

UNABRIDGED GLOSSARY AND LIST OF ABBREVIATIONS AND ACRONYMS (UGLAA) Missouri River Recovery Implementation Committee (MRRIC)

NOTES: 1) To help find an abbreviation or acronym, use the “Find” function and type the first letter of the sought after item four times (e.g. “AAAA”). This will take you to the beginning of the abbreviation or acronym list starting with that letter (e.g. A). 2) Use the find function and type “AtoZ” and it will take you to the beginning of the GLOSSARY on page 32 of 57. This document is forwarded the week before regular face-to-face meetings of the full MRRIC. See APPENDIX v.#

*.pdf document for graphical information. Send corrections, updates and new items to <jbg6267@aol.com>

AAAA

A

- Acceptable

AAA

- Army Audit Agency

AAMR

- Annual Adaptive Management Report

AAR

- After Action Review or After Action Report; report or review prepared after a phase or given project has been completed

ac.-ft

- acre-feet or acre foot; a value of volume for 1 foot of depth over an entire acre; 43,560 cubic feet; 325,829 gallons

ACEP

- Agricultural Conservation Easement Program

ACT

- Agency Coordination Team; Federal and State personnel involved with the MRRP downstream from Sioux City, Iowa. Team is made up of Federal staff from USACE, USFWS, EPA c/o Larry Shepard and USGS and State staff from MDC, Iowa-DNR, Kansas Department of Wildlife and Parks and NGPC.

ACHP

- Advisory Council on Historic Preservation

A&E

- Architectural and Engineering firms

ADM/DAA

- Alternatives Development Methodology/Decision Analysis Approach

AF

- acre-feet; Annual Forum

AGWI

- America’s Great Watershed Initiative

AHPS

- Advisory Hydrologic Prediction Service

AIDC

- Automatic Identification and Capture

ALARP

- “As Low As Reasonably Practicable”

AM

- Adaptive Management; a flexible decision-making process that promotes collaboration, flexible decision-making and learning from the outcome of management actions that ultimately leads to more effective decisions and enhanced environmental benefits from projects. It is a process that integrates elements of planning, implementation (build and operate), monitoring, analysis (assessment) and decision making (adjustment step) for the MRRP and the BiOp. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders. *Synonyms [or other variables]; Ameren Missouri (electric power company).*

AMI	-	American Watershed Initiative; a Report Card study on the uses and the economic benefits of the Mississippi River basin.
AM Strategy	-	This is the adjustment step for the MRRP and the BiOp in the AM process.
AMIT	-	Adaptive Management Integration Team
AMP	-	Adaptive Management Plan
AMPP	-	Adaptive Management Plan for Propagation
AMWG	-	Adaptive Management Work Group
ANOVA	-	Analysis of Variance
ANPR	-	Advanced Notice of Proposed Rulemaking
ANS	-	Aquatic Nuisance Species
AOP	-	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. 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. Webinars and/or face-to-face hearings for the AOP are held in cities from Montana to Missouri in the river basin. The AOP takes into account water presently stored in the upstream lakes and the snow pack on the plains and the mountains and how it will be released up to July. This includes proposed spring pulse 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.nwd.usace.army.mil
AP	-	Applied Science
APF	-	Announcement for Program Funding
APHIS	-	Animal Plant Health Inspection Service of the USDA
API	-	Application Program Interface
ARPA	-	Archaeological Resources Protection Act
ARRA	-	American Recovery and Reinvestment Act of 2009
AR	-	Annual Report
ASABE	-	American Society of Agricultural and Biological Engineers
ASA(CW)	-	Assistant Secretary of the Army for Civil Works
ASCE	-	American Society of Civil Engineers
ASDSO	-	Association of State Dam Safety Officials
ASFM	-	Association of Floodplain Managers
ASME	-	American Society of Mechanical Engineers
ASR	-	Annual Strategic Review
ASRD	-	Annual Strategic Review Document
ATON	-	Aids to Navigation ATON services of the US Coast Guard including buoys, shore line navigation markers, etc.
ATR	-	Agency Technical Review
AWG	-	Agenda Work Group; a MRRIC WG
AWI	-	America's Watershed Initiative A process sponsored by the Nature Conservancy North America Freshwater Program to develop a report card

- on the Mississippi River watershed. <http://www.americaswatershed.org>
The process involves stakeholder meetings via webinars.
- AWMA - Area Wide Market Appraisal for various regions in a state for Wetland Reserve Easement payments.
- AWP - Annual Work Plan; Annual work items for the MRRP.
- BBBB
- B - Billion
- BA - Biological Assessment; *Synonyms [or other variables]* Before-After
- BACI - Before-After-Control-Impact
- BGEPA - Bald and Golden Eagle Protection Act
- BIA - Bureau of Indian Affairs; an agency of the US Department of the Interior
- BiOp - US Fish and Wildlife Service 2000 Biological Opinion as amended in 2003.
The pallid sturgeon and least tern are listed as endangered, and the piping plover is listed as threatened under the Endangered Species Act (ESA) because their populations are low. Since 1944, the U.S. Army Corps of Engineers (Corps) have changed the river to provide for flood control and navigation on the Missouri River, but these changes affected the habitat for the fish and birds to the point that the population numbers decreased significantly along the river. Since all three of these species use the Missouri River for part or all of their lives, the U.S. Fish and Wildlife Service (Service) determined the Corps needed to change how it operates the dams and maintains the channel and banks to protect the three species and provide more habitats. Under the Endangered Species Act, the Service wrote the 2003 Amended Biological Opinion on the Operation of the Missouri River Main Stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System (BiOp) which contains a Reasonable and Prudent Alternative (RPA). The RPA includes recommendations to the Corps to protect and provide more habitats for the birds and pallid sturgeon while still providing for flood control, navigation, and other authorized purposes. The BiOp also provides the science of why the populations of the three species are declining. It is the Service's opinion that the Corps can change the river flows to mimic the flows prior to construction of the dams at important times during the year to provide more habitats for the birds to nest and the fish to spawn. The Service also recommended in the BiOp that the Corps build more habitats for the three species.
The major elements of the Reasonable and Prudent Alternative are:
- Adaptive Management (a method for evaluating and adjusting operations to improve conditions for the species)
 - Fort Peck Flow Changes (Intake Dam restoration activities have taken priority)
 - Gavin's Point Flow Changes

- Unbalancing water levels of the upper three reservoirs
- Pallid Sturgeon population augmentation (growing sturgeon in a hatchery and placing them in the river to increase population)
- Aquatic and Terrestrial Habitat Restoration
- Science program including research, monitoring, and evaluation components

Tribal Water Rights – The BiOp also includes how the species may be impacted by Tribal rights and natural resource management. The BiOp references *United States v. Winters*, 207 U.S. 564 (1908) in which the United States Supreme Court recognized the doctrine of reserved water rights, which assures that Native American lands will receive sufficient water to fulfill the purposes of the reservation. As tribal water rights are developed, the management of federally listed species may need reconsideration. Any tribal water development that requires Federal involvement may be subject to ESA section 7 consultation in accordance with Secretarial Order #3206. The Service is committed to harmonizing tribal rights, federal trust resources, and the ESA obligations to the extent possible.

- Blind Pony Hatchery - Blind Pony Fish Hatchery; MDC, 16285 BP Hatchery Dr, Sweet Springs, MO 65351, 660-335-4531
- BLM - Bureau of Land Management; an agency of the US Department of the Interior (DOI)
- BMP - Best Management Practice(s) Usually refers to practices, activities and/or procedures to protect the environment.
- BMWR - Big Muddy Wildlife Refuge; is operated by the USFWS of the DOI. It is still under development and authorized purchases of 60,000 acres of flood plain lands from willing sellers is underway in different locations between St. Louis and Kansas City. This program proceeds without recommendations from the MRRIC.
- BNL - Brookhaven National Laboratory in Long Island, NY
- Bozeman FTC - Bozeman Fish Technology Center
- BOR - Bureau of Reclamation; *synonyms [or other variables]* 'the Bureau'; an agency of the US Department of the Interior
- BRWFS - Big Rivers and Wetlands Field Station; a field station added to the Upper Mississippi River Restoration Program in 1991. Its primary responsibility is to carry the MDC's mission of research, planning and education in relation to Missouri's large rivers.
- BSNFWMP - Bank Stabilization and Navigation Fish and Wildlife Mitigation Project
- BSNP - Bank Stabilization and Navigation Project; 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.

CCCC
CA(s)

- Conservation Area (s),; *synonyms [or other variables]* Contributing Area(s); Geographic areas outside of the Missouri River main stem that contribute to the restoration of Key Ecological Attributes (KEA) of the Missouri River main stem. The CAs are identified based upon their ability to meet critically important habitat and species needs of the Missouri River main stem, their contribution to significant sources of stress upon those habitats and species, and opportunities to implement Management Measures (MMs). KEAs of life-sustaining attributes include features of hydrologic, geomorphic, biotic structure and composition, river chemistry, physical disturbance such as fire, and population dynamics attributes. The connection between a CAs and the Missouri River KEAs would be considered 'ecological connectivity' or a 'nexus'. Together, the Missouri River main stem, its' 'contributing areas', and the geographic extent of expected impacts comprise the entire geographic scope of the MRERP. The geographic scope of the MRERP is not expected to include all portions of all tributaries in the Missouri River Basin.

