

# Glossary of River Management Terminology (2010)

• The following discussion covers basic items that government agencies consider for the operation of the Missouri River. Landowners need to be familiar with these items to recognize agency proposals and policies about future river operation, in order to understand how they will affect landowners' interests and to take action in their own interests.

- 1) The "Master Manual" is the official guideline for operation of the river. The present "Master Manual" was implemented in March 2004 and was amended again in 2006 to allow for Adaptive Management. Adaptive Management gives government scientists the power to change the Master Manual if tested hypotheses and sound science are the basis for the changes. The Master Manual and the following have been the bases for discussion, concern, lawsuits, legislation, etc., and the like, and will continue to affect the operation of the river. The web site for the Master Manual (\*.pdf file 432 pages) is [www.nwd.usace.army.mil](http://www.nwd.usace.army.mil)
- 2) The "Annual Operating Plan" (AOP) is an annual plan developed by the US Army Corps of Engineers (USACE) for operation of the Missouri River system of dams and reservoirs. Of concern to Missourians are the proposed water depths in the river. The AOP is proposed in October for the following year. The final AOP is usually stated as a Record of Decision (ROD) in February or March. Hearings for the AOP are held in cities from Montana to Missouri along the river basin. Here in Missouri the hearings are usually held in Kansas City, Jefferson City and St. Louis. The AOP takes into account water presently stored in the upstream lakes and how it will be released up to July. This includes proposed spring rise releases. In early July, the USACE takes stock of the amount of water in storage and announces how the river will be operated for the rest of the year. The web site for AOP's is [www.ndw.usace.army.mil](http://www.ndw.usace.army.mil).
- 3) The average runoff from the upper river basin is 25 million-acre feet per year. The lakes holding the lion's share of this runoff are Lake and Dam Oahe at Pierre, South Dakota; Lake Sakakawea (Garrison Dam) in Western North Dakota; and Fort Peck Lake and Dam in East central Montana. Water levels in these lakes are designed to vary greatly (30 feet+). The water levels in the three lakes downstream from Lake Oahe to Lewis and Clark Lake (Gavin's Point Dam) are kept relatively constant and are operated basically to allow for a flow through of waters from the upper lakes. All of the dams have hydroelectric power stations. The six lakes together are known as the "Mainstem Reservoir System." The three most upstream Missouri River reservoirs formed by Fort Peck Dam, Garrison Dam, and Oahe Dam are called the "Upper Reservoirs" or the "Upper River." The segment of the Missouri River that extends from Gavin's Point Dam to the mouth of the river near St. Louis is called the "Lower River."
- 4) The operation of the river provides for multiple uses. A majority of them are:
  - a. Flood control
  - b. Navigation
  - c. Water outtakes (1,600) for potable water for cities and cooling water for coal and nuclear power plants
  - d. Hydroelectric power (10,000,000 Megawatt Hours)
  - e. Drainage (primarily downstream from Gavin's Point)

- f. Irrigation (primarily upper basin states)
  - g. Recreation (boating and fishing)
  - h. Environmental activities (fish and wildlife habitat, endangered species act)
- 5) The “Missouri River Authorized Purposes Study” (MRAPS), sometimes stated as “Mister APS” or “108 study”. This is a \$25 million study funded in 2009 to be conducted by the USACE to review the original authorized uses of the river and to determine if changes to the authorized purposes are warranted. The study is due out in 2014. This study comes on the heels of the Master Manual amended in 2004 and 2006. Political interests in the upper basin states for reallocating water usage, essentially amounting to retaining more water in the upper basin states, are responsible for this new study. Federal court cases to date have not been forthcoming in providing the reallocation desired. Their goal now is take the legislative route for water reallocation. Ultimate changes in the authorized purposes must be made by the US Congress and Senate. Of utmost concern to landowners in the navigable portion of the river (Sioux City, Iowa to St. Louis) is the continued agency support of navigation and flood control. The outcome of this study may have a profound negative effect on continued support of navigation and flood protection by the agencies. Scoping and public input meetings for stakeholders are presently underway throughout the Missouri River basin. Participation of stakeholders is of the utmost importance to have their concerns incorporated in the study. The web site for the study is [www.mraps.org](http://www.mraps.org)
- 6) The Water Resources Development Act (WRDA) is Federal legislation that authorizes new programs or projects nationwide. Separate legislation is needed to fund the projects. The Act spells out the scope of the projects. This includes the land areas affected by the Act as well as language and authorities for implementation for the different parts of the Act. WRDA legislation is not enacted every year but is usually passed once every two years. WRDA 2007 was passed in the fall of 2007. Significant programs and projects of interest in the midwest include reconstruction of the locks and dams on the upper Mississippi River, in Section 5018 the setting up and authorization and operation of the Missouri River Recovery Implementation Committee (MRRIC, pronounced Mister Ric), and in Title IX Section 9000 the setting up of a plenary committee to meet and report to Congress by mid-2009 recommendations for a national levee safety law to be enacted by Congress.

