

- **Board of Directors**  
**Water Planning and Stewardship Committee**

April 10, 2007 Board Meeting

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**9-5**

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**Subject**

Staff Review of Draft EIS on Colorado River Interim Shortage Guidelines and Coordinated Management Strategies for Lakes Powell and Mead

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**Description**

The Colorado River Basin states' representatives intend to submit joint comments to the Bureau of Reclamation (Reclamation) on its Draft Environmental Impact Statement (EIS) for establishing interim guidelines for managing storage and release of water from Lakes Powell and Mead. Comments are due on April 30, 2007. Metropolitan staff (along with other California entities represented on the Colorado River Board of California) is participating in negotiations on the terms of a seven-state Preferred Alternative to recommend to Reclamation as the proposed federal action. Of the four action alternatives, the Basin States Alternative is the most favorable to Metropolitan. Implementation of this alternative would improve Metropolitan's water supply reliability most notably through long-term "storage" opportunities in Lake Mead.

**Background**

From 2000 through 2006, the Colorado River Basin experienced the worst drought conditions in over one hundred years of recorded history. Storage in Colorado River reservoirs dropped from nearly full to less than 60 percent of capacity at the end of 2006. Currently, there are no guidelines in place to determine when, and by how much, Colorado River deliveries would be reduced in the Lower Basin. On February 28, Reclamation released its Draft EIS for public review and comment. Public hearings are scheduled on April 3, 4, and 5, 2007.

The Secretary of the Interior proposes to adopt specific interim guidelines for:

1. Determining when less than 7.5 million acre-feet of Colorado River water is available for use in the states of Arizona, California, and Nevada, and how much water is available for use in each state at such times;
2. Operating Lakes Powell and Mead in a more coordinated fashion, particularly under drought and low reservoir conditions;
3. Allowing for storage and delivery of conserved Colorado River system and non-system water in Lake Mead to increase the flexibility of meeting water needs; and
4. Modifying the conditions under which surplus water would be made available through 2026.

Since 2005, representatives of the seven Basin states have been participating in discussions and negotiations over this wide array of issues. These discussions yielded a seven-state "Preliminary Proposal" on coordinated Powell-Mead operations, allocation of shortages of 400,000, 500,000, and 600,000 acre-feet among Arizona, Nevada, and Mexico, "storage" of Colorado River system and non-system water in Lake Mead, and continuation of the Interim Surplus Guidelines with modifications. Metropolitan's staff participated in the negotiation of the Basin States Preliminary Proposal.

Because the Arizona Department of Water Resources requires prior authorization by its state Legislature before it may commit to agreements affecting the state's Colorado River water rights, the Lower Basin states in January 2007 negotiated a draft "Forbearance Agreement." The purpose of the Forbearance Agreement is to assure that Lower Basin parties will not claim another party's conserved Colorado River system water on the basis of one state's rights to another state's unused apportionment as decreed by the U.S. Supreme Court in *Arizona v. California*. Furthermore, Metropolitan's staff have been participating in talks with the seven Basin states over a

recommended Preferred Alternative for the upcoming federal action along with associated operational guidelines and a water delivery agreement with the Secretary of the Interior.

### **Purpose of Proposed Federal Action**

The purpose of the proposed federal action forming the basis of the Draft EIS is to:

1. Improve Reclamation's management of the Colorado River by considering tradeoffs between frequency and magnitude of shortages, and considering the effects on storage in Lakes Powell and Mead, and on water supply, power production, recreation, and environmental resources;
2. Provide users of Colorado River water, particularly those in Arizona, California, and Nevada, with a greater degree of predictability in determining annual water deliveries in future years; and
3. Provide additional mechanisms for storage of water supplies in Lake Mead and their delivery.

The interim guidelines would remain in effect for water supply determinations and reservoir operating decisions through 2026 and would provide guidance each year in development of the Annual Operating Plan for the Colorado River Reservoirs.

### **Alternatives Considered**

Five alternatives are considered and analyzed in the Draft EIS. The alternatives consist of a No Action Alternative and four action alternatives. The four action alternatives are: the Basin States (Preliminary Proposal), Conservation Before Shortage, Water Supply, and Reservoir Storage. Reclamation considered input from the Basin states to formulate the Basin States Alternative and from a consortium of environmental non-governmental organizations to formulate the Conservation Before Shortage Alternative.

