



# MISSOURI RIVER



# FACT SHEET

## Eight Representative Alternatives

### Summary

From a set of 64 alternatives, the preliminary RDEIS evaluates eight representative alternatives in detail, including the Current Water Control Plan (CWCP) as the baseline alternative. Three conservation alternatives (C18, C31, and C44) conserve water in drought conditions by increasing the permanent pool level in the lakes and by using higher navigation guide curves. Three fish and wildlife alternatives (FW10, FW15, and FW20) provide additional fish and wildlife benefits by increasing releases of water during the spring and summer followed by varying navigation service levels and season length. The Mississippi River alternative (M66) establishes a target flow for the Mississippi River near St. Louis to improve navigation conditions on the river during low-flow periods.

The Corps is looking for your input on these alternatives and any other potential alternative to help select a preferred alternative for evaluation in the RDEIS. The preferred alternative could be one of the eight representative alternatives, or one that combines different operation criteria from several alternatives.

### Background

Following publication of the DEIS in 1994, the Corps examined an additional 64 alternatives, or scenarios, to the existing Water Control Plan. After careful consideration of public comments on the DEIS and the modeled effects of these alternatives, the Corps selected seven to reflect three classes of system operation (conservation, fish and wildlife enhancement, and Mississippi River target flow). Along with the CWCP, these alternatives comprise the eight representative alternatives analyzed in detail in the preliminary RDEIS. For most key resources, comparison of the alternatives was based on modeled historic 1898 to 1997 inflow data.

### Characteristics of the Eight Representative Alternatives

Alternative Preliminary RDEIS ID	Intrasystem Regulation Criteria <sup>1/</sup>	Permanent Pool Level (MAF)	Navigation Guide Curves	Additional Spring/Summer Releases (kcfs)	Mississippi River Target
<b>Current Plan</b>					
1. CWCP	Balanced	18.1	Current	0	No
<b>Conservation Alternatives</b>					
2. C18	Unbalanced	18.1	Current	0	No
3. C31	Unbalanced	31	Higher (more conservation)	0	No
4. C44	Unbalanced	44	Highest (most conservation)	0	No
<b>Fish and Wildlife Alternatives</b>					
5. FW10	Unbalanced	31	Higher	10	No
6. FW15	Unbalanced	31	Higher	15	No
7. FW20	Unbalanced	18.1	Highest	20	No
<b>Mississippi River Alternative</b>					
8. M66	Unbalanced	18.1	Current	0	Yes

<sup>1/</sup> Under balanced intrasystem regulation, there is no purposeful effort to enhance resources in one of the upper three lakes at the potential expense of resources in another. When unbalanced, intrasystem regulation purposely enhances lake fisheries by implementing a 3-year rotating drawdown scheme among the three upper lakes.



## Eight Representative Alternatives

The eight representative alternatives are incremental variations of the CWCP. To facilitate comparison, the discussion of each alternative is structured to address the same five system operating criteria: intrasystem regulation, permanent pool level, navigation guide curves, additional spring/summer releases, and Mississippi River target flow. In addition, the key resource effects of the seven alternatives are compared to the CWCP.



### Current Water Control Plan

The CWCP provides guidelines for water releases from the six Mainstem Reservoir System lakes. It defines how water flowing down the Missouri River is stored and released to balance the needs of the System's many project purposes.

**Intrasystem Regulation**—Under the CWCP, intrasystem regulation is “balanced.”

In general, the movement of stored water from one lake to another follows specific guidelines to meet the water needs of project purposes. Under existing conditions, no purposeful effort is made to enhance resources in one of the three upper reservoirs at the potential expense of resources in another. Thus, the effects of intrasystem regulation are shared equally.

In each of the other seven representative alternatives, this operation criteria is changed to help answer the question: What would happen if system storage in the upper three lakes were unbalanced to preferentially enhance fish production?