### MRRIC

The MRRIC is a totally federally funded process and program except for covering the travel and meeting expenses of North American Tribe and non-governmental stakeholder committee members. The purpose of this committee is to provide a mouthpiece for the stakeholders in the river basin wherein they may, either as a MRRIC member or through their locally appointed representatives to the MRRIC, make recommendations about the operation of the river and recommendations about agency recovery activities involving the ecosystem, wildlife conservation and the environment. *The recommendations of the MRRIC are not binding on the affected Federal government agencies empowered with operation and recovery activities on the river.* The Federal agencies can receive and adopt recommendations from other individuals, organizations and sources. In addition to representation on the MRRIC, the Tribes can enter into consultations to formulate agreements with the Federal agencies outside of the recommendations of the MRRIC. The Federal agencies involved are the Department of Agriculture (USDA), the Department of Defense (DOD), the Department of Energy (DOE), Department of Interior (DOI), and the Environmental Protection Agency (EPA). The most heavily represented department is the Department of the Interior with its agencies that include the US Fish and Wildlife Service (FWS); the Bureau of Reclamation (BOR); the U.S. Geological Survey (USGS); The National Park Service (NPS); and the Bureau of Indian Affairs (BIA). Other departments and agencies are invited to participate in the

roundtable. The most notably missing department is the Department of Transportation which, elected not to participate. A Drafting Team and a Review Panel consisting of stakeholders in the Missouri River basin were appointed for formulating a Charter for MRRIC. The Charter was completed and adopted in the fall of 2008. Significant provisions in the Charter include: a) Recommendations of the MRRIC must be by consensus, i.e., 100% agreement through a two-meeting process. This prevents majority rule against one or two states' interests; b) The two lead agencies with a position among the committee stakeholders are the USACE and the US-FWS. Representatives of these agencies must be persons with a Senior Executive Service (SES) level in government. It is hoped that, given this level of representation, when consensus is reached with these individuals, the MRRIC recommendations will be carried out; c) The size of the MRRIC is made up with one governor-appointed representative from each State (8 States), one tribal appointed representative from each Tribe (28 North American Tribes), and a maximum of twenty-eight (28) stakeholder members, broken down into the interests listed below. Each interest may have a maximum of two (2) representatives and two (2) alternates. The MRRIC web site is <[www.mrric.org](http://www.mrric.org)>.

- Navigation
- Irrigation
- Flood Control
- Fish and Wildlife
- Recreation
- Water Quality
- Water Supply
- Agriculture
- Conservation Districts
- Waterway Industries
- Major Tributaries
- Thermal power
- Hydro power
- At large/other interests, e.g. cultural and historic preservation
- Local Government
- Environmental/conservation organizations

**MRERP** There are two significant items of interest to Missouri River Stakeholders in the provisions of WRDA 2007 for the MRRIC. One is a study of the entire basin called Missouri River Ecosystem Restoration Plan (MRERP, pronounced "Mister Earp") which is to determine actions required: a) to mitigate losses of aquatic and terrestrial habitat; b) to recover federal listed species under the Endangered Species Act of 1973....; and to restore the ecosystem to prevent further declines among other native species." This study's initial emphasis will be along the Missouri, Platte, Kansas and Yellowstone Rivers. There are provisions in this study to determine further recovery actions over the entire watershed of the Missouri River and its tributaries. This study will take several years to complete and is due in later 2017. The USACE receives and administers the funding for this program. The MRRIC will be reviewing the components of this study and making recommendations from time to time in the Needs and Purposes phase, the Findings phase, the Conclusions phase and the Recommendation or Alternatives phase. *The recommendations of the MRRIC are not binding on the affected Federal government agencies empowered with preparation of this "Plan"*. The MRERP web site is <[www.MRERP.org](http://www.MRERP.org)>