The Conservation Before Shortage Alternative assumes that certain amounts of water would be voluntarily conserved in a year when Lake Mead storage falls to certain levels. Funding for the conservation program is assumed to be made available by the federal government and from a surcharge on power rates and water deliveries. This alternative is designed to minimize involuntary shortages in the Lower Basin and avoid risk of curtailments in the Upper Basin. The Water Supply Alternative was developed by Reclamation to maximize water deliveries. The Reservoir Storage Alternative was developed by Reclamation in coordination with the National Park Service and Western Area Power Administration to benefit recreational and power interests. Reclamation will identify a preferred alternative in the Final EIS following receipt of public comments on the Draft EIS. The No Action Alternative provides a baseline for comparison of each of the action alternatives as shown in Table 1 in [Attachment 1](#).

### **Metropolitan Water Management**

Under provisions enacted in the 1968 Congressional authorization of the Central Arizona Project, users of post-September 30, 1968 water entitlements absorb all shortages (estimated to be nearly 1.4 million acre-feet in Arizona) before Reclamation may impose any reductions in deliveries upon California's basic apportionment of 4.4 million acre-feet. Therefore, Reclamation's modeling studies of the Basin states, Water Supply, and Reservoir Storage alternatives show no shortages to California for Lower Basin shortages under 1.7 million acre-feet as Nevada and Mexico deliveries would be reduced as well.

Table 2 in [Attachment 1](#) shows the maximum shortage allocation to California in five select years between 2008 and 2060 for each of the alternatives. Reclamation's analysis indicates that the Basin States Alternative would avoid potential shortages to California that otherwise may occur through 2027. In contrast, Reclamation's studies conclude the Conservation Before Shortage Alternative would expose California to a shortage of up to approximately 82,000 acre-feet in the year 2026. After the interim operating criteria end, maximum shortages in 2040 and 2060 would differ by up to 40,000 acre-feet among the alternatives. It should be noted that the Basin States Alternative includes initiation of efforts prior to 2026 to develop additional guidelines for reducing deliveries if Lake Mead storage falls to less than 22 percent of capacity. Reclamation would initiate re-consultation with the representatives of the Colorado River Basin states.

Implementation of the Basin States Alternative would provide several benefits to Metropolitan:

1. Implementing “stepped” shortages to Arizona and Nevada based on water levels in Lake Mead decreases the likelihood of shortages to California and increases the chances of Metropolitan obtaining surplus water.
2. Permitting Metropolitan and others to forgo using Colorado River supplies in certain years and “store” that water in Lake Mead for future use would enhance Metropolitan’s chances of maximizing deliveries through the Colorado River Aqueduct during dry years on the State Water Project.<sup>1</sup>
3. Extending the Interim Surplus Guidelines through 2026, with modifications would provide additional assurances that Metropolitan could access supplies above California’s basic apportionment of 4.4 million acre-feet under certain Lake Mead storage conditions.

**Summary of Potential Effects**

**Attachment 2** contains a summary of the potential effects of each of the five alternatives evaluated in the Draft EIS.

**Policy**

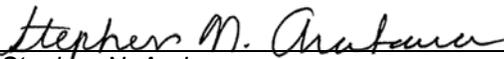
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By Minute Item 42820, dated Feb. 10, 1998, the Board supported the establishment of interim surplus criteria for the Colorado River reservoir system that makes more effective use of available surplus water in the Lower Basin.

**Fiscal Impact**

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No impact during the Interim Shortage Guidelines period.

  
 Stephen N. Arakawa  
 Manager, Water Resource Management

3/26/2007  
 Date

  
 Jeffrey Kightlinger  
 General Manager

3/27/2007  
 Date

**Attachment 1 – Comparison of Alternatives**

**Attachment 2 – Environmental Consequences**

BLA #5311

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<sup>1</sup> Metropolitan’s 1931 Colorado River water delivery contract with the United States gives Metropolitan a right to store 5 million acre-feet in Lake Mead. Among California contractors, this storage right is exclusive to Metropolitan. However, the Secretary of the Interior retained broad discretion to impose conditions on creation and recovery of this storage and to make similar storage arrangements with users in Arizona and Nevada. Due to political and other considerations, Metropolitan to date has been unable to utilize this contractual storage right.

