates that the Representative Preferred Alternative would likely be vulnerable to Lake Powell falling below 3,500 feet if the 2027-2026 average flow is 10.1 maf or less and Lake Mead falling below 975 feet if the 2027-2036 average flow is 10.0 maf or less. The Representative Preferred Alternative is reasonably unlikely to be vulnerable in the next 10 years because these conditions have not occurred and are about 15 percent drier than the driest 10-year period on record (2012-2021, average of 11.8 maf). However, estimates for 2026 natural flow suggest 2017-2026 will become the driest 10-year period on record (about 11.5 maf), reflecting that hydrology could continue to decline relative to the comparisons in this table. The possibility for a drier future is reflected in the set of 400 hydrologic traces analyzed in this EIS.

ES.4.3 Conclusions

A number of reservoir and water management decisional documents and agreements that govern operation of Colorado River facilities and management of Colorado River water are currently scheduled to expire at the end of 2026. The Secretary, acting through Reclamation, proposes adoption of new guidelines and coordinated management strategies to address Lake Powell and Lake Mead through their full operating range, to be implemented upon the expiration of the existing guidelines and agreements. Management strategies will primarily focus on the operation of Glen Canyon Dam and Hoover Dam but may include actions upstream and downstream of these facilities to protect critical reservoir elevations.

Since the adoption of the current guidelines in 2007, unprecedented drought has changed the Basin's understanding of hydrology. Hydrologic conditions drier than those in the previously observed record have continued to occur, confounding ongoing efforts to manage system risk. This reality poses both near- and long-term challenges in managing the Colorado River system to continue to provide predictability and certainty to Basin water users as well as operating flexibility to conserve and enhance water storage in Colorado River system reservoirs.

This Final EIS analyzes a reasonable and broad range of alternatives for the operational elements identified in the proposed federal action. These alternatives were developed through extensive engagement with a wide range of partners and stakeholders as well as the general public during a timeframe of over 4 years. In the absence of a consensus long-term agreement, Reclamation has included a Preferred Alternative decision framework in this Final EIS that establishes the operational principles, sideboards, and process that would govern development and adoption of operating guidelines through 2036. The sideboards of the Preferred Alternative were analyzed through the Representative Preferred Alternative, and the analysis of the potential impacts of these sideboards provides environmental compliance for decisions made consistent with the decision framework. Based on the analysis in this Final EIS and the key tradeoffs shown above, the Preferred Alternative, as analyzed in the Representative Preferred Alternative, appropriately balances the inherent system tradeoffs: it is a practical approach to robust protection of critical infrastructure while considering adverse impacts to water users and avoiding unnecessary impacts to other resources.

ES.5 Summary of Potential Effects

Table ES-7
Summary of Potential Effects of the Alternatives

Hydrology (See Section 3.3)

Impact Category	Performance Indicator ¹	Impacts Summary						
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	Representative Preferred Alternative
Reservoir Elevations	Ranking of alternatives related to Lake Powell end of water year (EOWY) median elevations in the critically dry flow category.	Ranked #6. Lowest median elevations in the critically dry flow category.	Ranked #5. Second lowest median elevations in the critically dry flow category.	Ranked #1. Highest median elevations in the critically dry flow category.	Ranked #2. Second highest median elevations in the critically dry flow category.	Tied Ranked #4. Tied third lowest median elevations in the critically dry flow category (same as Supply Driven Alternative [LB Pro Rata approach]).	Tied Ranked #4. Tied third lowest median elevations in the critically dry flow category (same as Supply Driven Alternative [LB Priority approach]).	Ranked #3. Third highest median elevations in the critically dry flow category.
	Percent of modeled futures in which <i>Lake Powell elevation stays above 3,500 feet 100% of the time.</i> The higher the percentage, the more likely Lake Powell will remain above the minimum power pool (3,490 feet) under most future hydrologic scenarios.	 4% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 19% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 81% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 94% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 35% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 35% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 58% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.
	Ranking of alternatives related to Lake Mead end of calendar year (EOCY) median elevations in the critically dry flow category.	Ranked #7. Lowest median elevations in the critically dry flow category.	Ranked #6. Second lowest median elevations in the critically dry flow category.	Ranked #4. Fourth lowest median elevations in the critically dry flow category.	Ranked #2. Second highest median elevations in the critically dry flow category.	Ranked #3. Third highest median elevations in the critically dry flow category.	Ranked #1. Highest median elevations in the critically dry flow category.	Ranked #5. Third lowest median elevations in the critically dry flow category.
	Percent of futures in which <i>Lake Mead elevation stays above 975 feet 100% of the time.</i> The higher the percentage, the more likely Lake Mead will remain above the minimum power pool (950 feet) under most future hydrologic scenarios.	 32% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 62% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 74% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 77% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 69% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 81% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	 72% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.

¹ Some performance indicator descriptions include italics to denote a definition of the "preferred minimum performance" that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.