**MRRP** The other provision is that MRRIC is to provide recommendations for the recovery of the pallid sturgeon, piping plover and the least tern under the Missouri River Recovery Program (MRRP) often

stated as the “Recovery Program”. Government funding for the operation of MRRIC comes from the MRRP budget. This program is presently underway in the form of land purchases and construction of shallow water habitat, chutes, wetlands, sandbar development, the intake project on the Yellowstone River and other recovery projects. The USACE receives and administers the funding for this program. Continuing authorization funding for this program is \$55 million per year and has been funded as high as \$75 Million per year. The MRRIC will be reviewing the components of this program, (annual project work requests and annual work plans) and making recommendations from time to time. *The recommendations of the MRRIC are not binding on the affected Federal government agencies empowered with the operation of this “Program”.* This program can proceed either with or without recommendations from the MRRIC. Projects are approved and implemented by various Federal and State government agencies through the Agency Coordination Team (ACT). The MRRP web site is <[www.moriverrecovery.org](http://www.moriverrecovery.org)>

## NATIONAL LEVEE SAFETY REVIEW AND LEGISLATION

The provisions for national levee review and a safety law in WRDA 2007 came about as the result of hurricane Katrina. The intent of the government is to reduce the financial exposure of the government to flood damage losses. The first draft of the plenary committee’s report to Congress (104 pages) is on file at <<http://www.iwr.usace.army.mil/ncls/reviews.cfm>> Items of concern in the draft and those that will need to be addressed are: a) Levee safety requirements will no longer be based on the levee height alone. Safety requirements will be based upon flood risk and will now include structural integrity of the levee and to what degree it meets USACE standards for levee construction, provisions for ditch and pump drainage of the flood protected lands and means for protecting people from danger; b) Under certain circumstances, operators of levees will at their own expense have to have their levees, drainage and population protection systems inspected and certified by an independent Registered Engineer; c) The States will have to enact laws to administer the levee safety program; and, d) There are provisions for exempting certain levee systems from the levee safety program.

Initially, the greatest attention is being directed toward levee systems, generally in urban areas, providing 100 years or more of protection (1 percent chance or less of flooding) and depending on FEMA flood insurance.

What is unclear as of this writing is how this program will affect levee systems providing less than 100 years or more of protection and to what extent they will still be able to receive Federal Title 84-99 levee repair funds. Under this part of the program, all federal levee systems are to have a “periodic” inspection by 2011 and repeat inspections every 5 years. Of interest to a majority of districts is the inspection program for non-federal levee districts. They are to have a “periodic” inspection by 2012. It is still unknown if repeat “periodic” inspections every 5 years for systems substantially providing less than 100 years of protection will need to be conducted. These inspections may or may not be fully paid for by the federal government. Availability of funding for these inspections varies widely throughout the various USACE districts. “Periodic” inspections are to occur every 5 years interspersed with “routine” annual or semi-annual inspections. Compliance for remaining eligible for Public Law 84-99 levee repair funds is provided in the “LEVEE OWNER’S MANUAL FOR NON-FEDERAL FLOOD CONTROL WORKS”, dated March 2006 (118 pages) Call Jud Kneuvean at (816) 389-3281 for copies of the manual.

- 7) The Missouri River Association of States and Tribes (MORAST) is basically the continuation of the disbanded Missouri River Basin Association (MRBA). MORAST makes recommendations on river issues based upon majority rule. For this reason, the State of Missouri is not a member of MORAST.

Committees like MRRIC and MORAST exist for the rivers draining into San Francisco Bay and the Platte River in Nebraska.

8) The following are definitions of terms about operation of the river:

a. Lake water storage levels:

**Carryover and Multiple Use** water storage levels are for average runoff years. Waters from this storage sustains water levels during periods of below normal precipitation in the basin.

**Annual Flood Control & Multiple Use** water storage levels are for annual flood control water level management.

**Exclusive Flood Control** water storage levels is a range of storage for above normal runoff and is the zone where water releases from lakes are mandatory to protect the lake system. Water releases are mandatory from this zone even when lower reaches of the river, like those in Missouri, are experiencing floods. The reason for this is to create room for the next season's expected average runoff. These water releases are called **Evacuations**.