CAA
CAM

- Clean Air Act
- Collaborative Adaptive Management ; Sometimes by some persons sarcastically referred to as '*another excuse to dither and delay*'.

CAP

- Continuing Authorities Program; of the USACE; or, Conservation Action Plan; of the Nature Conservancy

CAT

- Cooperating Agencies Team; A team of representatives of Federal, State and Tribal entities.

CAWS

- Chicago Area Waterway System

CCPI

- Cooperative Conservation Partnership Initiative USDA-NRCS

CDP

- Capital Development Plan

CEC

- Cation-Exchange Capacity; a phenomenon that is an important characteristic of soil that has a direct effect on a soil's ability to support plant life. The things that affect the CEC of a soil include the amounts of humus, sand, loam and clay in the soil profile. In a soil with the correct balance of these components, the higher the CEC the more fertile the soil. As a general rule, soils high in humus with a balance of loam and

- clay have a higher CEC than soils that are predominantly sand. Flood plain soils along the Missouri are known to have a higher CEC than prairie soils thereby explaining their greater farm crop yields.
- CE/ICA - Cost Effectiveness/Incremental Cost Analysis with a software program to analyze recovery cost effectiveness for an individual specie
- CESCF - Cooperative Endangered Species Conservation Fund of the US-FWS
- CEM - Conceptual Ecological Model
- CEP - Critical Engagement Points
- CEQ - Council on Environmental Quality; This council has the assigned authority to update the Principles and Guidelines (P & Gs) for Water and Land Related Resources Implementation Studies. In the Water Resources Development Act of 2007, Congress instructed the Secretary of the Army to develop a new set of P & Gs for the Corps. The Administration has expanded the scope of the P & Gs to cover all federal agencies that undertake water resource projects like the USACE, BOR, NRCS and TVA that are subject to the current P & Gs. The revised P & Gs will have a number of important changes with regard to water resources development in this country. More information is available on CEQ's web site at www.whitehouse.gov/administration/eop/ceq/initiatives/PandG
- CE QUAL-W2 - A water quality model to understand water quality and to predict water quality at a given point.
- CERA - Catcher's Earned Run Average in baseball statistics is the earned run average of the pitcher's pitching when the catcher in question is catching. It is to measure a catcher's game-calling, rather than his/her effect on the opposing team's hit and run game.
- CERC - Columbia Environmental Research Center (USGS); Columbia, Missouri (573) 875-5399 <http://www.cerc.usgs.gov>
- CFR - Code of Federal Regulations
- cfs - cubic feet per second; it used to describe flow or discharge of water in a stream; approximately 449 gallons per minute
- CG - Construction General
- CHXO - Channel Cross Over; a point where the river channel changes banks in the river.
- CI - Confidence Interval
- CJS - Cormack-Jolly-Seber
- CLMU - Central Lowlands Management Unit
- CLP - Certified Levee Professional
- CLRT - **Provide definition**
- CM - Conservation Measure; Conceptual Model
- CMR - Charles M. Russell 'National Wildlife Refuge, Montana'. Consists of 1.1 million acres of native prairie, river bottoms and timbered coulee canyons that embraces the 245,000 acre Fort Peck Reservoir and a portion of the Missouri River and all lying within the Missouri Breaks.

CNC	-	Candid non Committal; (discussion, statements, opinions, beliefs, etc.) <i>synonyms [or other variations]</i> see C ² NC.
C ² NC	-	Civil Candid non Committal; (discussion, statements, opinions, beliefs, etc.) <i>synonyms [or other variations]</i> see CNC.
CO	-	Commanding Officer; Contracting Officer
COA	-	Conservation Opportunity Area
COC	-	Contaminant of Concern (see NC)
COE	-	Corps of Engineers; an agency of the Department of Defense
COG	-	Councils of Government
Commission	-	Missouri Clean Water Commission; see (CWC)
COOP	-	Continuity of Operations Plan
CO-OP	-	cooperative stream-gaging program
CORBA	-	Central Ohio River Business Association
CORET	-	COoperating for REcovery Team; <i>synonyms [or other variations]</i> CORE.
CORE	-	COoperating for REcovery Team; <i>synonyms [or other variations]</i> CORET.
Corps	-	Corps of Engineers; an agency of the Department of Defense
CPOC	-	Civilian Personnel Operations Center
CPC	-	Climate Prediction Center The NOAA center develops long-range weather forecasts for the Missouri River Basin
CPUE	-	Catch Per Unit Effort; A standardize analysis on fish catch data based upon the amount of effort exerted for the catch.
CPR	-	Coalition to Protect the River; <i>synonyms [or other variables]</i> , Coalition to Protect the Missouri River.
CR	-	Conservation Recommendation (for threatened and endangered species)
CRA	-	Continuing Resolution Authority
CREI	-	Comprehensive Rodent Elimination Initiative
CRP	-	Construction Reference Plane; a synthesized water surface 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.
CRP	-	Conservation Reserve Program; of the USDA
CREP	-	Conservation Reserve Enhancement Program
CRREL	-	Corps' Cold Regions Research and Engineering Laboratory
CRS	-	Community Rating System
CRST	-	Cheyenne River Sioux Tribe
CRWR	-	Charles M. Russell Wildlife Refuge (1.1 million acres) in Montana
CSD	-	Commercial Sand Dredge
CSDR	-	Coastal Storm Damage Reduction (projects)
CSP	-	Conservation Stewardship Program USDA-NRCS
CSRFP	-	Comprehensive Sturgeon Research Program

CSU/DSU	-	Channel Service Unit/Data Service Unit
CTA	-	Conservation Technical Assistance USDA-NRCS
CV	-	Coefficient of Variation
CW	-	Civil Works
CWA	-	Clean Water Act of 1974 administered by the EPA.
CWC	-	Clean Water Commission (Missouri); a Governor appointed commission that oversees water quality requirements in the State
CWCP	-	Current Water Control Plan; the plan for operating the water levels in the main steam reservoirs.
CWE	-	Current Work Estimate
CWG	-	Communications Work Group
CWMS	-	Corps' Water Management System
CWQM	-	Continuous Water Quality Monitoring (program)
CWT	-	Coded Wire Tag; A 2 to 3 millimeter (approx. 1/8 th inch) long tag imbedded in flesh or fins of fish usually used to mark an entire batch of fish stocked in a given year. The location of the tag on a fish indicates the batch of fish it is from.
CWWRP	-	Civil Works and Water Resources Programs
CY	-	Calendar Year; January 1 to December 31
	-	Calendar Year; for MRRIC and the Federal budget it is October 1 to September 30
DDDD		
DBA	-	Draft Biological Assessment
DCP	-	Data Collection Platform
DEIS	-	Draft Environmental Impact Statement
DFIRM	-	Digital Flood Insurance Rate Map; <i>synonyms [or other variations] 'FIRM'</i> .
DFL	-	Duration Flow Limit
DHS	-	Department of Homeland Security; a United States cabinet level department.
DO	-	Dissolved oxygen
DOD	-	Department of Defense
DOI	-	Department of the Interior
DOMSAT	-	DOMestic SATellite
DPS	-	Distinct Population Segment
DQO	-	Data Quality Objectives
DRAA	-	Disaster Relief Appropriations Act
DRGS	-	Direct Readout Ground Station
DRM	-	Daily Routing Model
DSS	-	Data Storage System of the HEC
EEEE		
EA	-	Environmental Assessment; <i>synonyms [or other variations] Effects Analysis</i> . Effects Analysis is that step in the PrOACT process where the

	-	effects of proposed corrective actions (CA)'s are studied to provide the impact of the CA's on the environment and Human Considerations (HC)'s.
EAD	-	Expected Annual Damages
EC	-	Even Chance; Often a legend on weather maps, etc. to predict that there is an even chance precipitation or runoff will be either more or less than the norm.
EC	-	Engineering Circular is a publication containing USACE design standards.
ECB	-	Engineering and Construction Bulletin
ECP	-	Emergency Conservation Program; A USDA FSA cost share program to clear debris and sediment with overall purpose to return existing crop land to crop production.
EDU	-	Ecological Drainage Unit; An area composed of a 'drainage' or a 'watershed'.
EE	-	Expert Elicitation; A process of drawing out of data from experts based upon the best science for survivability and conservation of the pallid sturgeon.
EET	-	Expert Elicitation Team
EIS	-	Environmental Impact Statement
elev	-	elevation
EMWIN	-	Emergency Managers Weather Information Network
EMP	-	Environmental Management Program
ENS	-	Environmental Stewardship
EO	-	Executive Order
EOC	-	Emergency Operations Center
ERDC	-	Corps' Engineering Research and Development Center
EPA	-	Environmental Protection Agency An agency of the Executive Branch
EQ	-	Environmental Quality; registers non-monetary effects on significant natural and cultural resources.
EQIP	-	Environmental Quality Incentives Program USDA-NRCS
ERDC	-	Engineer Research and Development Center
ES	-	Engineered Sandbar(s)
ESA	-	Endangered Species Act
ESC	-	Executive Steering Committee
ESH	-	Emergent Sandbar Habitat
ESHMP	-	Emergent Sandbar Habitat Management Plan
ESRI	-	Environmental Service Research Institute
ERDC	-	Engineer Research and Development Center
EWP	-	Emergency Watershed Program; A USDA NRCS program to remove debris and sediment to reestablish flood damaged public infrastructure (ditches, culverts, etc.) working through a sponsor like a levee district, etc. This program works in concert with FEMA. It does include repairs being made by the USACE.
E&W	-	Energy and Water (resources)