Impact Category	Performance Indicator ¹	Impacts Summary					Representative Preferred Alternative
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Pro Rate)	
Reservoir Elevations (continued)	Lake Mohave and Lake Havasu end of year elevations.	No impact; the existing rule curves continue to determine elevations.					
	Ranking of alternatives related to Lake Powell + Lake Mead combined median storage capacity in all flow categories.	Ranked #7. Lowest combined storage in all flow categories.	Ranked #6. Second lowest combined storage in all flow categories.	Ranked #1. Highest combined storage in all flow categories.	Ranked #2. Second highest combined storage in all flow categories.	Ranked #3. Third highest combined storage in all flow categories.	Ranked #4. Fourth highest combined storage in all flow categories.
	Ranking of alternatives related to CRSP Reservoir (Flaming Gorge, Navajo, Blue Mesa, and Powell) combined median storage capacity in the two driest flow categories.	Tied Ranked #4. Tied second lowest combined storage in the driest flow categories (same as both Supply Driven Alternatives).	Ranked #5. Lowest combined storage in the driest flow categories.	Ranked #1. Highest combined storage in the driest flow categories.	Ranked #2. Second highest combined storage in the driest flow categories.	Tied Ranked #4. Tied second lowest combined storage in the driest flow categories (same as Supply Driven Alternative [LB Pro Rate approach] and No Action).	Ranked #3. Third highest combined storage in the driest flow categories.
	Ranking of alternatives related to Seven-Reservoir (Flaming Gorge, Navajo, Blue Mesa, Powell, Mead, Mohave, and Havasu) combined median storage capacity in all flow categories.	Ranked #7. Lowest combined storage in all flow categories.	Ranked #6. Second lowest combined storage in all flow categories.	Ranked #1. Highest combined storage in the driest flow categories.	Ranked #2. Second highest combined storage in all flow categories.	Ranked #3. Third highest combined storage in all flow categories.	Ranked #5. Third lowest combined storage in all flow categories.
Reservoir Releases	Annual Glen Canyon Dam EOWY releases under average and critically dry hydrology conditions (median values)	Releases of 8.23 maf in the average flow category. Releases of 6.36 maf in the critically dry flow category.	Releases of 8.23 maf in the average flow category. Releases of 6.92 maf in the critically dry flow category.	Releases of 7.95 maf in the average flow category. Releases of 5.11 maf in the critically dry flow category.	Releases of 8.17 maf in the average flow category. Releases of 5.61 maf in the critically dry flow category.	Releases of 8.41 maf in the average flow category. Releases of 6.04 maf in the critically dry flow category.	Releases of 8.23 maf in the average flow category. Releases of 6.00 maf in the critically dry flow category.
	10-year Glen Canyon Dam releases under average and critically dry hydrology conditions (median values)	Releases of 80.8 maf in the average flow category. Releases of 74.3 maf in the critically dry flow category.	Releases of 79.0 maf in the average flow category. Releases of 74.5 maf in the critically dry flow category.	Releases of 77.4 maf in the average flow category. Releases of 69.1 maf in the critically dry flow category.	Releases of 78.9 maf in the average flow category. Releases of 70.8 maf in the critically dry flow category.	Releases of 81.7 maf in the average flow category. Releases of 73.5 maf in the critically dry flow category.	Releases of 78.8 maf in the average flow category. Releases of 72.5 maf in the critically dry flow category.
	10-year Lee Ferry Compact Point flow volumes under average and critically dry hydrology conditions (median values)	Flows of 82.3 maf in the average flow category. Flows of 75.7 maf in the critically dry flow category.	Flows of 80.6 maf in the average flow category. Flows of 76.0 maf in the critically dry flow category.	Flows of 78.9 maf in the average flow category. Flows of 70.6 maf in the critically dry flow category.	Flows of 80.6 maf in the average flow category. Flows of 72.4 maf in the critically dry flow category.	Flows of 83.4 maf in the average flow category. Flows of 74.9 maf in the critically dry flow category.	Flows of 80.4 maf in the average flow category. Flows of 73.9 maf in the critically dry flow category.

¹ Some performance indicator descriptions include italics to denote a definition of the "preferred minimum performance" that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.

Impact Category	Performance Indicator ¹	Impacts Summary						Supply Driven Alternative (LB Pro Rata)	Representative Preferred Alternative
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)		
Reservoir Releases (continued)	Annual EOY Hoover Dam releases under critically dry hydrology conditions (median values)	Releases of 8.7 maf in the average flow category. Flows of 7.2 maf in the critically dry flow category.	Releases of 8.0 maf in the average flow category. Flows of 7.7 maf in the critically dry flow category.	Releases of 7.6 maf in the average flow category. Flows of 6.5 maf in the critically dry flow category.	Releases of 7.8 maf in the average flow category. Flows of 6.4 maf in the critically dry flow category.	Releases of 7.7 maf in the average flow category. Flows of 7.2 maf in the critically dry flow category.	Releases of 7.7 maf in the average flow category. Flows of 7.1 maf in the critically dry flow category.	Releases of 7.9 maf in the average flow category. Flows of 6.9 maf in the critically dry flow category.	
	Annual EOY Davis Dam releases under average and critically dry hydrology conditions (median values)	Releases of 8.5 maf in the average flow category. Releases of 7.1 maf in the critically dry flow category.	Releases of 7.9 maf in the average flow category. Releases of 7.6 maf in the critically dry flow category.	Releases of 7.4 maf in the average flow category. Releases of 6.4 maf in the critically dry flow category.	Releases of 7.6 maf in the average flow category. Releases of 6.3 maf in the critically dry flow category.	Releases of 7.6 maf in the average flow category. Releases of 7.1 maf in the critically dry flow category.	Releases of 7.5 maf in the average flow category. Releases of 7.0 maf in the critically dry flow category.	Releases of 7.8 maf in the average flow category. Releases of 6.9 maf in the critically dry flow category.	
	Annual EOY Parker Dam releases under average and critically dry hydrology conditions (median values)	Releases of 6.6 maf in the average flow category. Releases of 6.0 maf in the critically dry flow category.	Releases of 6.5 maf in the average flow category. Releases of 6.3 maf in the critically dry flow category.	Releases of 5.5 maf in the average flow category. Releases of 4.6 maf in the critically dry flow category.	Releases of 6.3 maf in the average flow category. Releases of 5.7 maf in the critically dry flow category.	Releases of 6.3 maf in the average flow category. Releases of 6.1 maf in the critically dry flow category.	Releases of 5.8 maf in the average flow category. Releases of 5.4 maf in the critically dry flow category.	Releases of 6.4 maf in the average flow category. Releases of 5.9 maf in the critically dry flow category.	
	Ranking of alternatives related to median river flows in Reach 1 (Glen Canyon Dam to Lake Mead).	Ranked #2. Second highest median river flows in the critically dry flow category. Mirrors trends for releases from Glen Canyon Dam. River flows decrease as flow categories get drier.	Ranked #1. Highest median river flows in the critically dry flow category. Mirrors trends for releases from Glen Canyon Dam. River flows decrease as flow categories get drier.	Ranked #6. Lowest median river flows in the critically dry flow category. Mirrors trends for releases from Glen Canyon Dam. River flows decrease as flow categories get drier.	Ranked #5. Second lowest median river flows in the critically dry flow category. Mirrors trends for releases from Glen Canyon Dam. River flows decrease as flow categories get drier.	Tied Ranked #3. Tied third highest median river flows in the critically dry flow category (same as Supply Driven Alternative [LB Pro Rata]). Mirrors trends for releases from Glen Canyon Dam. River flows decrease as flow categories get drier.	Tied Ranked #3. Tied third median river flows in the critically dry flow category (same as Supply Driven Alternative [LB Priority]). Mirrors trends for releases from Glen Canyon Dam. River flows decrease as flow categories get drier.	Ranked #4. Third lowest median river flows in the critically dry flow category (same as No Action Alternative). Mirrors trends for releases from Glen Canyon Dam. River flows decrease as flow categories get drier.	
River Flows	Ranking of alternatives related to median river flows in Reach 2 (Hoover Dam to Lake Mohave)	Ranked #3. Third highest median river flows in the critically dry flow category. Mirrors trends for releases from Hoover Dam. River flows decrease as flow categories get drier.	Ranked #1. Highest median river flows in the critically dry flow category. Mirrors trends for releases from Hoover Dam. River flows decrease as flow categories get drier.	Ranked #6. Second lowest median river flows in the critically dry flow category. Mirrors trends for releases from Hoover Dam. River flows decrease as flow categories get drier.	Ranked #7. Lowest median river flows in the critically dry flow category. Mirrors trends for releases from Hoover Dam. River flows decrease as flow categories get drier.	Ranked #2. Second highest median river flows in the critically dry flow category. Mirrors trends for releases from Hoover Dam. River flows decrease as flow categories get drier.	Ranked #4. Fourth highest median river flows in the critically dry flow category. Mirrors trends for releases from Hoover Dam. River flows decrease as flow categories get drier.	Ranked #5. Third lowest median river flows in the critically dry flow category. Mirrors trends for releases from Hoover Dam. River flows decrease as flow categories get drier.	
	Ranking of alternatives related to median river flows in Reach 3 (Davis Dam to Lake Havasu)	Tied Ranked #2. Tied second highest median river flows in the critically dry flow category (same as the Supply Driven Alternative [LB Priority]). Mirrors trends for releases from Davis Dam. River flows decrease as flow categories get drier.	Ranked #1. Highest median river flows in the critically dry flow category. Mirrors trends for releases from Davis Dam. River flows decrease as flow categories get drier.	Ranked #5. Second lowest median river flows in the critically dry flow category. Mirrors trends for releases from Davis Dam. River flows decrease as flow categories get drier.	Ranked #6. Lowest median river flows in the critically dry flow category. Mirrors trends for releases from Davis Dam. River flows decrease as flow categories get drier.	Tied Ranked #2. Tied second highest median river flows in the critically dry flow category (same as No Action Alternative). Mirrors trends for releases from Davis Dam. River flows decrease as flow categories get drier.	Ranked #3. Third highest median river flows in the critically dry flow category. Mirrors trends for releases from Davis Dam. River flows decrease as flow categories get drier.	Ranked #4. Third lowest median river flows in the critically dry flow category. Mirrors trends for releases from Davis Dam. River flows decrease as flow categories get drier.	