**Permanent Pool** The minimum water level necessary to allow the hydropower plants to operate and provide minimum service to recreation and fish and wildlife. The permanent pool also provides reserved space for sediment storage.

**Preclude** The total System storage in MAF below which the release of water to support a specific use would be suspended or precluded. For example, the Navigation Preclude is 31 MAF, so when the total System storage drops below 31 MAF releases for navigation are suspended. The Spring Rise Preclude has yet to be determined, but can be no higher than 40 MAF to ensure sufficient conservation benefits for the pallid sturgeon.

**Flood Control Constraints** – The Missouri River Master Water Control Manual (refer to Tables VII-7 and VII-8) contains more detailed information on Flood Control Constraints in the paragraphs that address “Flood Target Flows”. As a flood control measure, the normal relationship between navigation service levels and target flow levels may be modified when large amounts of tributary inflow are forecasted between Gavins Point Dam and the downstream flow target control points at Kansas City. One level of flood target flows reduces flows to those consistent with full navigation service support and the second level of flood target flows reduces flows to those consistent with minimum navigation service support. The “Flood Control Constraints” are increased by 10,000 cfs at Kansas City during periods of “Evacuation” for waters in the “Exclusive Pool.” The spring rise flows proposed by agencies and environmental interest groups require that the flood control constraints be adjusted upward. This will permit increased flows at Kansas City irrespective of flooding conditions across the State of Missouri.

**Unbalanced Reservoirs** A proposed method of operating the water levels either higher or lower in the three uppermost lakes to meet goals peculiar to an individual lake. This operating plan would apply to a specific time of the year after which water levels would be operated normally. This is proposed to be done to provide for environmental, recreational and/or water supply reasons. Such a plan could not adversely affect desired goals and operations of any of the other lakes.

b. Navigation terminology:

**Navigation Preclude** is a condition where, because of insufficient water stored in the upper basin lakes, there will be no water releases from the lakes to support navigation on the Missouri River. This will adversely affect barge traffic on the Missouri River and, during periods of drought in the lower midwest, adversely affect barge traffic on the Mississippi River.

**Navigation Season** is that period usually between April and December that the USACE supports navigation on the river from Sioux City, Iowa, to St. Louis, Missouri. When the season is shortened it usually comes at the end of the season. It takes 8 to 9 days for water levels in St. Louis to adjust to altered discharge rates from Gavin's Point Dam.

**Navigation Service / Support** is the minimum design and release levels of water to allow navigation. The USACE releases or monitors water levels to maintain an 8 to 9 foot deep channel for barges. The minimum flow or discharge maintained at Kansas City is 25, 000 to 28,000 cubic feet per second (cfs). In the 25,000 cfs down to 18,000 cfs range of flow, barges are not supported upstream of Kansas City. Anything below 18,000 cfs at Kansas City will not support navigation downstream from Kansas City.

c. Environmental terminology:

**Endangered** A plant or animal species that is in danger of extinction throughout all, or a significant portion of, its range. The U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS) designates endangered species.

**Floodplain Connectivity** Flooding of flood plains adjacent to the river to flush nutrients and aquatic food sources into the river. Before channelization of the river with straightening and rock revetments and dikes, annual over-bank flood flows in the spring happened on a fairly regular basis. It is well understood among environmental government agencies and activist groups that controlled releases from the reservoirs and that the barge channel and its rock structures keep river flows at elevations well below the levels of the adjoining floodplain. They know that the lack of maintenance and abandonment of the barge channel will cause the present channel to fill with sediment that in turn will raise normal water levels. My study of flood levels on a river reach through Boonville indicates that abandonment of the barge channel will cause fills of sediment from 7 to 19 feet to occur. This will cause flood levels presently seen once every 50 years to occur once every 10 years.

**Mitigation** An activity usually involving construction or management practices to create or enhance habitat for wildlife in general or for an endangered species. Construction would involve construction of a wetlands. A management practice may involve a flow like a spring rise. It is done to counteract current or past activities or land uses that have made areas unusable for pre-existing wildlife. It is either done on or off site. If it is done off site, it is usually done on an acre for acre basis or at an acreage greater than the original acreage.