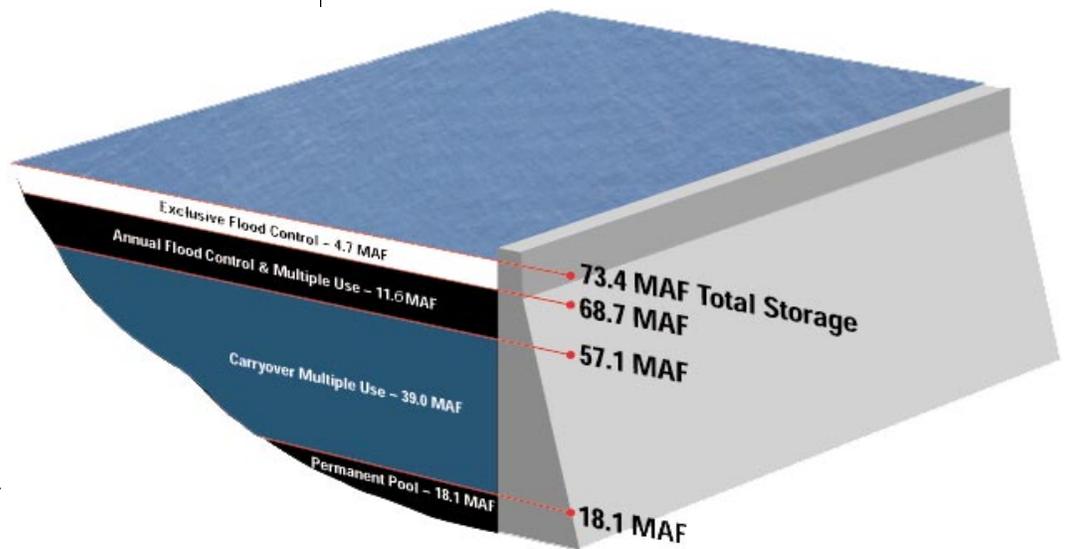
**Permanent Pool**—Under the CWCP, the permanent pool level is 18.1 million-acre-feet (MAF), approximately 25 percent of the total storage capacity of the six lakes (73.4 MAF).

For planning purposes, the CWCP separates the total available storage volume in the mainstem lakes into four zones. The permanent pool is the minimum amount of water necessary to operate the hydropower plants at the dams. The permanent pool also provides water for recreation, fish and wildlife, water supply for towns and irrigators, and sediment storage.

The other three zones are the annual flood control and multiple use zone, the carryover multiple use zone, and the exclusive flood control zone. The annual flood control and multiple use zone is used to capture high spring and summer flows. Water stored in this zone is released downstream so that it is emptied by March 1, the beginning of the next flood season. The carryover multiple use zone remains full in most years, but is designed to be gradually drawn down in multi-year droughts. The exclusive flood control zone is for storing flood waters from extreme storm events. Water is released from this zone as quickly as downstream channel conditions permit so that capacity remains to capture high flood waters in the near- and long-term future.

The permanent pool level varies in alternatives C31, C44, FW10, and FW15 to help answer the question: What is the effect of changing the permanent pool level to conserve more water?

**Navigation Guide Curves** —The CWCP contains guidelines for navigation service levels and season length in droughts based on the amount of water stored in the Mainstem Reservoir System.



### Mainstem Reservoir System Total Storage by Zone

The normal full-service navigation season maintains flows of 31 thousand cubic feet per second (kcfs) to maintain a 9-foot deep channel at Sioux City and Omaha (with other target flows specified at Nebraska City and Kansas City) for the 8-month period April 1 to December 1. When the amount of stored water declines during droughts, the navigation guide curves are used to make cutbacks in releases to conserve water. CWCP guidelines allow for shortening the navigation season to a minimum of 5.5 months (ending in mid-September) and reducing the channel depth to a minimum of 8-feet (25 kcfs at Sioux City).

The navigation guide curves are different in alternatives C31, C44, and all three of the fish and wildlife alternatives to provide insight to the question: What is the effect of changing the navigation guide curves to conserve water in droughts?