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Impact Category	Performance Indicator ¹	Impacts Summary						Representative Preferred Alternative
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	
River Flows (continued)	Ranking of alternatives related to median river flows in Reach 4 (Parker Dam to Cibola Gage)	Ranked #3. Third highest median river flows in the critically dry flow category. Mirrors trends for releases from Parker Dam. River flows decrease as flow categories get drier.	Ranked #1. Highest median river flows in the critically dry flow category. Mirrors trends for releases from Parker Dam. River flows decrease as flow categories get drier.	Ranked #7. Lowest median river flows in the critically dry flow category. Mirrors trends for releases from Parker Dam. River flows decrease as flow categories get drier.	Ranked #5. Third lowest median river flows in the critically dry flow category. Mirrors trends for releases from Parker Dam. River flows decrease as flow categories get drier.	Ranked #2. Second highest median river flows in the critically dry flow category. Mirrors trends for releases from Parker Dam. River flows decrease as flow categories get drier.	Ranked #6. Second lowest median river flows in the critically dry flow category. Mirrors trends for releases from Parker Dam. River flows decrease as flow categories get drier.	Ranked #4. Fourth highest median river flows in the critically dry flow category. Mirrors trends for releases from Parker Dam. River flows decrease as flow categories get drier.
	Ranking of alternatives related to median river flows in Reach 5 (Cibola Gage to Imperial Dam)	Ranked #3. Third highest median river flows in the critically dry flow category. Mirrors trends for river flows in Reach 4. River flows decrease as flow categories get drier.	Ranked #1. Highest median river flows in the critically dry flow category. Mirrors trends for river flows in Reach 4. River flows decrease as flow categories get drier.	Ranked #7. Lowest median river flows in the critically dry flow category. Mirrors trends for river flows in Reach 4. River flows decrease as flow categories get drier.	Ranked #5. Third lowest median river flows in the critically dry flow category. Mirrors trends for river flows in Reach 4. River flows decrease as flow categories get drier.	Ranked #2. Second highest median river flows in the critically dry flow category. Mirrors trends for river flows in Reach 4. River flows decrease as flow categories get drier.	Ranked #6. Second lowest median river flows in the critically dry flow category. Mirrors trends for river flows in Reach 4. River flows decrease as flow categories get drier.	Ranked #4. Fourth highest median river flows in the critically dry flow category. Mirrors trends for river flows in Reach 4. River flows decrease as flow categories get drier.
	Ranking of alternatives related to median river flows in Reach 6 (Imperial Dam to Northerly International Boundary (NIB))	Tied Ranked #3. Tied third highest median river flows in critically dry flow category (same as Representative Preferred Alternative). Releases of 0.9 maf in the critically dry flow category.	Ranked #1. Highest river flows in critically dry flow category. Releases of 1.0 maf in the critically dry flow category.	Ranked #6. Lowest median river flows in critically dry flow category. Releases of 0.8 maf in the average flow category.	Ranked #4. Third lowest median river flows in critically dry flow categories. Releases of 0.8 maf in the critically dry flow category.	Ranked #2. Second highest median river flows in critically dry flow category. Releases of 0.9 maf in the critically dry flow category.	Ranked #5. Second lowest median river flows in critically dry flow category. Releases of 1.0 maf in the critically dry flow category.	Tied Ranked #3. Tied third highest median river flows in all flow categories (same as No Action Alternative). Releases of 0.8 maf in the critically dry flow category.
Groundwater	Likelihood for infrequent river flows to occur in wetter flow categories in Reach 7 (NIB to SIB, below Morelos)	Flows below Morelos Dam are infrequent under all flow categories. Least likely for infrequent flows to occur in the wetter flow categories.	Flows below Morelos Dam are infrequent under all flow categories. Least likely for infrequent flows to occur in the wetter flow categories.	Flows below Morelos Dam are infrequent under all flow categories. Among the middle performing for infrequent flows to occur in the wetter flow categories.	Flows below Morelos Dam are infrequent under all flow categories. Among the middle performing for infrequent flows to occur in the wetter flow categories.	Flows below Morelos Dam are infrequent under all flow categories. Most likely for infrequent flows to occur in the wet flow category.	Flows below Morelos Dam are infrequent under all flow categories. Most likely for infrequent flows to occur in the wet flow category.	Flows below Morelos Dam are infrequent under all flow categories. Among the middle performing for infrequent flows to occur in the wetter flow categories.
	Groundwater in Reach 1 (Glen Canyon Dam to Lake Mead).	Ranked #5. Second least robust at keeping elevations at Lake Powell above 3,500 feet; changes to groundwater levels adjacent to Lake Powell may be affected by changes in reservoir elevations.	Ranked #5. Second least robust at keeping elevations at Lake Powell above 3,500 feet; changes to groundwater levels adjacent to Lake Powell may be affected by changes in reservoir elevations.	Ranked #2. Second most robust at keeping elevations at Lake Powell above 3,500 feet; changes to groundwater levels adjacent to Lake Powell may be affected by changes in reservoir elevations.	Ranked #1. Most robust at keeping elevations at Lake Powell above 3,500 feet; changes to groundwater levels adjacent to Lake Powell may be affected by changes in reservoir elevations.	Tied Ranked #3. Tied third most robust at keeping elevations at Lake Powell above 3,500 feet; changes to groundwater levels adjacent to Lake Powell may be affected by changes in reservoir elevations.	Tied Ranked #3. Tied third most robust at keeping elevations at Lake Powell above 3,500 feet; changes to groundwater levels adjacent to Lake Powell may be affected by changes in reservoir elevations.	Ranked #4. Third least robust at keeping elevations at Lake Powell above 3,500 feet; changes to groundwater levels adjacent to Lake Powell may be affected by changes in reservoir elevations.
	Groundwater in Reach 2 (Hoover Dam to Lake Mohave)	Groundwater elevations through Grand Canyon are not anticipated to be affected.	Groundwater elevations through Grand Canyon are not anticipated to be affected.	Groundwater elevations through Grand Canyon are not anticipated to be affected.	Groundwater elevations through Grand Canyon are not anticipated to be affected.	Groundwater elevations through Grand Canyon are not anticipated to be affected.	Groundwater elevations through Grand Canyon are not anticipated to be affected.	Groundwater elevations through Grand Canyon are not anticipated to be affected.
		Groundwater elevations through this reach are not anticipated to be affected.						