<b>Table 1 - Comparison of Alternatives</b>				
<b>Alternative</b>	<b>Shortages Conditions Compared to No Action</b>	<b>New Criteria for Coordinated Operation of Lakes Powell and Mead?</b>	<b>Mechanism for Storage and Delivery of Conserved System and Non-System Water in Lake Mead?</b>	<b>Modification and Extension of the Interim Surplus Guidelines?</b>
<b>No Action<sup>1</sup></b>		No	No	No
<b>Basin States<sup>2</sup></b>	Less frequent likelihood of shortages in 2017 and 2026 <sup>3</sup>	Yes, to minimize shortages in the Lower Basin and avoid curtailments of use in the Upper Basin	Yes, with maximum annual storage and delivery of 400,000 acre-feet and maximum total storage of 1.5 million acre-feet for California	Yes, through 2026
<b>Conservation before Shortage<sup>4</sup></b>	Less frequent likelihood of shortages in 2017 and 2026	Yes	Yes, expanded beyond the Basin States Alternative <sup>5</sup>	Yes, through 2026
<b>Water Supply<sup>6</sup></b>	No shortage projected for 2017 and less frequent likelihood of shortages in 2026.	Yes, when reservoir conditions are relatively low, the amount of water in Lakes Powell and Mead would be balanced	No	Extension only through 2026
<b>Reservoir Storage<sup>7</sup></b>	Less frequent likelihood of shortages in 2017 and 2026	Yes, keeping more water in Lake Powell than the Basin States Alternative	Yes, expanded beyond the Basin States Alternative	No, the Guidelines would be terminated after 2007

<sup>1</sup> Water deliveries to users in Arizona, Nevada, and Mexico would be reduced by between 350,000 and 500,000 acre-feet in a year when Lake Mead storage falls to less than 9.7 million acre-feet in 2008 or greater amounts in future years. Water deliveries would be reduced further to keep at least about 4.3 million acre-feet in Lake Mead.

<sup>2</sup> Water deliveries to users in Arizona, Nevada, and Mexico would be reduced by 400,000, 500,000, or 600,000 acre-feet in a year when Lake Mead storage falls to less than 9.4, 7.5, or 5.8 million acre-feet of water, respectively.

<sup>3</sup> Two years selected by Reclamation for presentation of consequences. These years represent the midpoint and the last year of the proposed Interim Shortage Guidelines period.

<sup>4</sup> Assumes that 400,000, 500,000, or 600,000 acre-feet of water would be voluntarily conserved in a year in which Lake Mead storage falls to less than 9.4, 7.5, or 5.8 million acre-feet of water, respectively. Water deliveries would be reduced to keep at least 4.3 million acre-feet in Lake Mead.

<sup>5</sup> Including water for environmental uses.

<sup>6</sup> Assumes that a reduction in water deliveries would not be imposed until Lake Mead reaches dead storage, however it is assumed that Southern Nevada Water Authority would be unable to divert water when Lake Mead storage falls to less than 4.3 million acre-feet as the lake elevation would be below the elevation of the Authority's water intake.

<sup>7</sup> Water deliveries to users in Arizona, Nevada, and Mexico would be reduced by 600,000, 800,000, or 1,000,000 acre-feet in a year in which Lake Mead storage falls to less than 11.5, 9.4, or 7.5 million acre-feet of water, respectively.

<b>Table 2</b>					
<b>Maximum Shortage Allocation to California<sup>1</sup> (acre-feet)</b>					
<b>Year</b>	<b>No Action</b>	<b>Basin States through 2026</b>	<b>Conservation Before Shortage through 2026</b>	<b>Water Supply through 2026</b>	<b>Reservoir Storage through 2026</b>
2008	0	0	0	0	0
2017	0	0	0	0	0
2026	45,798	0	81,835	0	0
2027	55,625	0	0	511,784 <sup>2</sup>	0
2040	68,599	70,931 <sup>3</sup>	66,220	96,968	70,717
2060	91,745	52,187	51,389	91,745	51,356

<sup>1</sup> Based on the Bureau of Reclamation’s assumption of how shortages would be allocated.

<sup>2</sup> This magnitude of shortage is required to allow Lake Mead to contain at least 4.332 million acre-feet (the amount of water in Lake Mead at the elevation of Southern Nevada Water Authority’s lower intake).

<sup>3</sup> From 2027 through 2060, there is less than a 1 percent likelihood of Lower Basin shortages impacting water deliveries to California.