**Spring/Summer Releases**—Under the CWCP, system releases for navigation are not modified to benefit fish and wildlife.

Additional volumes of water are released during spring and early summer months followed by reduced releases in varying periods under alternatives FW10, FW15, and FW20 to help answer the question: What would happen if additional water were released to further benefit fish and wildlife.

**Mississippi River Target Flow**—Under the CWCP, there are four minimum target flow locations established downstream of Gavins Point Dam to maintain navigation service levels on the Missouri River during low-flow periods. There is no minimum target flow at any location on the Mississippi River.

There are currently minimum target flow sites along the Missouri River — Sioux City, Omaha, Nebraska City, and Kansas City. As the Missouri River is major tributary of the Mississippi River, a flow target on the Mississippi River could benefit navigation during low-flow periods on this river.

The establishment of a Mississippi River target flow (66 kcfs) at St. Louis is included in alternative M66 to address the question: What would happen if there were a Mississippi River target flow established at St. Louis to help Mississippi River navigation in low-flow periods.



## Conservation Alternatives

To increase the conservation of water, the permanent pool level and navigation guide curves vary for the conservation alternatives (C18, C31, and C44).

**Intrasystem Regulation Criteria**—Unlike the CWCP, intrasystem regulation is unbalanced in the three large lakes under each of the conservation alternatives to benefit fish production.

**Permanent Pool Level**—The permanent pool level is 18.1 MAF under alternative C18, the same as under the CWCP. The permanent pool level increases to 31 MAF for alternative C31 and totals 44 MAF for C44.

**Navigation Guide Curves**—Alternative C18 incorporates the CWCP navigation guide curves for service level and season length. C31 has higher navigation guide curves, which provide less support to navigation and conserve more water in a drought compared to the CWCP. The highest navigation guide curves are found in alternative C44 and provide the least support to navigation and conserve the most water in the mainstem lakes during droughts.

**Additional Spring/Summer Releases**—Under the conservation alternatives, the service levels during the navigation season are not varied to benefit fish and wildlife as under the CWCP.

**Mississippi River Target Flow**—Like the CWCP, there is no target flow for the Mississippi River at St. Louis under the conservation alternatives.

**Comparison**—Alternative C18 is the same as the CWCP except intrasystem regulation is unbalanced. Alternative C31 is the same as C18 except the permanent pool level is increased to 31 MAF and higher navigation guide curves are implemented. Similarly, Alternative C44 is the same as C18 except the permanent pool level is increased even higher to 44 MAF and the highest navigation guide curves are used.



## Fish and Wildlife Alternatives

To provide additional benefits to fish and wildlife, additional water is released above normal navigation requirements during the spring and early summer under the fish and wildlife alternatives (FW10, FW15, and FW20). In addition, lower service levels are provided in subsequent parts of the navigation season.

**Intrasystem Regulation Criteria**—Unlike the CWCP, intrasystem regulation is unbalanced in the three large lakes under the fish and wildlife alternatives to benefit fish production.

**Permanent Pool Level**—The permanent pool level increases to 31 MAF under alternatives FW10 and FW15. Under FW20, the permanent pool level remains at 18.1 MAF, the same as under the CWCP. Alternative FW20 is the past preferred alternative identified in the 1994 DEIS.

**Navigation Guide Curves**—Alternatives FW10 and FW15 have intermediate navigation guide curves, which provide less support to navigation and conserve more water during drought conditions in comparison to the CWCP. Alternative FW20 incorporates the highest guide curves, which provide the least support to navigation and the most conservation of water during droughts.

**Additional Spring/Summer Releases**—Alternative FW10 provides an additional release of 10 kcfs above navigation requirements during spring and summer months at Gavins Point Dam. Similarly, alternatives FW15 and FW20 provide additional releases of 15 kcfs and 20 kcfs, respectively.

**Mississippi River Target Flow**—Like the CWCP, there is no target flow for the Mississippi River at St. Louis under the fish and wildlife alternatives.