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Impact Category	Performance Indicator ¹	Impacts Summary						Representative Preferred Alternative
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	
Groundwater (continued)	Groundwater in Reach 3 (Davis Dam to Lake Havasu)	Tied Ranked #2. Tied second highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage. Groundwater elevations adjacent to Lake Havasu are not anticipated to be affected.	Ranked #1. Highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage. Groundwater elevations adjacent to Lake Havasu are not anticipated to be affected.	Ranked #5. Second lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage. Groundwater elevations adjacent to Lake Havasu are not anticipated to be affected.	Ranked #6. Lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage. Groundwater elevations adjacent to Lake Havasu are not anticipated to be affected.	Tied Ranked #2. Tied second highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage. Groundwater elevations adjacent to Lake Havasu are not anticipated to be affected.	Ranked #3. Third highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage. Groundwater elevations adjacent to Lake Havasu are not anticipated to be affected.	Ranked #4. Third lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage. Groundwater elevations adjacent to Lake Havasu are not anticipated to be affected.
	Groundwater in Reach 4 (Parker Dam to Cibola Gage)	Ranked #3. Third highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #1. Highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #7. Lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #5. Third lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #2. Second highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #6. Second lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #4. Fourth highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.
	Groundwater in Reach 5 (Cibola Gage to Imperial Dam)	Ranked #3. Third highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #1. Highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #7. Lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #5. Third lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #2. Second highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #6. Second lowest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.	Ranked #4. Fourth highest river flows in reach; changes to groundwater levels adjacent to the river may be affected by changes in river stage.
	Groundwater in Reach 6 (Imperial Dam to NIB)	Most of the river channel is bypassed with a series of canals and sluiceways. Groundwater elevations through this reach are not anticipated to be affected.						
	Groundwater in Reach 7 (NIB to SIB)	Least likely for infrequent flows to occur in this reach. Groundwater in the southern reach of the limitrophe may be affected by decreased flows.	Least likely for infrequent flows to occur in this reach. Groundwater in the southern reach of the limitrophe may be affected by decreased flows.	Among the middle performing for infrequent flows to occur in this reach. Groundwater in the southern reach of the limitrophe may be affected by decreased flows.	Among the middle performing for infrequent flows to occur in this reach. Groundwater in the southern reach of the limitrophe may be affected by decreased flows.	Most likely for infrequent flows to occur in this reach. Groundwater in the southern reach of the limitrophe may be affected by decreased flows.	Most likely for infrequent flows to occur in this reach. Groundwater in the southern reach of the limitrophe may be affected by decreased flows.	Among the middle performing for infrequent flows to occur in this reach. Groundwater in the southern reach of the limitrophe may be affected by decreased flows.

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Water Deliveries (See Section 3.4)

Impact Category	Performance Indicator ¹	Impacts Summary						
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	Representative Preferred Alternative
Apportionments	Upper Division States Lower Division States	No impact Shortages are distributed based on priority.	No impact Shortages are distributed based on priority.	No impact Shortages are distributed based on pro rata.	No impact Shortages are distributed priority based on Lower Division States' submission.	No impact Shortages are distributed priority based on Lower DivisionD States' submission.	No impact Shortages are distributed pro rata based on Lower DivisionD States' submission.	No impact Shortages are distributed based on priority.
Lower Division States Water Supply Determinations and Total Water Deliveries ²	Percent of modeled futures in which <i>dead pool-related reductions are avoided in 100% of years</i> . The higher the percentage, the more likely dead pool-related reductions are avoided.	41% of modeled futures meet <i>the preferred minimum performance</i> during the 2027-2039 modeling period.	68% of modeled futures meet <i>the preferred minimum performance</i> during the 2027-2039 modeling period.	88% of modeled futures meet <i>the preferred minimum performance</i> during the 2027-2039 modeling period.	94% of modeled futures meet <i>the preferred minimum performance</i> during the 2027-2039 modeling period.	77% of modeled futures meet <i>the preferred minimum performance</i> during the 2027-2039 modeling period.	88% of modeled futures meet <i>the preferred minimum performance</i> during the 2027-2039 modeling period.	95% of modeled futures meet <i>the preferred minimum performance</i> during the 2027-2039 modeling period.
	Effects of modeling assumptions for Upper and Lower Basin conservation activity (comparison of shortage and depletion results when turning conservation activity on and off).	Median reductions remain similar with conservation on or off. ³	Median reductions remain similar with conservation on or off. ¹	Median shortages slightly higher with conservation off compared to conservation on in all flow categories. Median depletions slightly lower with conservation off in all flow categories.	Median shortages slightly lower with conservation off compared to conservation on in wetter flow categories but higher or similar in drier flow categories . Median depletions slightly higher with conservation off compared to conservation on in wetter flow categories but slightly lower in drier flow categories .	Median shortages slightly lower with conservation off compared to conservation on. Median depletions slightly higher with conservation off compared to conservation on.	Median shortages slightly lower with conservation off compared to conservation on. Median depletions slightly higher with conservation off compared to conservation on.	Median shortages higher with conservation off compared to conservation on. Median depletions slightly lower with conservation off compared to conservation on.

¹ Some performance indicator descriptions include italics to denote a definition of the “*preferred minimum performance*” that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.

² Total shortage volumes and deliveries include assumptions related to reductions in water deliveries to Mexico. Appendix A provides additional detail. Reclamation’s modeling assumptions are not intended to constitute an interpretation or application of the 1944 Water Treaty or to represent current U.S. policy or a determination of future U.S. policy regarding deliveries to Mexico. The U.S. will conduct all necessary and appropriate discussions regarding the proposed federal action and implementation of the 1944 Water Treaty with Mexico through the IBWC in consultation with the Department of State.