FFFF

- F° - Fahrenheit
- FACA - Federal Advisory Committee Act
- FAPRI-UMC - Food and Agricultural Policy Research Institute-University of Missouri Columbia
- FBM - Floodway Boundary Map; provided by FEMA that shows the flood boundary (total flooded area); and, the floodway boundary (the area in the flood plain necessary to allow the passage of a 100 year frequency flood or a 1 percent chance flood).
- FCCE - Flood Control and Coastal Emergency
- FCSA - Federal Cost Share Agreement
- FCW - Flood Control Works
- FDR - Flood Damage Reduction
- FEIS - Final Environmental Impact Statement; for the Missouri River Master Water Control Manual
- FEMA - Federal Emergency Management Agency; Federal agency of the Department of Homeland Security (DHS) that administers the National Flood Insurance Program (NFIP) in the flood plains of the United States and disaster relief programs
- FERC - Federal Energy Regulatory Commission
- FFP - Fixed Firm Price
- FFRMS - Federal Flood Risk Management Standard
- FHMP - Flood Hazard Management Plan
- FIFMTF - Federal Interagency Floodplain Management Task Force
- FIOPs - Federal Interagency Operational Plans
- FIRM - Flood Insurance Rate Map; *synonyms [or other variations]* 'DFIRM', A map provided by FEMA for the purpose of administering flood plain development ordinances. It usually includes Base Flood Elevations that are regulatory 100 year (1% chance) flood frequency elevations and floodway boundaries.
- FIS - Flood Insurance Study; an Engineering study for the development of the FIRM
- FLMA - Federal Land Management Act of 1976
- FMP - Floodplain Management Plan
- FNR - Focal Natural Resources; *synonyms [or other variations]* 'FNRs'; are the ecosystems and species that characterize the natural resources and ecological diversity of an ecosystem. They include a full suite of native ecosystem types plus a limited number of species with special management of life history. The resources are divided into 3 groups: '*terrestrial ecosystems*', '*aquatic ecosystems*' and '*individual species*'. For MRRIC, these resources will be evaluated during the MRERP process. The resources will be considered in their natural state before the

	influence of humans. See GLOSSARY or terms: Section f. Environmental terminology: Ecosystems for FNR in the MRERP, Study of
FONSI	- Finding of No Significant Impact
FPC	- Federal Power Commission a five-member, bipartisan commission.
FPMS	- Flood Plain Management Services; Interagency work that promotes participation by USACE staff to work in conjunction with other partners to achieve flood risk management benefits that could not be achieved by any one party alone.
FPP	- Flood Protection Project
FR	- Federal Register
FRM	- Flood Risk Management
ft	- feet
FTT	- 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.
FTW(s)	- Floating Treatment Wetlands
FUI	- Forecasted Ungaged Inflow
FWCA	- Fish and Wildlife Coordination Act
FWG	- Federal Working Group; staff personnel from DOD (USACE), DOI (USFWS, NPS, EPA, BOR, BLM, BIA and USGS), USDA (Forest Service & NRCS), WAPA, NWS, NOAA, Federal Highway Administration, U.S. Coast Guard and Maritime Administration.
FWOP	- Future With Out Project (condition).
FWP	- Farmable Wetlands Program USDA-NRCS
FWS	- Fish and Wildlife Service; <i>synonyms [or other variables] ‘the Service’</i> an agency of the Department of the Interior (DOI).
FY	- Fiscal Year; For the Federal government it is October 1 to September 30.
FY+1	- The next Fiscal Year
GGGG	

GANTT	-	GANTT (chart); <i>synonyms [or other variations]</i> Gantt; A bar chart that illustrates a schedule. Developed and used by Henry Gantt during World War I.
GAO	-	Government Accountability Office
GAP	-	Usually a report that that indicates progress of projects on how they are meeting the time frames for specific recovery goals for a specie.
GARC	-	Geographic Area Rate Cap for various regions in a state for Wetland Reserve Easement payments.
Garrison Dam Hatchery	-	Garrison Dam National Fish Hatchery; P.O. Box 530, Riverdale, ND, 58565, 701-654-7451; < http://www.fws.gov/garrisondam/ >
Gavins Point Hatchery	-	Gavins Point National Fish Hatchery; 31227 436 th Ave, Yankton, SD, 57078, 605-665-3352; < http://www.r6.fws.gov/gavinspoint/ >
GI	-	General Investigation(s)
GIS	-	Geographic Information System; a form imagery mapping that provides geographic location and numeric information about terrain features and structures
GLMRIS	-	Great Lakes Mississippi River Inter-basin Study
GMA	-	General Management Actions
GNSS	-	Global Navigation Satellite System an integral part of other GPS systems
GOES	-	Geostationary Orbiting Environmental Satellite
GPMU	-	Great Plains Management Unit
GPS	-	Global Positioning System
GRP	-	Grassland Reserve Program USDA-FSA & NRSC
GSA	-	General Service Administration
GWh	-	gigawatt hour
HHHH		
HAMP	-	Habitat Assessment and Monitoring Program
HAZUS	-	A FEMA software program that employs a methodology for computing potential physical and financial losses from natural disasters like floods, earthquakes and tornados, etc. It employs GIS and other data sources and provides NED and RED results.
HBN	-	Hydrologic Benchmark Network
HC	-	Human Consideration
HCO	-	Human Consideration Objectives
HCP	-	Habitat Conservation Plan(s) are agreements between a landowner (includes counties, states and territories) and the FWS which allow otherwise lawful activities even if the impact listed species. The Plans can include LAGP's.
HEC	-	Hydrologic Engineering Center of the USACE
HEC-2	-	Hydrologic Engineering Center-2; River hydrologic computer model analysis replaced by HEC-RAS
HEC-RAS	-	Hydrologic Engineering Center-River Analysis System

HEC-RESSIM	-	Hydrologic Engineering Center-Reservoir (System) Simulation; <i>synonyms [or other variations]</i> HEC-Res Sim
HEAT	-	Habitat Evaluation and Assessment Tools
HEM	-	Helicopter Electromagnet
H&H	-	H&H analysis; Hydrologic ‘and’ Hydrographic analysis of the means of conveyance ‘and’ discharge rates and volumes of runoff from precipitation across and out of a watershed (drainage).
HMGP	-	Hazard Mitigation Grant Program
HMS	-	Corps’ Hydrologic Modeling System
Holdouts	-	Natural, or unregulated, flows
HPRCC	-	High Plains Regional Climate Center; The NOAA Center records percent of normal precipitation for the region.
HQ	-	Head Quarters
HQUSACE	-	Headquarters, U.S. Army Corps of Engineers
HR	-	House Resolution
HTRW	-	Hazardous and Toxic Waste Remediation Works; <i>synonyms [or other variations]</i> Hazardous, Toxic and Radioactive Waste
HUD	-	Housing and Urban Development
HYD	-	Hydropower
IIII		
IA	-	Individual Assistance
IBWC	-	International Boundary and Water Commission
ICOLD	-	International Commission on Large Dams
ICW	-	Inspection of Completed Works
IDA	-	Information and Data Advisory (programs)
IEPR	-	Independent External Peer Review; a review performed by an IERP
IERP	-	Independent External Review Panel performs an IEPR
ILF	-	In Lieu of Fee for wetland mitigation
ILH	-	International Levee Handbook
IMPLAN	-	Impact Analysis for Planning
I-O	-	input-output
IP	-	Interim Policy
IPET	-	Interagency Project Evaluation Taskforce
IP&S	-	Integrated Planning and Science
IPgM	-	Implementation Program Manager
IPR	-	In Progress Review
IRBM	-	Integrated River Basin Management
IRC	-	Interception & Rearing Complex An area for wildlife, usually fish.
IRPT, Inc	-	Inland Rivers, Ports and Terminals, Inc; an association promoting river navigation and the Marine Highways (MH)’s Contact: Aimee admin@@irpt.net
IRRM	-	Interim Risk Reduction Measures

- IRT - Interagency Review Team
- ISAP - Independent Science Advisory Panel; *synonyms [or other variations]* ‘Advisory Panel’, ‘MR ISAP’. An advisory panel appointed by the TPSN to review and provide recommendations to the USACE, UFWS and MRRIC on potential refinements to various ‘management actions’ under way in the MRRP. Through collaborative interaction between the USACE, USFWS and the MRRIC, AM plans are intended to be developed. The present ISAP is under contract from 2011 to 2014.
- ISB - InSide Bank; of a stream.
- ISETR - Independent Social Economic Technical Review (Panel) managed by Robb Turner of the Third Party Science Neutral (TPSN).
- ISPMT - Integrated Science Program Management Team
- ISP - Integrated Science Program; *synonyms [or other variables]*, initial starting point
- ISR - Independent Science Review
- ISRP - Independent Science Review Panel; *synonyms [or other variations]* ‘Review Panel’.
- IT - Information Technology
- IVRM - In-Valley River Mile
- IWIN - Interactive Weather Information Network
- IWR - Institute for Water Resources (Plan)
- IWRM - Integrated Water Resources Management
- IWTF - Inland Waterways Trust Fund – generated by a 20 to 29 cent per gallon diesel fuel tax on the inland barge industry. This is a 50-50 cost share with the Federal government, and is used to pay for construction and major rehabilitation of locks and dams. This generates about \$80-90 million from the industry yearly, but that amount is not nearly enough to rehab aging infrastructure.