**Comparison**—Alternative FW10 is the same as C31 except



May 1 through mid-June releases are 10 kcfs above and the mid-July to mid-August are 6 kcfs below those of the CWCP. Also, no flood storage evacuation is allowed during the mid-July to mid-August period. FW15 is the same as FW10 except the May 1 through mid-June releases are increased to 15 kcfs above levels under the CWCP. April 1 through mid-June releases under alternative FW20 are 20 kcfs above the full service navigation releases. In contrast, the permanent pool level in FW20 is reduced to 18.1 MAF, the same as the CWCP, and the highest navigation guide curves are used as under alternative C44. This alternative also has flows 6 kcfs below full navigation service (equal to minimum navigation service) through October and no navigation service in November in a normal year.

### Mississippi River Alternative

Alternative M66 includes a navigation target of 66 kcfs for the Mississippi River at St. Louis. All of the existing Missouri River targets remain in place. Due to release restrictions in summer months to protect endangered and threatened bird species and ice conditions during winter months, meeting the flow target at St. Louis is not always possible.

**Intrasystem Regulation Criteria**—Unlike the CWCP, intrasystem regulation is unbalanced in the three large lakes under alternative M66 to benefit fish production.

**Permanent Pool Level**—The permanent pool level is 18.1

MAF, the same as under the CWCP.

**Navigation Guide Curves**—Alternative M66 follows the CWCP navigation guide curves for service level and season length in droughts.

**Additional Spring/Summer Releases**—Flow releases to benefit fish and wildlife are not included in this alternative.

**Mississippi River Target Flow**—Unlike all of the other seven representative alternatives, M66 includes a target flow of 66 kcfs for the Mississippi River at St. Louis.

**Comparison**—Alternative M66 is the same as alternative C18 except intrasystem regulation criteria are unbalanced and a target flow of 66 kcfs is established for the Mississippi River at St. Louis.

### Impacts of the Alternatives

The table below compares the effects of the eight representative alternatives on key uses and resources. Impacts that represent a positive change greater than 1 percent are shaded dark gray, while negative changes greater than 1 percent are shaded light gray. The impacts are percentage differences between the impact value of the alternatives relative to the impacts of the CWCP.

Relative Impacts to the CWCP for the other Seven Alternatives (Percent)

Resource/Use	Effect of Increased Conservation			Effect of Fish and Wildlife Measures				Effect of St. Louis Target	
	C18	C31	C44	FW Base <sup>1/</sup>	FW 10	FW 15	FW 20	Miss Base <sup>2/</sup>	M66
<b>Missouri River</b>									
Flood Control	-1	-1	-1	-1	-1	-1	-1	-1	-1
Hydropower	0	1	3	1	1	1	0	0	0
Recreation	0	4	6	4	3	3	0	0	1
Navigation	0	-5	-18	-5	-7	-9	-23	0	-3
Water Supply	0	0	1	0	0	0	0	0	0
Wildlife Habitat (Tern and Plover)	24	39	34	39	23	27	24	24	51
Wetland Habitat	1	-1	4	-1	2	3	4	1	1
Riparian Habitat	-2	-3	-5	-3	-5	-6	-8	-2	-2
Young-of-Year Fish Production	3	3	3	3	0	0	-4	3	6
Coldwater Fish Habitat in Lakes	-1	5	15	5	6	6	7	-1	-1
Coldwater Fish Habitat in River	3	5	8	5	2	1	3	3	3
Warmwater Fish Habitat in River	-3	-9	-12	-9	-8	-5	6	-3	-3
Physical Habitat for Native Fishes	0	0	0	0	1	2	4	0	0
Interior Drainage	0	1	-1	1	5	5	-3	0	3
Groundwater	-1	0	-2	0	1	2	-5	-1	-1
Total NED Economics	0	0	1	0	0	0	0	0	0
Historic Properties Index	1	-2	-11	-2	-2	-2	-4	1	2
<b>Mississippi River</b>	-1	-4	-6	-4	-1	-2	-9	-1	47

<sup>1/</sup> FW Base is Alternative C31  
<sup>2/</sup> Miss Base is Alternative C18