³ While the No Action and Basic Coordination alternatives do not include mechanisms to conserve and store water in Lake Powell or Lake Mead, the model does include assumptions for the delivery of existing ICS that was conserved prior to 2027. In the conservation-off results, activity related to pre-2027 conservation is turned off for all the alternatives and the CCS Comparative Baseline. Refer to TA 4, Water Deliveries, for more details.

Impact Category	Performance Indicator ¹	Impacts Summary						Representative Preferred Alternative
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	
Lower Division States Water Supply Determinations and Deliveries (continued)	Maximum shortage (maf) where shortage is any modeled reduction to the ability of an entitlement holder to exercise an entitlement as described in the assumptions of the model	Total Lower Basin: 0.60 ⁴ Arizona: 0.47 California: 0.00 Nevada: 0.03	Total Lower Basin: 1.48 ⁴ Arizona: 1.15 California: 0.00 Nevada: 0.08	Total Lower Basin: 3.00 Arizona: 0.93 California: 1.47 Nevada: 0.10	Total Lower Basin: 4.00 Arizona: 1.93 California: 1.28 Nevada: 0.20	Total Lower Basin: 2.10 Arizona: 1.22 California: 0.44 Nevada: 0.09	Total Lower Basin: 2.10 Arizona: 0.92 California: 0.76 Nevada: 0.07	Total Lower Basin: 3.6 Arizona: 1.96 California: 0.9 Nevada: 0.21
	Annual volume of Lower Basin shortage and dead pool-related reductions under critically dry hydrologic conditions (median values). Volumes are expressed as a total volume of reductions to the Lower Basin, including Mexico.	Median reductions increase as flow categories become drier. Shortage: 0.6 maf Lowest Dead pool-related reductions: 1.5 maf Highest	Median reductions increase as flow categories become drier. Shortage: 1.5 maf Second lowest Dead pool-related reductions: 0 maf Tied lowest	Median reductions increase as flow categories become drier. Shortage: 3.0 maf Second highest Dead pool-related reductions: 0 maf Tied lowest	Median reductions increase as flow categories become drier. Shortage: 3.1 maf Highest Dead pool-related reductions: 0 maf Tied lowest	Median reductions increase as flow categories become drier. Shortage: 2.0 maf Third lowest Dead pool-related reductions: 0 maf Tied lowest	Median reductions increase as flow categories become drier. Shortage: 1.9 maf Third lowest Dead pool-related reductions: 0 maf Tied lowest	Median reductions increase as flow categories become drier. Shortage: 2.1 maf Third highest Dead pool-related reductions: 0 maf Tied lowest
	Annual shortage by state under critically dry hydrology conditions (median values). Values are reported as percent of apportionment.	Arizona: 16.7% ⁴ Lowest California: 0% Lowest Nevada: 11% Lowest	Arizona: 41.1% ⁴ Fourth highest California: 0% Lowest Nevada: 27.2% Fourth highest	Arizona: 33.3% Third lowest California: 33.3% Highest Nevada: 33.3% Third highest	Arizona: 58.7% Highest California: 17.3% Second highest Nevada: 48.0% Highest	Arizona: 41.2% Third highest California: 10.0% Second lowest Nevada: 26.6% Third lowest	Arizona: 31.8% Second lowest California: 15.8% Third lowest Nevada: 22.0% Second lowest	Arizona: 53.1% Second highest California: 10.0% Second lowest Nevada: 36.3% Second highest
	Annual depletions (reported as percent of apportionment) by state under critically dry hydrology conditions (median values). Depletion is defined as total consumptive use (such as the amount of water diverted from the river) minus the return flow.	Arizona: 56.7% Third lowest California: 90.9% Second highest Nevada: 66.8% Lowest	Arizona: 58.9% Second highest California: 100% Highest Nevada: 83.3% Second highest	Arizona: 67.5% Highest California: 66.6% Lowest Nevada: 83.1% Third highest	Arizona: 42.5% Lowest California: 81.4% Second lowest Nevada: 69.8% Second Lowest	Arizona: 57.1% Fourth highest California: 86.9% Third highest Nevada: 83.1% Third highest	Arizona: 58.2% Third highest California: 82.8% Third lowest Nevada: 86.6% Highest	Arizona: 51.8% Second lowest California: 86.0% Fourth highest Nevada: 73.3% Third lowest

¹ Some performance indicator descriptions include italics to denote a definition of the "preferred minimum performance" that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.

⁴ Note that these impacts are based on low maximum Lower Basin shortage volumes that translate to higher volumes of dead pool-related reductions (see **Figure TA 4-12**), which could result in significant but highly uncertain impacts.

Impact Category	Performance Indicator ¹	Impacts Summary						
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	Representative Preferred Alternative
Deliveries to Mexico	Annual delivery reduction under critically dry hydrology (median values). Values are reported as percent of allotment.	6.7% ⁴ Lowest	16.4% ⁴ Second lowest	33.3% Second highest	34.3% Highest	22.3% Fourth highest	22.0% Third lowest	23.6% Third highest
	Annual depletions under critically dry hydrology (median values). Values are reported as percent of allotment.	76.8% Third Lowest	83.6% Highest	67.4% Second Lowest	65.4% Lowest	78.3% Fourth highest	79.2% Third highest	81.5% Second highest
Lower Division States Combined Shortages	Shortage Allocation Model and Alternative Distribution Model estimated shortage impacts by water user type (Tribal, Domestic, and Non-Tribal Irrigation) under shortage conditions over a specified range of shortage volumes	Tribal: ⁴ 241 kaf Domestic: 277 kaf Non-Tribal Irrigation: 6 kaf	Tribal: ⁴ 241–489 kaf Domestic: 277–752 kaf Non-Tribal Irrigation: 6-34 kaf	Tribal: 76-378 kaf Domestic: 109-546 kaf Non-Tribal Irrigation: 316-1,578 kaf	Tribal: 209-582 kaf Domestic: 313-1,501 kaf Non-Tribal Irrigation: 2-1,211 kaf	Tribal: 209-510 kaf Domestic: 313-1,179 kaf Non-Tribal Irrigation: 2-88 kaf	Tribal: 139-357 kaf Domestic: 155-449 kaf Non-Tribal Irrigation: 206-944 kaf	LB Priority 2027-2028 Tribal: 209-346 kaf Domestic: 313-858 kaf Non-Tribal Irrigation: 2-70 kaf
								Priority (2029-later) Tribal: 241-576 kaf Domestic: 277-1,472 kaf Non-Tribal Irrigation: 6-829 kaf

¹ Some performance indicator descriptions include italics to denote a definition of the "preferred minimum performance" that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.