**Riparian Habitat** The area adjacent to a stream channel, a reservoir, or wetland that supports the growth of woody vegetation that is not adapted for life in saturated soil conditions.

**Reference Hydrograph** A hydrograph is a graph containing plotted data consisting of observed runoff, usually expressed in cubic-feet-per-second (cfs), at the lowest downstream point of an entire

watershed consisting of the “outlet in common” of all of the tributaries in a watershed. The flow data is plotted along the vertical axis in relation to time intervals of measurement plotted along the horizontal axis. The Reference Hydrograph is the “run-of-river” hydrograph. Data from the Corps’ simulation of “run-of-river” was used to develop the reference hydrograph.

**Restoration** Restoration, as it is presently being proposed, includes restoration projects and policies to recover “...federally protected species in the Missouri River basin and the ecosystem upon which they depend...”. This includes not only the species but also the lands of *the entire land mass of the basin*. Heretofore, only the river channel and the floodplain were being considered in the scope of the recovery effort. This would amount to more than 1,000,000 acres of private property which is mostly farmland. Now the entire watershed area is being proposed by the agencies. This amounts to an area of about 273,850 square miles. For that portion of this area south of Pierre, South Dakota, in the States of South Dakota, Nebraska, Kansas, Iowa and Missouri, a super majority of it is private property. The nature and the extent of the regulation of land use over the lands involved are not known at this time. However, it is being proposed by the agencies that regulations and requirements will be forthcoming based upon conclusions and perceived necessary adjustments resulting from “adaptive management.” It is presently proposed that the *adaptive management process and the conclusions and adjustments derived there from be implemented at the pleasure of the agencies without the advice and consent and control of those being affected by the regulations and policies, namely, the private landowners.*

**Run of River** Flows that are basically uncontrolled, as was experienced before the construction of the dams.

**Shallow Water Habitat** Areas along the river that are less than 5 feet deep, flowing at no more than 2.5 feet per second.

**Similarity of Appearance (SOA)** When hunting or fishing, both private and commercial, of a non-listed species results in the take of a listed endangered species because it is “similar” in appearance or other reasons, the US-FWS can take action to stop the take of the non-listed species based the Similarity of Appearance (SOA) of the listed endangered specie.

**Spawning Cue** Either a natural or man-made condition that may prompt fish to spawn. Many environmentalists and some biologists believe that for the pallid sturgeon and other native river fish, a spring rise on the Lower River may prompt spawning although there is no sound science to prove this theory. Monitoring of spawning sturgeon in the river in 2007 indicated that other factors like water temperature and length of day may affect the spawning cue to a greater degree than a spring rise. Other data indicates that spawning takes place over a longer period of time not previously realized. Scientists agree that more data needs to be collected to give a clearer picture of spawning conditions.

**Spring Rise Plenary Group** A group of over 50 individuals representing public, private, environmental, municipal, tribal, activists and governmental interests and authorities as “stakeholders” met May through August, 2005, to try to resolve the issue of the “Spring Rise.” The group was unable to come to a consensus on the issue. A show of hands indicated a majority of members did not want a spring rise.

**Tail waters** The river reach immediately downstream from a dam.

**Threatened** Legal status afforded to a plant or animal species likely to become endangered within the foreseeable future throughout all or a significant portion of its range, as determined by the USFWS or the NMFS Master Manual.

**Wetland Habitat** Areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support vegetation adapted for life in saturated soil conditions.

d. Flow terminology:

**Steady State or Constant Discharge Rate** is a discharge rate from Gavin's Point Dam, May through July, to maintain water levels upstream from Omaha at constant levels on sandbars for endangered nesting birds. The purpose is to prevent drowning of the nests. These discharges remain steady even when flooding or natural drainage of fields is threatened downstream. The USACE states that this form of discharge wastes water that is not needed downstream to support navigation.

**Flow to Target** applies to varying discharges from Gavin's Point Dam to satisfy support of navigation downstream from Kansas City. When water flows needs are low the bird's nests are not threatened; however, when more water flow is needed, increased flows drown out nests near the water's edge. To prevent this, the USACE moves the nests to higher ground. The Department of the Interior (DOI) Fish and Wildlife Service (FWS) prevents the USACE from moving the nests during some years and the "Steady State Discharge Rate" is the rule. For the USACE, however, "Flow to Target" is the preferred method of releasing water since it conserves water by releasing only what is needed for navigation. This flow regime keeps water levels as low as possible during the spring months to provide natural drainage from farm fields and maximum channel capacity for conveyance of flood waters.