- JJJJ

- KKKK

- KAF - 1,000 acre-feet
- Kcfs - 1,000 cubic feet per second
- KCP&L - Kansas City Power and Light
- KEA - Key Ecological (Environmental) Attributes include features of hydrologic, geomorphic, biotic structure and composition, river chemistry, physical disturbance such as fire, and population dynamics attributes that contribute to the restoration of endangered species. KEA to be studied for the pallid sturgeon, least tern and plover are hydrology, sediment, water quality (chemistry and temperature), connectivity within separate areas (river channel, floodplain lands and river flows into and out of the floodplain), river and floodplain habitat quality; and, native plants and animals (river and floodplain plants, river wildlife; and, floodplain wildlife).
- Kn - A factor for indicating the body condition of fish and wildlife.

kW	-	kilowatt
kWh	-	kilowatt hour
LLLL		
L1, L2, L3 & L4	-	Levels indicating the stage of developing (L1) investigation in the laboratory of the causes of the loss of habitat and species population , (L2) testing laboratory results in the field, (L3) actual construction of facilities in select locations, and (L4) adoption of final plans, corrective actions and construction of facilities over the natural range of the species for its recovery.
LAM	-	Land Acquisition and Management
LAM WG	-	Land Acquisition and Management Work Group; a MRRIC Ad Hoc or Work Group
LAN	-	Local Area Network
LAGP	-	Land Acquisition Grant Program in HCP's with the USFWS. <i>[synonyms [or other variations]</i> RLAGP.
LAMP	-	Levee Analysis Mapping Procedures
LBS	-	Location Based Services
LCC	-	Landscape Conservation Cooperatives
LCLSMS	-	Lewis and Clark Lake Sediment Management Study (lake upstream from Gavins Point)
LCPI	-	Land Capability Potential Index integrates fundamental factors that determines suitability of land for various uses.
LFT	-	Lead Facilitation Team (Resolve)
LHRHa	-	Luteinizing Hormone-Releasing Hormone analogue
LiDAR	-	Light Detection and Ranging; a laser image scanning form of surveying with stationary or mobile platforms with vehicle or aircraft mounted equipment to gather topographical data for the development of topographical maps, and 3-D modeling and volumetric calculations of terrain features, etc.
LMR	-	Lower Mississippi River south of the mouth of the Ohio River; <i>[synonyms [or other variations]</i> LMRS Lower Mississippi River System
LMOR	-	Lower Missouri River
LMRB	-	Lower Missouri River Basin
LOE	-	lines-of-evidence
LRGS	-	Local Readout Ground Stations
LRS	-	Long-Range Study
LSAC	-	Levee Safety Action Classification A USACE report whose content is based upon the agency's historical records, periodic and routine inspections of the physical flood protection facilities and the community's overall emergency management capabilities. The report provides analyses, conclusions and ratings on physical facilities, a rating of the

	-	flood risk and a rating on the overall public safety; <i>synonyms [or other variations]</i> Levee Safety Assessment Cadre
LSAF	-	Levee Safety Assessment Features
LSOG	-	Levee Safety Oversight Group
LSP	-	Levee Safety Program; of the USACE.
LT/PP	-	Least Tern/Piping Plover
LWD	-	Large Woody Debris
MMMM		
M	-	million
MA	-	Management Actions for restoration that may or may not include the regulation of property and construction projects; <i>synonyms [or other variations]</i> ‘Management Measures’.
MA	-	Minimally Acceptable
MAF	-	Million Acre Feet
MAFC	-	Mid-America Freight Coalition
MAP	-	Management Action Period
MAPP	-	Mid-continent Area Power Pool
MARAD	-	Maritime Administration
MARC	-	Mid America Research Council
Master Manual	-	Missouri River Water Control Manual; 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 >
Master Manual Study	-	Missouri River Master Water Control Manual Review and Update Study
MATOC	-	Multiple Award Task Order Contract
MBIAC	-	Missouri River Basin Inter-Agency Committee
MBRFC	-	Missouri Basin River Forecast Center; of the National Weather Service
MBSA	-	Missouri Basin States Association
MBSC	-	Missouri Basin Survey Commission
MBTA	-	Migratory Bird Treaty Act
MCHF	-	Missouri Conservation Heritage Foundation; Stream stewardship Trust Fund, In-Lieu Fee Mitigation Program, In-Lieu Fee Sponsor
MDC	-	Missouri Department of Conservation; an antonymous commission with the mission “To protect and manage the fish, forest and wildlife resources of the state; . . . etc.”; the agency receives over half of its

funding from a 1/8th cent sales tax that provides in the range of \$100 million per year for the purchase, development, operation and maintenance of wildlife areas and wildlife conservation programs. www.missouriconservation.org This tax is a State constitutional amendment enacted in 1976 and has no sun-down provision. The annual operations report may be viewed in a January issue of the MDC magazine at [HTTP://mdc.mo.gov/](http://mdc.mo.gov/) As of 2015: A) state wide MDC owns 800,000 acres and manages 200,00 additional acres for other entities like Cities, Counties, USFWS, USACE, NRCS, etc. MDC turns down management of agency properties when conflicts with entities like levee districts and neighboring private landowners arise or the required land management practices do not meet the goals of the MDC. B) State wide, MDC presently has 60,000 acres in crop production with 45,000 acres in row crops with 3,000 tenant farmers and 13,000 acres that are farmed by MDC staff with the remainder in rental of pasture and hay production. C) Presently tenant farmers are allowed to use presently accepted farming practices utilizing pesticides, Bt, GMOs , etc. D) Presently MDC pays \$19 million annually in property taxes. Through consultation with County Assessors, Property Tax rates are adjusted every 5 years. During 2010, MDC provided technical assistance on wildlife habitat through out Missouri through 71,886 rural and urban landowner contacts that included 23,228 on-site visits.

- MDNR - Missouri Department of Natural Resources; *synonyms [or other variables]* MO-DNR
- ME - Multiplier Effect
- MECA - Midwest Electric Consumers Association
- MH - Marine Highway; is a section of one or more rivers that is conducive to navigation and utilizes the route number of a nearby Interstate highway that parallels the river section. MH's in Missouri include MH-70 and MH-29. MH's exist in other parts of the country.
- MINK - Missouri, Iowa, Nebraska and Kansas
- MISO - Midwest Independent System Operator controls electric generation and transmission in over a 14 state Midwestern region
- MIT - Mitigation; *synonyms [or other variables]* 'Mitigation Team'.
- Miles City Hatchery - Miles City Fish Hatchery; Miles City Montana
- MITACT - Mitigation Agency Coordination Team
- MM - Management Measures for restoration that may or may not include the regulation of property and construction projects; *synonyms [or other variations]* 'Management Actions'; Master Manual.
- MMR - Mid Mississippi River; Cairo, Illinois to St. Louis, Missouri
- MNRR - Missouri National Recreational River of the National Park Service
- MOA - Memorandum Of Agreement
- MO-DNR - Missouri Department of Natural Recourses; The cost share soil conservation project construction program for landowners and Missouri

- State Park operations are equally funded with a Parks and Soils 1/10th cent State sales tax approved in 1984. This makes approximately \$35 to \$50 million dollars available each year for soil conservation which has a direct effect on water quality. This tax has a sun-downer provision and has been reinstated in every state referendum since its first adoption *synonyms [or other variables]* MDNR.
- MOFEP - Missouri Ozark Forest Ecosystem Project
- MoRAP - Missouri Resource Assessment Partnership
- MoRAST - Missouri River Association of States and Tribes; this association replaced the Missouri River Basin Association (MRBA)
- MOU - Memorandum Of Understanding
- MP² - Membership Procedures and Process; work group; *synonyms [or other variables]* MP2.
- MP2 - Membership Procedures and Process; work group; *synonyms [or other variables]* MP².
- MPE - Multi-sensor Precipitation Estimates
- mph - miles per hour
- MR - Missouri River; *synonyms [or other variables]* 'Mississippi River'.
- MRADS - Missouri River Automatic Data System
- MRAC - Missouri River Action Committee
- MRAF - Missouri River Adoration Fever A life time nonfatal affliction initially acquired by inhaling the air in the river valley. All "river rats" are known to have this affliction. Symptoms are a sense of calm brought on by the aura of the flora, fauna and landscape while in the valley.
- MRAP - Missouri River Action Plan
- MRAPS - Missouri River Authorized Purposes Study; pronounced Mister Aps or Em—Raps; *synonyms [or other variables]* '108 study' and 'Authorized Purposes Study'; a 2009, \$25 million Federally funded study to be conducted by the USACE to review the original purposes based on the Flood Control Act of 1944 to determine if changes to the authorized purposes may be warranted. The study was not funded by the lawmakers for 2011 and at this writing future funding may be stopped too. Passage of a funding bill can start the study again. < www.mraps.org > This study proceeds without recommendations from the MRRIC. The MRRIC monitors the progress of this study via agency briefings at regular meetings of the MRRIC.
- MR&T - Mississippi River and Tributaries
- MRBA - Missouri River Basin Association; this association is no longer active.
- MRBC - Missouri River Basin Commission; this Commission is no longer active.
- MRBIR - Missouri River Basin Interagency Roundtable; executive level supervisors of the FWG personnel from USACE,USFWS, USDA, NPS, EPA BOR, WAPA, BIA, BLM, NRCS, USGS, NWS, NOAA, Federal Highway Administration and Maritime Administration
- MRBWMD - Missouri River Basin Water Management Division