⁴ Note that these impacts are based on low maximum Lower Basin shortage volumes that translate to higher volumes of dead pool-related reductions (see **Figure TA 4-12**), which could result in significant but highly uncertain impacts.

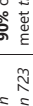
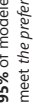
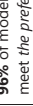
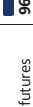
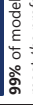
Geomorphology and Sediment (See Section 3.5)

Impact Category	Performance Indicator ¹	No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Impacts Summary			Representative Preferred Alternative
					Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	
Water Availability	Percent of modeled futures in which Lake Powell exceeds 3,500 feet in November or April (or both) in 100% of years.	 19% of modeled futures meet the preferred minimum performance.	 36% of modeled futures meet the preferred minimum performance.	 88% of modeled futures meet the preferred minimum performance.	 97% of modeled futures meet the preferred minimum performance.	 46% of modeled futures meet the preferred minimum performance.		 60% of modeled futures meet the preferred minimum performance.
	Percent of modeled futures in which Lake Powell exceeds 3,523 feet (the historical low elevation) in November or April (or both) in 100% of years.	 3% of modeled futures meet the preferred minimum performance.	 6% of modeled futures meet the preferred minimum performance.	 29% of modeled futures meet the preferred minimum performance.	 24% of modeled futures meet the preferred minimum performance.	 12% of modeled futures meet the preferred minimum performance.		 14% of modeled futures meet the preferred minimum performance.
Sand Mass	Percent of modeled futures in which the monthly Glen Canyon Dam releases are less than 900 kcf (approximately 15,000 cubic feet per second (cfs)) in at least 90% of months. In other words, Glen Canyon Dam release rates are non-erosive in at least 90% of the simulation period.	 21% of modeled futures meet the preferred minimum performance.	 50% of modeled futures meet the preferred minimum performance.	 68% of modeled futures meet the preferred minimum performance.	 39% of modeled futures meet the preferred minimum performance.	 24% of modeled futures meet the preferred minimum performance.		 41% of modeled futures meet the preferred minimum performance.
	Percent of modeled futures in which the sand mass in Marble Canyon exceeds 294,000 metric tons, the average transport capacity for a 60-hour duration high-flow experiment (HFE), in November or April at least once every four years.	 78% of modeled futures meet the preferred minimum performance.	 79% of modeled futures meet the preferred minimum performance.	 79% of modeled futures meet the preferred minimum performance.	 79% of modeled futures meet the preferred minimum performance.	 77% of modeled futures meet the preferred minimum performance.		 77% of modeled futures meet the preferred minimum performance.
HFE Frequency and Duration	Percent of modeled futures in which a spring or fall HFE of at least 60 hours occurs at least once every four years.	 34% of modeled futures meet the preferred minimum performance.	 54% of modeled futures meet the preferred minimum performance.	 60% of modeled futures meet the preferred minimum performance.	 64% of modeled futures meet the preferred minimum performance.	 55% of modeled futures meet the preferred minimum performance.		 55% of modeled futures meet the preferred minimum performance.
Sandbar Volume	Percent of modeled futures in which the maximum sediment year sandbar volume is greater than the sandbar volume at the start of the simulation period in at least 60% of years. In other words, net sandbar growth is positive for at least 60% of the years.	 71% of modeled futures meet the preferred minimum performance.	 85% of modeled futures meet the preferred minimum performance.	 90% of modeled futures meet the preferred minimum performance.	 90% of modeled futures meet the preferred minimum performance.	 88% of modeled futures meet the preferred minimum performance.		 85% of modeled futures meet the preferred minimum performance.

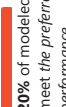
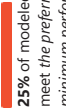
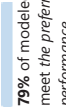
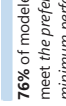
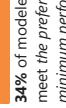
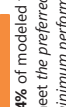
¹ Some performance indicator descriptions include italics to denote a definition of the "preferred minimum performance" that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.

Impact Category	Performance Indicator ¹	Impacts Summary						Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	Representative Preferred Alternative
Sand Transport	Percent of modeled futures in which the <i>fraction of sand mass transported by sandbar-forming flow rates (above 37,000 cfs) is at least 0.4 (40% of the sand transport)</i> .	No Action Alternative 49% of modeled futures meet the preferred minimum performance. Please note that this percentage is for the full modeling period. The sand load index data used for this performance indicator does not allow for subperiod modeling.	Basic Coordination Alternative 74% of modeled futures meet the preferred minimum performance. Please note that this percentage is for the full modeling period. The sand load index data used for this performance indicator does not allow for subperiod modeling.	Enhanced Coordination Alternative 82% of modeled futures meet the preferred minimum performance. Please note that this percentage is for the full modeling period. The sand load index data used for this performance indicator does not allow for subperiod modeling.	Maximum Operational Flexibility Alternative 82% of modeled futures meet the preferred minimum performance. Please note that this percentage is for the full modeling period. The sand load index data used for this performance indicator does not allow for subperiod modeling.			77% of modeled futures meet the preferred minimum performance. Please note that this percentage is for the full modeling period. The sand load index data used for this performance indicator does not allow for subperiod modeling.	76% of modeled futures meet the preferred minimum performance. Please note that this percentage is for the full modeling period. The sand load index data used for this performance indicator does not allow for subperiod modeling.	

Water Quality (See Section 3.6)

Impact Category	Performance Indicator ¹	Impacts Summary						Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	Representative Preferred Alternative
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)			
How would reservoir storage, reservoir releases, and corresponding changes in river flows downstream of the reservoirs affect projected salinity ?	Percent of modeled futures in which the salinity concentration below Hoover Dam is less than 723 milligrams per liter (mg/L) in 100% of years.	 90% of modeled futures meet the preferred minimum performance.	 95% of modeled futures meet the preferred minimum performance.	 91% of modeled futures meet the preferred minimum performance.	 94% of modeled futures meet the preferred minimum performance.	 95% of modeled futures meet the preferred minimum performance.	 96% of modeled futures meet the preferred minimum performance.			 92% of modeled futures meet the preferred minimum performance.
	Percent of modeled futures in which the salinity concentration below Parker Dam is less than 747 mg/L in 100% of years.	 90% of modeled futures meet the preferred minimum performance.	 94% of modeled futures meet the preferred minimum performance.	 84% of modeled futures meet the preferred minimum performance.	 95% of modeled futures meet the preferred minimum performance.	 96% of modeled futures meet the preferred minimum performance.	 96% of modeled futures meet the preferred minimum performance.			 94% of modeled futures meet the preferred minimum performance.
	Percent of modeled futures in which the salinity concentration at Imperial is less than 879 mg/L in 100% of years.	 97% of modeled futures meet the preferred minimum performance.	 97% of modeled futures meet the preferred minimum performance.	 97% of modeled futures meet the preferred minimum performance.	 98% of modeled futures meet the preferred minimum performance.	 99% of modeled futures meet the preferred minimum performance.	 99% of modeled futures meet the preferred minimum performance.			 98% of modeled futures meet the preferred minimum performance.
How would reservoir storage, reservoir releases, and corresponding changes in river flows downstream of the reservoirs affect projected temperature ?	Annual average daily temperature of the Colorado River at Lees Ferry under critically dry flow category (median values)	13.8 degrees Celsius (°C); 56.8 degrees Fahrenheit (°F)	13.8 °C (56.8 °F)	12.9 °C (55.2 °F)	13.4 °C (56.1 °F)	13.7 °C (56.7 °F)	13.7 °C (56.7 °F)			14.1 °C (57.4 °F)
	Annual maximum daily temperature of the Colorado River at Lees Ferry under critically dry flow category (median values)	19.9 °C (67.8 °F)	19.7 °C (67.5 °F)	17.1 °C (62.8 °F)	18.1 °C (64.6 °F)	19 °C (66.2 °F)	19 °C (66.2 °F)			20.1 °C (68.2 °F)