**ES-2  
Summary of Potential Effects of the Alternatives**

Draft EIS Section	Consequences by Resource, Year and Value	Alternatives				
		No Action	Basin States	Conservation Before Shortage	Water Supply	Reservoir Storage
<b>4.3</b>	<b>Hydrologic Resources</b>					
	Probability of Glen Canyon annual release volumes $\geq$ 7.5 maf, 2009 to 2060	100%	96.3%	96.3%	97.4%	100%
	Probability of Glen Canyon annual release volumes $\geq$ 8.23 maf, 2009 to 2060	99.7%	96.3%	96.3%	96.3%	94.0%
	Lake Powell March elevation, probability of elevations $\leq$ 3,490 feet msl, 2026	1.0%	0%	0%	8.0%	0%
	Lake Mead December elevation, probability of elevations $\leq$ 1,050 feet msl, 2026	26.0%	20.0%	20.0%	21.0%	4.0%
	Hoover Dam annual release, 2026 50 <sup>th</sup> percentile values	9.1 maf	9.2 maf	9.1 maf	9.4 maf	8.7 maf
<b>4.4</b>	<b>Water Deliveries</b>					
	Probability of involuntary Shortage, 2026	47%	35%	8%	9%	37%
	Probability of voluntary and involuntary Shortage, 2026	47%	35%	33%	9%	37%
	Probability of Normal deliveries	35%	26%	29%	52%	47%
	Probability of Surplus	17%	38%	37%	39%	16%
<b>4.5</b>	<b>Water Quality</b>					
	Temperature at Little Colorado River, July 2026, 50 <sup>th</sup> percentile	10 to 14 °C	10 to 15°C	10 to 15°C	10 to 15°C	10 to 13°C
	Lake Mead release temperature, July 2026, 50 <sup>th</sup> percentile	13 to 18°C	13 to 18°C	13 to 18°C	13 to 18°C	12 to 16°C
	Salinity below Parker Dam, 2026	624 mg/L	628 mg/L	629 mg/L	637 mg/L	619 mg/L
	Salinity at Imperial Dam, 2026	744 mg/L	751 mg/L	756 mg/L	764 mg/L	740 mg/L
<b>4.6</b>	<b>Air Quality</b>					
	Lake Powell 2026, 10 <sup>th</sup> percentile lake elevation, exposed shoreline	17,000 acres	17,000 acres	17,000 acres	21,000 acres	14,000 acres
	Lake Mead 2026, 10 <sup>th</sup> percentile lake elevation, exposed shoreline	87,000 acres	84,000 acres	85,000 acres	86,000 acres	72,000 acres

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Summary of Potential Effects of the Alternatives**

Draft EIS Section	Consequences by Resource, Year and Value	Alternatives				
		No Action	Basin States	Conservation Before Shortage	Water Supply	Reservoir Storage
<b>4.7</b>	<b>Visual Resources</b>					
	Lake Powell maximum height of calcium carbonate ring, 10 <sup>th</sup> percentile lake elevation, 2026	160 feet	150 feet	150 feet	195 feet	160 feet
	Lake Mead maximum height of calcium carbonate ring, 10 <sup>th</sup> percentile lake elevation, 2026	209 feet	209 feet	209 feet	210 feet	208 feet
<b>4.8</b>	<b>Biological Resources<sup>1</sup></b>					
	Effects on Vegetation and Wildlife					
	Lakes Powell and Mead	-	None	None	Minor negative	Minor positive
	Glen Canyon Dam to Lake Mead	-	Minor negative	Minor negative	Minor negative	Minor negative
	Hoover Dam to NIB	-	None to minor negative	None to minor negative	Minor positive to none	Minor negative
	NIB to SIB	-	None	Moderate positive	None	Moderate positive
	Effects on Special Status Species					
	Glen Canyon Dam to Lake Mead humpback chub	-	None	None	Minor positive	Minor negative
	Parker Dam to Imperial Dam Yuma clapper rail	-	None	None	Minor positive	Minor negative
	NIB to SIB Southwestern willow flycatcher	-	None	Moderate positive	None	Moderate positive
<b>4.9</b>	<b>Cultural Resources</b>					
	Number of Lake Powell sites potentially exposed, 10 <sup>th</sup> percentile lake elevation	193 sites	190 sites	190 sites	222 sites	193 sites
	Probability of exposing 32 Lake Mead sites, elevation ≤ 1,080 feet msl, 2026	43%	44%	44%	48%	22%
<b>4.10</b>	<b>Indian Trust Assets<sup>1</sup></b>					
	Water rights affected	-	None	None	None	None
	Trust land affected	-	None	None	None	None