- MRC - Mississippi River Commission; A seven member Presidentially appointed Commission created in 1879 for the general improvement of the rivers in the entire basin, the extent which includes the headwaters of the river and to the headwaters of all of its 250 tributaries (41% of the United States including all or part of 31 States and 2 Canadian provinces).
< www.mvd.usace.army.mil/mrc >
- MRCTI - Mississippi River Cities and Towns Initiative
- MRD - Corps' former Missouri River Division
- MRERP-EIS - Missouri River Ecosystem Restoration Plan-EIS; usually pronounced 'Mister Earp'; *synonyms [or other variables]* 'The Restoration Plan' or 'The Plan'; a provision of WRDA 2007 for a study of the entire basin which is to determine alternatives recommendations and 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 (due date 2017). MRERP is a comprehensive ecosystem planning process for the Missouri River Basin and is currently not funded. 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. The MRERP web site is
<www.MRERP.org>
- MRFTF - Missouri River Flood Task Force; will provide a temporary forum for coordination, collaboration and cooperation among the federal officials and designated officers of state, local and Tribal governments within the States of Nebraska, Montana, Iowa, South Dakota, North Dakota, Wyoming, Kansas and Missouri. The mission of the MRFTF is to complete initial repairs by 1 March 2012 and to conduct long term recovery activities in response to the Missouri River Basin flood of 2011 to address floodplain management challenges and keep comprehensive flood risk reduction as the top priority. The Task Force ceased activity in the spring of 2013.
- MRISAP - Missouri River Independent Science Advisory Panel; *synonyms [or other variations]* 'ISAP'.
- MRJIC - Missouri River Joint Information Center
- MRNRC - Missouri River Natural Resources Committee; Established in 1987, this committee's members are from Federal and the various State wildlife conservation agencies and stakeholders within the basin.
- MRR - Missouri River Recovery
- MRRMP - Missouri River Recovery Management Plan; *synonyms [or other variations]* MRRMP-EIS; Missouri River Recovery Management Plan-

- Environmental Impact Statement; A three year planning effort (due May 2016) by the USACE district offices in Kansas City and Omaha with the outcome to evaluate the effectiveness of the MRRP in recovering the pallid sturgeon, the least tern and the piping plover provisions in the 2003 BiOp, to include an Adaptive Management (AM) plan, to provide an updated EIS for species recovery, to incorporate the actions, studies and recommendations of the MRAPS, MRERP, MRRIC and ISAP and to comply with NEPA. The ‘Consequences’ of proposed corrective actions are due May 2014, and ‘Tradeoffs’ impacting human considerations are due May 2015. See: <http://moriverrecovery.usace.army.mil> The geographic scope (Ft. Peck to mouth) and substantive scope (recovery and mitigation only...Not restoration) are different than MRERP. In addition tributaries are in general not part of the geographic scope of the MRRMP.
- MRRMP-EIS - Missouri River Recovery Management Plan- Environment Impact Statement (see MRRMP).
- MRRIC - Missouri River Recovery Implementation Committee; usually pronounced ‘Mister Rick’. The MRRIC is a totally federally funded process and program except for covering the travel and meeting expenses of MRRIC members representing the North American Tribes and the non-governmental stakeholder committee members. The members of the committee are appointed by the Assistant Secretary of the Army of Public Works. 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.* A 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; 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; 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 appointed by the Assistant Secretary of the Army for Civil Works broken down into the interests listed below. Each interest may have a maximum of two (2) representatives and one (1) alternate for each representative. The stakeholder interests are: 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 and non-government environmental and conservation organizations. This manner of representation by the MRRIC members for the affected citizens essentially bypasses the US Constitutional requirement of direct contact and involvement of a citizen with the actions of the government. The MRRIC public access web site is <www.mrric.org>.
- MRRP - Missouri River Recovery Program; *synonyms [or other variations]* ‘the Recovery Program’; a program presently underway composed of an amalgamation of efforts that include 'mitigation' for the loss of flood plain acres due to the BSNP (purchases of 166,750 acres from St. Louis to Gavins Point), BiOp compliance (ESA component for the recovery of the pallid sturgeon, piping plover and the least tern), restoration efforts in WRDA 2007; Sec 5018 language, and collaboration efforts via the MRRIC. Visible signs of this program in the floodplain are land purchases, construction of shallow water habitat, chutes, wetlands, the intake project on the Yellowstone River and other recovery projects. Of the land purchased, only 3 to 5 percent of the land area is used for endangered species recovery. The rest of the area is allowed to be flooded whereby other wildlife and wildlife food sources are eliminated. This program can proceed either with or without recommendations from the MRRIC. The MRRP allows the Corps to operate the Missouri River system for the 8 authorized purposes. The MRRP allows the USACE to meet the 2003 BiOp requirements, thus forestalling a finding of the USFWS that mainstream project operations “jeopardize the continued existence of listed species” or result in the “destruction or adverse modification of critical habitat of threatened and endangered species”. The MRRP enables the USACE to meet the Nation’s laws while continuing to meet all the authorized functions of the Missouri River system. MRRP projects are approved and implemented by various government agencies. 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. Government funding for the operation of MRRIC comes from the MRRP budget. The MRRP public web site is www.moriverrecovery.org
- MR&T - Mississippi River and Tributaries
- msl - mean sea level; a datum used to indicate elevation in either feet or meters above an ocean body
- MSMM - Missouri Stream Mitigation Method; Adopted March 1, 2007, the MSMM is the primary tool the USACE uses for the evaluation of stream impacts and mitigation proposals for Department of the Army permit actions within the State of Missouri. Its purpose is to enhance the USACE ability to protect the Nation’s aquatic resources, while allowing reasonable development through fair, flexible and balanced permit decisions.

MT	-	Mitigation
MTAC	-	Multiple Threat Assessment Center
MTFWP	-	Montana Department of Fish, Wildlife, and Parks
MT WQS	-	Montana Water Quality Standards
MU	-	Management Unit
MVD	-	USACE Mississippi Valley Division, Hqtrs. Vicksburg, Miss
MVFCA	-	Mississippi Valley Flood Control Association
MVP	-	USACE St. Paul District, District of MVD
MVR	-	USACE Rock Island District, District of MVD
MVS	-	USACE St. Louis District, District of MVD
MW	-	megawatt
MWAM	-	Missouri Wetlands Assessment Method
MWh	-	megawatt hour
NNNN		
NAAQS	-	National Ambient Air Quality Standards
NAFSMA	-	National Association of Flood and Stormwater Management Agencies
NAS	-	National Academy of Science
NAGPRA	-	Native American Graves Protection and Repatriation Act
NAV	-	Navigation
NAWCA	-	North American Wetlands Conservation Act; 86,000+ acres in Missouri
NC	-	Not of Concern Contaminant Not of Concern
NCLS	-	National Committee on Levee Safety
NCPC	-	NOAA Climate Prediction Center; The NOAA Center predicts probable drought conditions throughout the US
NCTC	-	National Conservation Training Center; A US-FWS campus in Shepherdstown West Virginia for taking workshop courses in SDM.
NDFD	-	National Digital Forecast Database (NWS)
NDEM	-	National Development Economic Model contains nation wide criteria and requirements for developing benefit cost ratios (B:C)s for projects funded by the Federal Government.
NDMC	-	National Drought Mitigation Center; The NOAA Center monitors drought conditions in the US.
NDSP	-	National Dam Safety Program
NEB	-	National Economic Benefit
NED	-	National Economic Development; account registers changes in the distribution of the national output of goods and services expressed in monetary units.
NEI	-	National Economic Investment
Neosho Hatchery	-	Neosho, Missouri Fish Hatchery
NEMWI	-	Northeast-Midwest Institute
NEPA	-	National Environmental Policy Act; this act includes a procedure for involving stakeholders

NESP	-	Navigation and Eco-System Program; <i>synonyms [or other variations]</i> , Navigation-Ecosystem Sustainability Program
NESSP	-	Navigation Economical System Sustainability Program
NFH	-	National Fish Hatchery
NFIP	-	National Flood Insurance Program; administered by FEMA
NFS	-	National Forest Service; an agency of the USDA
NGPC	-	Nebraska Game and Parks Commission
NHES	-	Not Highly Erodable Soil A typical USDA soil classification for all of the soils in a flood plain.
NHPA	-	National Historic Preservation Act
NIDS	-	NWS Internet Dissemination System
NIMBY	-	Not In My Back Yard
NIMS	-	National Incident Management System
NLD	-	National Levee Database
NLSA	-	National Levee Safety Act
NLSB	-	National Levee Safety Board
NLSP	-	National Levee Safety Program
NOAA	-	National Oceanic and Atmospheric Administration; official agency for providing river stage forecasts. An agency of the US Department of Commerce
NOC	-	Network Operations Center
NOHRSC	-	National Operational Hydrologic Remote Sensing Center; The NOAA Center records snow pack depths in the mountains and plains.
NO ₃ /NO ₂	-	Nitrate NO ₃ /Nitrite NO ₂
NPDES	-	National Pollutant Discharge Elimination System ‘permit’ that is required for any effluent that is discharged to the waters of the United States. Examples would be sewage plants, potable water treatment plants, power plants, etc.
NPS	-	National Park Service; an agency of the DOI <i>synonyms [or other variations]</i> Nitrogen, Phosphorous Sediment (pollution).
NPVU	-	National Precipitation Verification Unit (NWS)
NPWRC	-	Northern Prairie Wildlife Research Center
NRC	-	National Research Council
NRCS	-	Natural Resource Conservation Service; an agency of the USDA
NRI	-	Natural Resources Inventory
NRMS	-	Natural Resource Management System
NRSA	-	National Rivers and Streams Assessment; an EPA program
NSAP	-	Non-Structural Alternative Project
NSQAN	-	National Stream Quality Accounting Network
NWC	-	National Waterways Conference, Inc. Headquartered in Washington, DC
NWCC	-	National Water and Climate Center
NWD	-	Corps’ Northwestern Division; headquarters in Portland, Oregon; the entire Missouri River basin lies within this division
NWG	-	Nominating Work Group; A WG on the MRRIC