**Spiking** is water releases from Gavins Point with a sharp rise/flow increase producing a peak flow of short duration (2 to 3 days  $\pm$ ) followed by a sharp fall/flow decreasing to usual flows. The time period for a rise or a fall would take place in 2 to 3 days instead of weeks. These releases would be part of a spring rise plan and have been used in the past to help control the location of plover nesting on sand bars.

e. Characteristics of the river in Missouri:

**Construction Reference Plane** A profile of the water surface of the river designated by the USACE. It is used as a design reference for construction of channel stabilization and rock structures in the river and public and private improvements on the banks and in the floodplain of the river. From the Construction Reference Plane (CRP), the elevation of the water's surface can be determined at any point along the river.

**The River** For environmental regulation purposes it is now defined as the area between the bluffs instead of the river's water surface. This was mandated by our elected representatives and agencies with neither the consent nor input of the landowners.

**Bank Stabilization and Channelization Act** The work accomplished with this project straightened the channel and stabilized the banks of the Missouri River with rock blankets on the banks (revetments) and piling and rock wing dikes in the channel. These structures provide a self scoured channel of design depth and a large deep channel for high rates of flow that hold down high flood

levels. The river will not naturally maintain the present channel without these rock and piling structures. The loss or lack of maintenance of these structures will result in shallow, wide and meandering multiple channels (braided stream). Along with higher flood levels, the meandering channels will undercut existing levees. Additionally, such structures on tributaries were included in the 1944 Flood Control Act. These were authorized but have yet to be funded as well as many Pick-Sloan levees that have never been funded nor built.

9) Several additional and alternative proposals for the operation of the river have been put forward that amount to changes in the original Master Manual. Some of them are:

- a. **Spring Rise or Pulse and/or Flow Enhancement** is a proposal to increase water levels in the river channel from April to July. This is the most flood prone period of the year in Missouri. Proposals include increasing presently prescribed discharges by 10,000 cfs to as high as 64,000 cfs. Below “flood level,” an increase of 10,000 cfs increases the water level by 1.0 foot at Jefferson City. This holds true above “flood stage” for many reaches where bluffs and/or levees are near the banks on both sides of the river. Extra water heights cause bank scouring above existing revetments and dikes, close flap gates affecting natural drainage, and cause overtopping of existing levees during high river stages. With respect to the Spring Rise releases, the “Magnitude” is the amount that the release is above the normal release for that time. The “Frequency” is how often this increase would occur, and the “Duration” is the length of time that the release would be above normal releases. With “Proration,” the magnitude of the Spring Rise release is proportionally adjusted based on the amount of water in total system storage. A higher total system storage amount would provide a proportionally higher Spring Rise release.
- b. **Split Navigation Season** is a proposal to stop support of navigation during August into September. Flows at Kansas City would fall below 18,000 cfs. This threatens water outtakes as well as navigation on the Missouri and Mississippi Rivers. Barge industry spokespersons state that they will not operate on the Missouri River with a “split” season because it requires them to gather up barges twice per navigation season. Additionally, low summer flows would lower water levels in some of the shallow water habitat and render it useless to the pallid sturgeon.
- c. **Adaptive Management** is a proposal where the MRRIC is set up to “monitor” management of the river and recommend flow and operational adjustments from year to year based upon tested hypotheses and changes based upon sound scientific data.
- d. **Conservation Alternatives** for water level management involve increasing the “Permanent Pool Level” in the upstream lakes in the 10 to 30 million-acre foot range. This provides for increased water levels in the upper large lakes for recreational purposes. It also restricts water available for navigation during periods of drought in Missouri and decreases the amount of storage for runoff waters for flood protection in Missouri. Under the “Current Water Control Plan” (CWCP), required water releases from the “Exclusive Pool”, based upon historical runoff records, will occur approximately 17 times in 100 years. With any of the “Conservation Alternatives,” required water releases from the “Exclusive Pool” increase to 35 times in 100 years. These releases occur during heavy spring snow melt and runoff periods. This amounts to a doubling of the number of times that water will be released from the lakes during springtime flood periods in the lower basin states of Missouri, Iowa, Kansas and Nebraska.