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Impact Category	Performance Indicator ¹	Impacts Summary					Representative Preferred Alternative
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	
How would reservoir storage, reservoir releases, and corresponding changes in river flows downstream of the reservoirs affect projected temperature? <i>(continued)</i>	Annual average daily temperature of the Colorado River at Pearce Ferry under critically dry flow category (median values)	16.7 °C (62.1 °F)	16.7 °C (62.1 °F)	16.6 °C (61.9 °F)	16.8 °C (62.2 °F)	16.8 °C (62.2 °F)	17 °C (62.6 °F)
	Annual maximum daily temperature of the Colorado River at Pearce Ferry under critically dry flow category (median values)	23.3 °C (73.9 °F)	23.5 °C (74.3 °F)	23.3 °C (73.9 °F)	23.6 °C (74.5 °F)	23.6 °C (74.5 °F)	23.8 °C (74.8 °F)
How would reservoir storage, reservoir releases, and corresponding changes in river flows downstream of the reservoirs affect projected dissolved oxygen?	Percent of modeled futures in which <i>Lake Powell</i> reservoir elevations stay above 3,490 feet and minimum dissolved oxygen concentration is greater than 2mg/L from Glen Canyon Dam releases in at least 90% of years.	 20% of modeled futures meet the preferred minimum performance.	 25% of modeled futures meet the preferred minimum performance.	 79% of modeled futures meet the preferred minimum performance.	 76% of modeled futures meet the preferred minimum performance.	 34% of modeled futures meet the preferred minimum performance.	 44% of modeled futures meet the preferred minimum performance.
	Qualitative comparison of water year minimum Lake Powell reservoir elevations under critically dry flow category (median values)	Water year minimum Lake Powell elevation median is the lowest, which would pose the highest increased risk for cyanobacterial blooms.	Water year minimum Lake Powell elevation median is the second lowest, which would pose increased risk for cyanobacterial blooms.	Water year minimum Lake Powell elevation median is the highest, which would pose a decreased risk for cyanobacterial blooms.	Water year minimum Lake Powell elevation median is the second highest, which would pose a decreased risk for cyanobacterial blooms.	Water year minimum Lake Powell elevation median is third lowest compared with the other alternatives, which would pose an increased risk for cyanobacterial blooms compared with the Enhanced Coordination and Maximum Operational Flexibility alternatives, but a decreased risk compared with the No Action and Basic Coordination alternatives.	Water year minimum Lake Powell elevation median is third highest, which would pose a decreased risk for cyanobacterial blooms.
How would reservoir storage, reservoir releases, and corresponding changes in river flows downstream of the reservoirs affect dilution capacity?	Qualitative comparison of water year minimum Lake Powell reservoir elevations under critically dry flow category (median values)	Water year minimum Lake Powell elevation median is the lowest, which would pose the greatest increased risk of greater concentrations of pollutants of concern but it is unlikely that any of the reservoir elevations of the alternatives would substantially reduce the dilution capacity and increase the concentration of pollutants of concern.	Water year minimum Lake Powell elevation median is the lowest, which would pose an increased risk of greater concentrations of pollutants of concern but it is unlikely that any of the reservoir elevations of the alternatives would substantially reduce the dilution capacity and increase the concentration of pollutants of concern.	Water year minimum Lake Powell elevation median is the highest, which would pose a decreased risk of greater concentrations of pollutants of concern but it is unlikely that any of the reservoir elevations of the alternatives would substantially reduce the dilution capacity and increase the concentration of pollutants of concern.	Water year minimum Lake Powell elevation median is the highest, which would pose a decreased risk of greater concentrations of pollutants of concern but it is unlikely that any of the reservoir elevations of the alternatives would substantially reduce the dilution capacity and increase the concentration of pollutants of concern.	Water year minimum Lake Powell elevation median is third lowest compared with the other alternatives, which would pose an increased risk of greater concentrations of pollutants of concern compared with the Enhanced Coordination and Maximum Operational Flexibility alternatives, but a decreased risk compared with the No Action and Basic Coordination alternatives. However, it is unlikely that any of the reservoir elevations of the alternatives would substantially reduce the dilution capacity and increase the concentration of pollutants of concern.	Water year minimum Lake Powell elevation median is third highest, which would pose a decreased risk of greater concentrations of pollutants of concern compared with the Enhanced Coordination and Maximum Operational Flexibility alternatives, but a decreased risk compared with the No Action and Basic Coordination alternatives. However, it is unlikely that any of the reservoir elevations of the alternatives would substantially reduce the dilution capacity and increase the concentration of pollutants of concern.

¹ Some performance indicator descriptions include italics to denote a definition of the "preferred minimum performance" that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.

Air Quality (See Section 3.7)

Impact Category	Performance Indicator ¹	Impacts Summary						Supply Driven Alternative (LB Pro Rata)	Representative Preferred
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)			
Shoreline Area	Percent of modeled futures in which Lake Mead shoreline exposure area stays below 500 square kilometers in every month.	54% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	75% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	88% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	93% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	81% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	92% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.		
	Percent of modeled futures in which Lake Powell shoreline exposure area stays below 500 square kilometers in every month.	25% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	45% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	87% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	98% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	46% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	66% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.		
Shoreline Dust Emissions	Percent of modeled futures in which Lake Mead shoreline dust emissions stay below 500 kilograms in every month.	34% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	64% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	79% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	84% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	72% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	74% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.		
	Percent of modeled futures in which Lake Powell shoreline dust emissions stay below 450 kilograms in every month.	14% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	37% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	84% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	96% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	43% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.	59% of modeled futures meet the preferred minimum performance during the 2027-2039 modeling period.		
How would lake reservoir elevations and releases impact power generation and carbon dioxide equivalent (CO ₂ e) emissions?	Change in CO ₂ e emissions due to a loss of hydropower generation at Glen Canyon Dam under average hydrology conditions.	Hydropower generation would be highly affected resulting in the tied most CO₂e emissions under this alternative. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be slightly less affected than under the Representative Preferred Alternative, resulting in the third most CO₂e emissions under this alternative. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be least affected, resulting in the tied lowest CO₂e emissions under this alternative. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be similar to that under the Enhanced Coordination Alternative, resulting in the tied lowest CO₂e emissions under this alternative. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be the same as under the No Action Alternative, resulting in the tied most CO₂e emissions under this alternative. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.			