NWK	-	Corps' Kansas City District; District of NWD
NWO	-	Corps' Omaha District; District of NWD
NWR	-	National Wildlife Refuge
NWS	-	National Weather Service
NWSAHP	-	National Weather Service Advanced Hydrologic Prediction(s)
NWSTC	-	National Weather Service Training Center
NWSRFS	-	NWS River Forecast System
OOOO		
O&M	-	Operation and Maintenance
O/O	-	Owner/Operator
OHW(M)	-	Ordinary High Water mark or elevation
ORAU	-	Oak Ridge Associated Universities; the Third Party Science Neutral (TPSN) for the MRRIC; c/o Robb Turner, October 1, 2010.
OSB	-	Out Side Bank; of a stream.
ORP	-	Provide Definition
ORV	-	Outstandingly Remarkable Value(s)
OSE	-	Other Social Effects; account registers effects not reflected in the NED, EQ and RED.
PPPP		
P3s	-	Public Private Partnerships
PA	-	Programmatic Agreement
PAH	-	Provide definition
PAO	-	Public Affairs Office; office in the USACE.
PAP	-	Population Assessment Program; <i>synonyms [or other variations]</i> Planning Assistance Program
P & G's	-	Principles and Guidelines; <i>synonyms [or other variations]</i> Principles and Standards', 'Principles and Requirements', criteria for agency development and implementation of water and land related studies and/or projects.
P & N	-	Purpose and Needs (Statement)
PE	-	Professional Engineer
PED	-	Pre-construction Engineering and Design
PCA	-	Principle Component Analysis
PCR	-	Polymerase Chain Reaction
PDEA	-	Preliminary Draft Environmental Assessment
PDF	-	Project Design Flood
PDSG	-	Pallid sturgeon
PDT	-	Product Delivery Team; Project Development Team
PEA	-	Programmatic Environmental Assessment

PED	-	Preconstruction and Engineering Design
PEIS	-	Programmatic Environmental Impact Statement
PG	-	Professional Geologist
PgMP	-	Program Management Plan
PgM	-	Project Manager; <i>synonyms [or other variations]</i> PM.
PI	-	Periodic Inspection
PIInS	-	Project Information Sheet
PIR	-	Project Implementation Report; Project Information Report; Project Information Request
PIT	-	Passive Integrated Transponder; A 5 to 6 millimeter (approx. 1/4 inch) long signal tag with letters and numbers surgically inserted into the bodies to help identify individual fish.
PL	-	Public Law
PL 84-99	-	Public Law 84-99 A Federal program to provide funding for repair of flood damaged levees and flood control structures. A Benefit : Cost (B:C) ratio is determined by the USACE. A B:C greater than one is needed to receive the funding.
PM	-	Project Manager; <i>synonyms [or other variations]</i> PgM.
PMG	-	Performance Metric Goals
PMI	-	Project Management Institute
PMP	-	Project Management Plan
PL	-	Public Law
plover	-	piping plover
POC	-	Point of Contact; person in an agency or a MRRIC work group
POP	-	Points of Presence
POSIS	-	Polar Organic Scientific Integrated Sampler
pp	-	power plant
PPA	-	Project Partnership Agreement
PPG	-	Probability of Population Growth
ppm	-	parts per million
PPCS	-	Power Plant Control System
PRA	-	Pre Flood Assessment
PRB	-	Project Review Board
PRC	-	Project Review Committee
PrOACT	-	Programmatic Objectives, Alternatives, Consequences and Tradeoffs A process or analysis tool entailing a specific approach to Structural Decision Making (SDM) used by agencies, consultants, committees, etc. to develop CEM's, AMP's, CA's, MA's, etc.
PSA	-	Programmatic Strategic Assessment (Task Group); Public Service Announcement
PSIV	-	Pallid Sturgeon Iridovirus
PSPAP	-	Pallid Sturgeon Population Assessment Program

P-S MBP	-	Pick-Sloan Missouri Basin Program (1944); a program implemented to combine the water resource programs in the Missouri River Basin of the BOR and the USACE
PWP	-	Project Work Plan; projects for the MRRP
PWR	-	Project Work Request; annual requests for work projects (WP)'s for the MRRP
QQQQ		
QA/QC	-	Quality Assessment-Analysis/Quality Control to meet EPA requirements
QPE	-	Quantitative Precipitation Estimates
QPF	-	Quantitative Precipitation Forecasts
RRRR		
RAS	-	River Analysis System
RAWS	-	Remote Automated Weather Stations
R&D	-	Research and Development
RESSIM	-	Reservoir Simulation; <i>synonyms [or other variations]</i> , HEC-RESSIM, HEC-Res Sim
RCC	-	Reservoir Control Center; It is located in Omaha District of the USACE in Omaha, Nebraska. This center controls the releases of water from the main stem reservoirs and other reservoirs under its jurisdiction in the Missouri River basin. www.nwd-mr.usace.army.mil/rcc/
RCL	-	Rectified Channel Line
RCPP	-	Regional Conservationist Partnership Program
RDEIS	-	Revised Draft Environmental Impact Statement
RED	-	Regional Economic Development; account registers changes in the distribution of regional economic activity.
REG	-	Regulatory
REI	-	Regional Economic Investment
RDEM	-	Regional Development Economic Model contains regional (States) criteria and requirements for developing benefit cost ratios (B:C)s for projects funded by the Local, State and Federal Governments.
RFC	-	River Forecast Center
RFID	-	Radio Frequency (ID) identification; implanted tags for tracking critters.
RI	-	Routine Inspection
RIN	-	Regulation Identifier Number
RiskMAP	-	Risk Mapping, Assessment and Planning (FEMA)
RIT	-	Regional Integration Team; provides centralized Washington DC Headquarters support to USACE division. For example, it is a single point of contact and representation for the NWD at the Washington DC, HQ level to integrate regional mission areas including resources and program

		requirements and establish and to maintain relationships at the national level.
RLAGP	-	Recovery Land Acquisition Grant Program; <i>synonyms [or other variations]</i> LAGP
RM	-	River Mile; a point in a river channel indicated as the distance from the mouth of the river (St. Louis, Missouri is RM 0.00 for the Missouri River)
RM	-	Rule Making
RMA	-	Risk Management Agency of the USDA
RMC	-	Provide definition
RMP	-	Risk Management Plan
ROC	-	Regional Operations Center (NWS)
ROD	-	Record of Decision
ROM	-	Rough Order of Magnitude
RPA	-	Reasonable and Prudent Alternative
RPM	-	Reasonable and Prudent Measure
RPMA	-	Recovery and Priority Management Area; <i>synonyms [or other variations]</i> Recovery Program Management Area
RPW	-	Rapid Prototype Workshop
RTK	-	Real Time Kinematic; satellite navigation is a technique used to enhance the precision of position data in the vicinity of a base station that allows moment by moment updates on location and elevation derived from satellite-based positioning systems like GNSS, GPS, GLONASS, Galileo, etc..
SSSS		
SAE	-	Society of Automotive Engineers
SAM	-	Science/Adaptive Management (Work Group); <i>synonyms [or other variations]</i> 'SAM WG'; a work group created by combining the ISP and MRRP work groups on May 5, 2011.
SAM WG	-	Science/Adaptive Management Work Group; <i>synonyms [or other variations]</i> 'SAM'; a work group created by combining the ISP and MRRP work groups on May 5, 2011.
SAP	-	Science Advisory Panel
SAR	-	Safety Assurance Review
SARC	-	South Dakota Archaeological Resource Center
SCA	-	Site Characterization Assessment
SCE	-	Social Cultural Economic; <i>synonyms [or other variations]</i> 'SETC,' 'SECT,' and 'Social ETC '.
SDM	-	Structured Decision Making; A workshop course taken in the US-FWS National Conservation Training Center (NCTC) in Shepherdstown West Virginia.
SDSU	-	South Dakota State University
SE	-	Survival Estimate