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Draft EIS Section	Consequences by Resource, Year and Value	Alternatives				
		No Action	Basin States	Conservation Before Shortage	Water Supply	Reservoir Storage
<b>4.11</b>	<b>Electrical Power Resources</b>					
	Glen Canyon Powerplant					
	Average annual generation and percent change from No Action Alternative value	4,265,749 MWh	(0.25)%	(0.21)%	(2.2)%	0.63%
	Average monthly capacity and percent change from No Action Alternative value	603 MW	0.57%	0.60%	(1.9)%	1.6%
	Average total economic value and percent change from No Action Alternative value	\$6,808,948,737	(0.07)%	(0.04)%	(2.05)%	0.92%
	Hoover Powerplant					
	Average annual generation and percent change from No Action Alternative value	3,156,820 MWh	0.46%	0.59%	(1.5)%	8.7%
	Average monthly capacity and percent change from No Action Alternative value	1,201 MW	1.1%	1.3%	(1.9)%	11.3%
	Average total economic value and percent change from No Action Alternative value	\$7,350,904,219	1.03%	1.22%	(1.20)%	10.1%
	Davis and Parker Powerplants					
	Average annual generation and percent change from No Action Alternative value	1,618,736 MWh	(0.58)%	(0.69)%	0.1%	(1.1)%
	Average monthly capacity and percent change from No Action Alternative value	331 MW	0%	0%	0%	0%
	Average total economic and percent change from No Action Alternative value	\$2,242,612,717	(0.55)%	(0.73)%	0.28%	(1.6)%
	Headgate Rock Powerplant					
	Average annual generation and percent change from No Action Alternative value	77,386 MWh	(1.2)%	(1.6)%	(0.29)%	(1.8)%
	Average monthly capacity and percent change from No Action Alternative value	not applicable	not applicable	not applicable	not applicable	not applicable
	Average total economic value and percent change from No Action Alternative value	\$102,892,840	(1.3)%	(1.9)%	(0.19)%	(2.5)%

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**Table ES-2  
Summary of Potential Effects of the Alternatives**

Draft EIS Section	Consequences by Resource, Year and Value	Alternatives				
		No Action	Basin States	Conservation Before Shortage	Water Supply	Reservoir Storage
4.12	<b>Recreation</b>					
	Lake Powell					
	Probability of closure, Wahweap and lower Bullfrog launch ramps, 2026	6%	8%	8%	20%	2%
	Probability of navigation closures, Castle Rock, Gregory Butte, 2026	29%	36%	36%	47%	21%
	Effects on sport fish	-	None	None	None	None
	Lake Mead					
	Probability of closure, Pearce Bay launch ramp, 2026	76%	76%	77%	78%	68%
Probability of closure, Echo Bay launch ramp, 2026	26%	20%	22%	21%	4%	
Probability of navigation difficulties, upper Lake Mead, 2026	74%	73%	73%	77%	65%	
4.13	<b>Transportation<sup>1</sup></b>					
	Probability of Lake Powell ferry closure, end of September 2026	4%	6%	6%	17%	1%
	Effects on Colorado River ferry	-	None	None	Slight increase	Slight decrease
	Effects on Lake Havasu ferry service	-	None	None	None	None

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Draft EIS Section	Consequences by Resource, Year and Value	Alternatives				
		No Action	Basin States	Conservation Before Shortage	Water Supply	Reservoir Storage
<b>4.14</b>	<b>Socioeconomics and Land Use<sup>1</sup></b>					
	Agricultural production and effects on employment, income, and tax revenues in Arizona, 2026	46%	35%	7%	9%	37%
	Agricultural production and effects on employment, income, and tax revenues in Arizona, 2060	79%	63%	65%	80%	67%
	Agricultural production and resulting effects on employment, income, and tax revenues in California and Nevada	-	None	None	None	None
	Recreation spending at Lake Powell	-	Same	Same	Decrease	Increase
	Recreation spending at Lake Mead (LMNRA)	-	Same	Same	Same	Increase
	Change in river recreation economic activity					
	Lake Powell to Lake Mead	-	None	None	None	None
	Downstream of Lake Mead	-	None	None	None	None
	Change in economic activity in Municipal & Industrial sector					
	Arizona	-	None	None	None	None
	Nevada	-	None	None	None	None
	California	-	None	None	None	None
<b>4.15</b>	<b>Environmental Justice</b>	-	None	None	None	None

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