- e. **Water Neutral Release Rates** are water release plans where there is no net loss of water stored after the end of the calendar year. This water release plan is proposed for spring rise releases before it is known how much water is available for total annual releases from Gavins Point in July. Shortfalls in projected year-end carryover amounts of water are made up for by shortening the navigation season. This helps assure some water availability for the following year's spring rise.
- f. **Garrison Diversion** is a proposal actively being pursued in legislation underway to divert water from the Missouri River northeastward ultimately into the Red River flowing through Fargo, North Dakota. This would be accomplished by pumping and a pipeline and open channel flow to enhance flows in the Cheyenne and Red Rivers channels that flow through Canada into Hudson Bay. Canada does not support moving water from the Missouri River watershed to their streams because of environmental concerns. Waters taken from the Missouri River basin would threaten navigation and water supply users all along the Missouri River.
- 10) No moneys are planned to be available for damages arising from the proposed manmade spring rise either now or in the future. This includes the following: Flood damage to crops either from internal drainage due to seepage or flap gates being closed or levees being overtopped; damages to drainage systems and other earthworks either private or sponsored by the USACE; additional costs related to longer periods of pump operation at greater heads; repairs to public infrastructure, including stone, to maintain the river channel, public roads, and other public works. This is contrary to the Government's compensation to landowners and drainage districts on the upper Mississippi River when the locks and dams were constructed. As for damages to levees, 84-99 funds would not be available unless a disaster type event over a large area is declared. The flood damage in a few widely separated levee districts in all likelihood would not be declared a disaster type event, thereby making 84-99 funds unavailable for repairs.

## ACRONYMS

AGO Attorney General's Office	MRBA Missouri River Basin Association (disbanded 2006)
AOP Annual Operating Plan	MRBIR Missouri River Basin Interagency Roundtable
BA Biological Assessment	MRERP Missouri River Ecosystem Restoration Plan
BIA Bureau of Indian Affairs	MRNRC Missouri River Natural Resources Committee
BiOp Biological Opinion	MRRIC Missouri River Recovery Implementation Committee
BOR Bureau of Reclamation	MRRP Missouri River Recovery Program
Corps/COE/USACE U.S. Army Corps of Engineers	MRRIP Missouri River Recovery Implementation Program
CPR Coalition to Protect the River	MW megawatt
CRP Construction Reference Plane	MWh megawatt-hours
CWCP Current Water Control Plan	NGO Non-Governmental Organization
DEIS Draft Environmental Impact Statement	NPS National Park Service
DOD Department of Defense	NEPA National Environmental Policy Act
DOE Department of Energy	PA Preferred Alternative
DOI Department of Interior	PDEIS Preliminary Draft Environmental Impact Statement
EPA Environmental Protection Agency	PRDEIS Preliminary Revised Draft Environmental Impact Statement
ESA Endangered Species Act	RCC Reservoir Control Center
FCA Flood Control Act	RDEIS Revised Draft Environmental Impact Statement
FEIS Final Environmental Impact Statement	RHM Reservoir Habitat Model
FWG Federal Working Group	ROD Record of Decision
GIS Geographic Information System	ROR run of river
kfs thousand cubic feet per second	Study Master Water Control Manual Review and Update
MAF million acre-feet	System Missouri River Mainstem Reservoir System
MARC 2000 Mid-West Area River Coalition 2000	

Master Manual Missouri River Master Water Control Manual MLDDA Missouri Levee and Drainage District Association MO-ARK Missouri-Arkansas River Basins Association MCP Modified Conservation Plan MORAST Missouri River Association of States and Tribes MRAPS Missouri River Authorized Purposes Study	UMIMRA Upper Mississippi, Illinois, Missouri River Assoc. USFWS U.S. Fish and Wildlife Service USGS U.S. Geological Survey WAPA Western Area Power Administration WRDA Water Resources Development Act
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Prepared by Joseph B. Gibbs, PE, Board Member, Missouri Levee and Drainage District Association (MLDDA)  
1115 Club Meadows Drive, Columbia, Missouri 65203 (573) 815-0347 JBG6267@aol.com