SECT	-	Social, Economic, Cultural and Tribal; <i>synonyms [or other variations]</i> 'SETC,' ' Social ETC,' and 'SCE'".
SEI	-	Sustainable Ecosystems Institute
SEIS	-	Supplemental Environmental Impact Statement
SES	-	Senior Executive (Service or Staff); The service level of a Lead Federal Agency official required in the MRRIC Charter to participate fully and completely in all MRRIC meetings and any sub-committees or panels formed by the MRRIC.
Service	-	U.S. Fish and Wildlife Service
SETC	-	Social, Economic Tribal and Cultural; <i>synonyms [or other variations]</i> 'SECT,' ' Social ETC,' and 'SCE'".
SFH	-	State Fish Hatchery
SFHA	-	Special Flood Hazard Area(s)
SHPO	-	State Historic Preservation Officer
SNODAS	-	Snow Data Assimilation System
SNOTEL	-	SNO(w) TEL(ometry); <i>synonyms [or other variations]</i> Automated Snowpack Telemetered Network (NRCS)
SNSG	-	Shovelnose sturgeon
SNUR	-	Significant New Use Rules
SOA	-	Similarity of Appearance; 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.
Social ETC	-	Social, Economic, Tribal and Cultural; <i>synonyms [or other variations]</i> 'SETC,' ' SECT,' and 'SCE'".
SOP	-	Standard Operating Procedure
SOR	-	Scope of Review
Southwestern	-	Southwestern Power Administration
SOW	-	Scope Of Work
SP	-	Spring Pulse
SPA	-	Strategic Programmatic Assessment (Task Group) MRRIC members of the SAM WG and agency personnel.
SPDT	-	Senior Product Delivery Team; Single Pole Double Throw 'electric switch'.
SPE	-	Satellite Precipitation Estimates
SPF	-	Standard Project Flood; A design flood discharge for a 500 year flood (0.2 percent chance) during a 12 month time frame.
SPgM	-	Senior Program Manager
SR	-	Steady Release; 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.
SRFM	-	Spring Rise Flow Modification
SRP	-	Scientific Resolution Panel; panels are being appointed by FEMA to resolve technical and scientific data submitted by communities and FEMA in the development of FIRMs.
SSARR	-	Streamflow Synthesis and Reservoir Regulation
SSTF	-	Stream Stewardship Trust Fund
Sq. Mi.	-	square mile(s); 640 acres
SWE	-	Snow Water Equivalency
SWH	-	Shallow Water Habitat; Areas along the river that are less than 5 feet deep, flowing at no more than 2.0 feet per second = 1.4 miles per hour.
SWIF	-	System Wide Improvement Framework is folio of forms to be filled out and submitted to the USACE to return a District to compliance with the requirements for receiving 84-99 levee repair funds.
SWP	-	Source Water Protection <i>plan</i>
System	-	Missouri River Main Stem Reservoir System
TTTT		
T&E	-	Threatened and Endangered (species)
T&I	-	Transportation and Infrastructure
TBD	-	To Be Determined
TCP	-	Traditional Cultural Properties
TEK	-	Traditional Ecological Knowledge (Sarah E. Rinkevich, University of Arizona writes), "...is used to describe the knowledge held by indigenous cultures about their immediate environment and the cultural practices that build on that knowledge. TEK includes an intimate and detailed knowledge of plants, animals and natural phenomena, the development and use of appropriate technologies for hunting, fishing, trapping, agriculture and forestry and a holistic knowledge or 'world view' which parallels the scientific discipline of ecology (Berkes 1993)." Though there is "... no universally accepted definition ... for TEK (Johnson 1992)", She ... refers "to the working definition developed by Berkes et al. (2000) ..." in that TEK "... as a cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (human and non-human) with one another and with their environment."
tern	-	interior least tern
TF	-	Task Force
TG	-	Task Group
THPO	-	Tribal Historic Preservation Officer
TIF	-	Tax Increment Financing
TLR	-	transmission loading relief

TMDL	-	Total Maximum Daily Load; the maximum 24 hour allowable load (concentration) of a pollutant in a stream (sediment, chemicals, etc.) expressed as a unit of measure per volume of water (mg per liter, parts per million (ppm), etc)
TO	-	Task Order
TPDMS	-	Interior Least Tern and Piping Plover Data Management System
TPMP	-	Tern and Plover Monitoring Program for interior least tern and piping plover.
TPSN	-	Third Party Science Neutral; for MRRIC c/o Robb Turner of Oak Ridge Associated Universities (ORAU) October 1, 2010.
TTHMs	-	Trihalomethanes; a by product of drinking water disinfection with chlorine.
TREC	-	Three Rivers Electric Cooperative
TRG	-	Tolerable Risk Guidelines
TSCA	-	Toxic Substances Control Act
TSS	-	Total Suspended Solids
tw	-	tailwater; The river reach immediately downstream from a dam.
UUUU		
UAS	-	Unmanned Aerial System(s); <i>synonyms [or other variations]</i> Unmanned Aircraft Systems
UAV	-	Unmanned Aerial Vehicle
UAVS	-	Unmanned Aerial Vehicle Surveying
UB	-	Upper Basin
UMRBA	-	Upper Mississippi River Basin Association
UMRCP	-	Upper Mississippi River Comprehensive Plan
UMRS	-	Upper Mississippi River System; That portion of the river northward from the mouth of the Ohio River, <i>[synonyms [or other variations]</i> UMR.
UMRS FFS	-	Upper Mississippi River System Flow Frequency Study; A study by the USACE completed in 2004 that reestablished flood levels in the river valley for different storm and runoff recurrence time intervals (10 year, 25 year, 50 year, 100 year, 500 year, etc.)
UNET	-	Unsteady Flow through a Full Network; this computer program was used in developing the flood profile levels for the Missouri River in the Flow Frequency Study published in 2004
UPS	-	Uninterrupted Power Supplies
UTP	-	Unshielded Twisted Pair
USACE	-	US Army Corps of Engineers; <i>synonyms [or other variations]</i> 'Corps', 'the CORPS', 'COE'; an agency of the Department of Defense, sometimes pronounced "Use See"
USBR	-	US Bureau of Reclamation; <i>synonyms [or other variations]</i> 'The Bureau' or BOR; an agency of the Department of the Interior
USCG	-	United States Coast Guard; a Service of the Department of Defense.

USC&GS	-	United States Coastal and Geodetic Survey part of NOAA
USD	-	University of South Dakota
USDA	-	US Department of Agriculture
USGS	-	US Geological Survey; an agency of the Department of the Interior
USFWS	-	US Fish and Wildlife Service; <i>synonyms [or other variations]</i> ‘the service’; an agency of the Department of the Interior (DOI).
USIECR	-	US Institute of Environmental Conflict Resolution; <i>synonyms [or other variations]</i> ‘The Institute’.
USSD	-	United States Society on Dams
UTC	-	Coordinated Universal Time
UTP	-	Unshielded Twisted Pair
VVVV		
VPI	-	Virginia Polytechnic Institute
VTC	-	Video Tele-Conference
WWWW		
WINPPP	-	Water Infrastructure Now Public-Private Partnership; A pilot program to explore agreements between the USACE and private entities to add private monies to Federal funds for financing, planning, design and construction models.
WAMS	-	Waterways Analysis Management System a study by the USCG January to April 2015
WAP	-	Waterways Action Plan
WAPA	-	Western Area Power Administration; <i>synonyms [or other variations]</i> ‘Western
WCA	-	Wildlife Coordination Act
WCI	-	Waterways Council Incorporated
WERF	-	Water Environment Research Foundation
Western	-	Western Area Power Administration
WFO	-	Weather Forecast Office (NWS)
WG	-	Work Group; a subcommittee of the MRRIC
WHIP	-	Wildlife Habitat Incentives Program A 10 year voluntary plan where the USDA-NRCS provides 75 percent development cost share to private landowners to develop and improve wildlife habitat on agricultural lands.
WIA	-	Watershed Inventory Assessment
WM	-	Water Management
WMA	-	Wildlife Management Area
WOTUS	-	Waters of the United States
WP	-	Work Project; a project for the MRRP
WR	-	Water Resources; <i>synonyms [or other variations]</i> , Wildlife Refuge

WRDA	-	Water Resources Development Act administered by the National Park Service
WRRDA	-	Water Resources Reform Development Act
WRP	-	Wetlands Reserve Program; a USDA-NRCS program for restoring critical wetland habitat. As of January 2011, for example, there are 982 recorded easements in Missouri encompassing 141,358 acres.
WS	-	Water Surface
WSCC	-	Western Systems Coordinating Council
WSFO	-	National Weather Service Weather Forecast Offices
WSRA	-	Wild and Scenic Rivers Act
WTR	-	Water Supply
WWA	-	Watch/Warning/Advisory
WY	-	Water Year

XXXX

YYYY

YIP	-	Yellowstone Intake Project
YOY	-	Young Of (the) Year
yr	-	year

ZZZZ

AtoZ

The following is the GLOSSARY or terms:

a. **Reservoir water sources, storage levels, names, river miles, and operations:**

Mainstem Reservoir Annual Flood Control & Multiple Use water storage levels are for annual flood control water level management and support of other ‘authorized uses’ of the water. Water levels are to be completely evacuated from this zone by March 1st of each year to make room for the annual snow melt, etc. The design runoff for sizing the flood control storage and **Exclusive Flood Control** system of the mainstem system was the 1881 flood which included 40 MAF of runoff over a 5 month period March through July. To account for record breaking releases from the system in 2011, the runoff forecast for 2011 is for 44 MAF of runoff from March through July, 4 MAF more than the design runoff (10 percent). In 2011, the runoff exceeded the design runoff amount by more than 20 percent thereby leading to widespread flooding the upper and lower basin. The only way to provide more flood water runoff storage is to lower the Multiple Use pool in the system. In the Missouri River basin, the USACE manages flood control operations with the 6 main stem reservoirs and 45 other reservoirs on tributaries of the Missouri River. Among the

reservoirs on the tributaries of the Missouri River operated by the BOR, 22 of their reservoirs have 'annual flood control and multiple use zones' and 'exclusive flood control zones'. When water levels rise into these zones, water releases from these reservoirs come under control of the USACE for controlling flooding throughout the basin. Irrespective of flooding conditions in the basin, normal water releases from 2 main stem dams to support authorized uses in the Missouri River channel between the reservoirs are as follows: 1) Releases from Fort Peck Dam are in the range of 5,000 to 6,000 cfs to provide water levels for irrigation, municipal water supply and fisheries between Fort Peck and Garrison Dam. Of this discharge, water uses for irrigation are in the range of 100 to 200 cfs. 2) Releases from Garrison Dam are in the range of 14,500 to 16,500 cfs to provide water levels for irrigation, municipal water supply and power plants between Garrison and Oahe. Water releases from the 4 remaining dams, Oahe, Big Bend, Fort Randall and Gavins Point are based upon reservoir and downstream conditions.