¹ Some performance indicator descriptions include italics to denote a definition of the "preferred minimum performance" that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.

Impact Category	Performance Indicator ¹	Impacts Summary						Representative Preferred
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	
How would lake reservoir elevations and releases impact power generation and carbon dioxide equivalent (CO ₂ e) emissions? <i>(continued)</i>	Change in CO ₂ e emissions due to a loss of hydropower generation at Hoover Dam under average hydrology conditions.	Hydropower generation would be most affected resulting in the most CO₂e emissions , with potential decrease in CO ₂ e emissions. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be less affected than under the No Action Alternative, resulting in the second most CO₂e emissions under this alternative. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be similar to that under the Maximum Operational Flexibility Alternative, resulting in the second lowest CO₂e emissions under this alternative. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be slightly more affected than under the Supply Driven Alternative, resulting in the second lowest CO₂e emissions under this alternative. This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be least affected, resulting in the lowest CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be similar to that under the Supply Driven Alternative (LB Pro Rata) having the lowest CO₂e emissions .	Hydropower generation would be similar to that under the Supply Driven Alternative (LB Pro Rata) having the lowest CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.
	Change in CO ₂ e emissions due to a loss of hydropower generation at Davis Dam under average hydrology conditions.	Hydropower generation would be the least affected, resulting in the lowest CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be slightly less affected than under the No Action Alternative, resulting in the second lowest CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be highly affected, resulting in the tied most CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be similar to that under the Enhanced Coordination Alternative, resulting in the tied most CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be similar to that under the Supply Driven Alternative (LB Pro Rata) having the highest CO₂e emissions .	Hydropower generation would be similar to that under the Enhanced Coordination Alternative. Hydropower generation would be similar between the two Supply Driven Alternatives with the Supply Driven (LB Pro Rata) having the highest CO₂e emissions .	Hydropower generation would be slightly less affected than under the Basic Coordination Alternative, resulting in the third lowest CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.
	Change in CO ₂ e emissions due to a loss of hydropower generation at Parker Dam under average hydrology conditions.	Hydropower generation would be the least affected, resulting in the tied least CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be similar to that under the No Action Alternative, resulting in the tied least CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be highly affected, resulting in the most CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be slightly more affected than under the Representative Preferred Alternative, resulting in the third least CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Under the Supply Driven Alternative (LB Priority approach), hydropower generation would be similar to that under the Maximum Flexibility Alternative.	Under the Supply Driven Alternative (LB Pro Rata approach), hydropower generation would be highly affected, resulting in the second most CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.	Hydropower generation would be slightly more affected than under the No Action Alternative, resulting in the second least CO₂e emissions . This is due to the inverse correlation between CO ₂ e emissions from alternative energy sources and generation from reservoir elevations and releases.

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Aquatic Resources (See Section 3.8)

Impact Category	Performance Indicator ¹	Impacts Summary						
		No Action Alternative	Basic Coordination Alternative	Enhanced Coordination Alternative	Maximum Operational Flexibility Alternative	Supply Driven Alternative (LB Priority)	Supply Driven Alternative (LB Pro Rata)	Representative Preferred Alternative
Lake Powell elevations	Percent of modeled futures in which Lake Powell elevation is below 3,598 feet at least 70% of months, meaning critical habitat of Colorado Pikeminnow and Razorback Sucker is riverine (lotic) in the Colorado River Inflow.	52% of modeled futures meet the <i>preferred minimum performance</i> .	49% of modeled futures meet the <i>preferred minimum performance</i> .	28% of modeled futures meet the <i>preferred minimum performance</i> .	27% of modeled futures meet the <i>preferred minimum performance</i> .	53% of modeled futures meet the <i>preferred minimum performance</i> .	53% of modeled futures meet the <i>preferred minimum performance</i> .	40% of modeled futures meet the <i>preferred minimum performance</i> .
	Percent of modeled futures in which Lake Powell elevation is below 3,600 feet at least 70% of months, meaning critical habitat of Colorado Pikeminnow and Razorback Sucker is riverine (lotic) in the San Juan River Inflow.	52% of modeled futures meet the <i>preferred minimum performance</i> .	50% of modeled futures meet the <i>preferred minimum performance</i> .	29% of modeled futures meet the <i>preferred minimum performance</i> .	29% of modeled futures meet the <i>preferred minimum performance</i> .	54% of modeled futures meet the <i>preferred minimum performance</i> .	54% of modeled futures meet the <i>preferred minimum performance</i> .	42% of modeled futures meet the <i>preferred minimum performance</i> .
	Percent of modeled futures in which Lake Powell elevation is below 3,666.5 feet in 100% of months, meaning the Paiute Farms Waterfall remains a barrier to upstream fish passage.	56% of modeled futures meet the <i>preferred minimum performance</i> .	56% of modeled futures meet the <i>preferred minimum performance</i> .	44% of modeled futures meet the <i>preferred minimum performance</i> .	38% of modeled futures meet the <i>preferred minimum performance</i> .	62% of modeled futures meet the <i>preferred minimum performance</i> .	62% of modeled futures meet the <i>preferred minimum performance</i> .	50% of modeled futures meet the <i>preferred minimum performance</i> .
	Percent of modeled futures in which October 1 Lake Powell elevation is above 3,570 feet at least 70% of years, meaning the risk of smallmouth bass entrainment is reduced.	33% of modeled futures meet the <i>preferred minimum performance</i> .	39% of modeled futures meet the <i>preferred minimum performance</i> .	62% of modeled futures meet the <i>preferred minimum performance</i> .	60% of modeled futures meet the <i>preferred minimum performance</i> .	35% of modeled futures meet the <i>preferred minimum performance</i> .	35% of modeled futures meet the <i>preferred minimum performance</i> .	42% of modeled futures meet the <i>preferred minimum performance</i> .

¹ Some performance indicator descriptions include italics to denote a definition of the “*preferred minimum performance*” that was used as a significant reference point for technical analysis. The following were considered when determining preferred minimum performance: input from resource experts, the severity of negative outcomes associated with not satisfying a given performance level, historical (observed) data, and/or reasonably expected outcomes if current operations and recent hydrology continued. To find more information about preferred minimum performance levels, see Volume III – Technical Appendices.