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

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 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.

Excess Stored Water Waters reserved for irrigation in the initial authorized project purposes that have not been utilized have been declared as 'excess' in the 'Carryover Multiple Use' pool. In 2012 a portion of it was allocated to the State of North Dakota for alternative industrial uses.

Exclusive Flood Control water storage zone or level 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. Normal winter time releases from the system are in the range of 12,000 cfs. During this time period they are increased to 17,000 cfs or more if flood water is being evacuated. These water releases are called **Evacuations**.

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 Gavin’s 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.

Missouri River Basin Regulated and Unregulated Watersheds – The dams in the basin impound runoff and provide a means of regulated flow in the streams. The dams are operated by the BOR and the USACE to provide flood control, power generation, etc. Runoff from 31 percent of the Basin area is not regulated. A breakdown of the Missouri River Basin Regulated Areas:

	Square Miles
Total Missouri Basin Drainage Area	529,350
Missouri River Mainstem Dams	-279,480
All Other USACE Omaha District and BOR Projects	-21,500
USACE Kansas City District and BOR Projects	<u>-63,300</u>
Total Unregulated Area 31.2%	165,070

Utilizing USGS records (stream flow data > 80 years), by comparing the mean annual runoff of the Missouri River at Sioux City and Hermann; and the mean annual average runoff of the James, Big Sioux, Kansas, and Osage Rivers, approximately **56 percent** of the mean annual runoff from the Missouri River basin is regulated.

Mountain Snowpack provides 50 percent of the runoff to the reservoirs and directly to the Missouri River upstream from Sioux City, Iowa. Snowfall peaks around the middle of April. Runoff begins around the first of May. Approximately 40 percent of this runoff flows into Fort Peck Lake and approximately 60 percent of this runoff flows into Lake Sakakawea (Garrison Dam). Flows downstream are controlled with operation of the dams. (See **Rainfall and Plains Snowpack**)

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.

Plains Snowpack provides 25 percent of the runoff to the reservoirs and directly to the Missouri River upstream from Sioux City, Iowa. Runoff begins in late March with some being regulated by the reservoirs and some flowing directly to the Missouri River. Eastern most areas of North and South Dakota and southwestern most areas of Minnesota for the Big

Sioux, James and Vermillion Rivers; and, western Iowa, northern Missouri, eastern Kansas and most of Nebraska constitute the Plains Snowpack area whose runoff is not controlled by the reservoirs. (See **Rainfall and Mountain Snowpack**)

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.

Rainfall provides 25 percent of the runoff to the reservoirs and directly to the Missouri River upstream from Sioux City, Iowa (See **Mountain Snowpack and Plains Snowpack**).

Reservoirs: Kansas River

Kansas City	River Mile: 0.0
Perry Lake	River Mile: 64.5
Tuttle Creek	River Mile: 145.3
Milford Lake	River Mile: 169.5

Reservoirs, Main Stem-River Miles: Missouri River

St. Louis	River Mile: 0.0	
Kansas City at mouth Kansas River	River Mile: 367	
		Year
St. Joseph	River Mile :450	1960
Omaha	River Mile: 620	In valley
Sioux City	River Mile: 730	miles
Gavins Point (Reservoir: Lake Lewis and Clark)	River Miles: 811.1 to 836.00 =	24.9
Fort Randall (Reservoir: Lake Francis Case)	River Miles: 880.0 to 987.44 =	107.4
Big Bend (Reservoir: Lake Sharpe)	River Miles: 987.4 to 1,067.0 =	79.6
Oahe (Reservoir: Lake Oahe)	River Miles: 1,072.3 to 1,303.00 =	230.7
Garrison (Reservoir: Lake Sakakawea)	River Miles: 1,389.9 to 1,568.00 =	178.1
Fort Peck (Reservoir: Lake Fort Peck)	River Miles: 1,771.6 to 1,906.00 =	<u>134.4</u>
	Total	755.1
		=====
	Percent	32%
Three Rivers Montana - Headwaters MO River	River Mile: 2,341	

Sediment Load In an ongoing basis, sediment from erosion accumulates in the reservoirs. The size of other water storage and management zones, like the **Permanent Pool** are reduced so that the 'Exclusive Flood Control' and 'Annual Flood Control and Multiple Use' zones are preserved and maintained at their original design capacity.

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 1 and December 1 that the USACE supports navigation on the river from Sioux City, Iowa, to St. Louis, Missouri (735 miles of channel). 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. For any amount less than 25,000 cubic feet per second (cfs) at Sioux City plus increasing incremental flow amounts downstream, barges are not supported upstream from Kansas City. The minimum flow or discharge maintained at Kansas City for navigation is 35,000 cfs. Anything below this amount at Kansas City will not support navigation downstream from Kansas City. With this amount at Kansas City, increasing incremental tributary flows downstream from Kansas City is necessary to provide minimum flow. Full service level is 6,000 cfs above these minimum service levels. Minimum service flow support is generally sufficient to provide a navigation channel that is 8 feet deep by 200 feet wide, and full service flow support provides a navigation channel 9 feet deep by 300 feet wide (**Source:** RCC Technical Report 2000-A). Though the channel may be 9 feet deep that does not mean that you can navigate the area with an 8 foot draft tow. When going upstream, the power of the motor and the propellers actually draws water from under the barges (**shadow of the tow**) at a rate that lowers the barges to the point that they touch the river bottom. Abreast of a tow one can see the lower water line on the shore (up to a foot or more) and how the water level comes back up downstream of the tow boat.

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. Urban and Irrigation Water Supplies From the Missouri River:

Water Supplies Directly From Streams, Diversion Channels and Reservoirs

Water is taken directly from the river, intake diversion channels and the reservoirs. These systems are capable of providing several million gallons of water daily. This is the preferred source of potable water in the upper basin because of the mineral content of well water. For irrigation and wildlife habitat (wetlands, etc.) it provides the most desirable flow rates (1,200 gpm to 30,000 gpm±). Intake facilities for an open water source usually consist of a lengthy movable large intake suction hose connected directly to the pump, a movable pump on rails to move the pump up and down the bank for varying water levels or a wet well supplying the pump intake. Wet wells are popular for urban systems and consist of a horizontal conduit connected to a vertical well section that is located either on the bank or inland away from the bank to protect pumping and control facilities from flooding, barge traffic, etc. The horizontal conduit extends landside of the bank to the vertical well section and can be located low enough to reach the bottom of the reservoir or stream (to allow for water level variations and ice), in the side of the bank (for stable water levels) or some other variation. All of these methods of intake have some variation of trash racks. The pump is located in the vertical well section. Electrical power and water mains service the pump and its controls. If necessary, because of the type of sediment in the water, a hydraulic sand extractor at the pump site would utilize part of the intake waters to discharge the non-colloidal sediment back into the stream or reservoir. For wildlife habitat the water is discharged (30,000 gpm±) into ditches where the sediment is allowed to settle out. Periodic annual or bi-annual excavation and stockpiling of the sediment is done to keep the distribution ditches open and to prevent the sediment from filling in wildlife wetlands habitat. Periodically the stock pile is removed from the site. Buried transmission water mains convey the raw water to either irrigation systems or a treatment plant. Treatment of the water for urban purposes usually consists of the addition of a flocculating agent like alum to facilitate settling of sediment and colloidal matter in large settling basins. The frequency of excavation of the accumulated sediment from the basins is based upon the amount and type of sediment in the raw water. The potable water is passed through a sand filter into a clear well, then chlorinated and pumped to water towers. All of these facilities are constructed of steel and concrete and the treatment facilities are not adaptable to raw water supplies from alluvial wells. These systems depend on water level management in the reservoirs as well as in the streams. For all of these facilities to function reliably and provide long service, the banks must remain stable and remain in place. These systems depend on a stabilized channel and banks to direct an adequate flow of water to the intake and a flood control system to prevent scouring from flood waters, which destroy the pumping facilities, as well as the transmission power and water lines and the treatment facilities. In Missouri, intake directly from the river provides water for more than 40 percent of Missouri citizens. In the winter time during the closed navigation season these systems depend on temporary Gavins Point discharges above 12,000 cfs during ice formation to keep water intakes along the lower river operational.

Water Supplies From Floodplain Alluvial Wells

Water is taken directly from floodplain wells in the range of 100 feet deep by 1.5 to 4 feet+ in diameter that typically provide 1,000 to 2,000+ gallons per minute each. Higher rates of flow to an individual well are realized when additional intake screens radiate out horizontally from the vertical screened casing sections into the water bearing stratum. These well systems are capable of providing several million gallons of water daily for irrigation and urban water supplies. In Missouri, water from these systems are well suited for urban use since they avoid withdrawing water from ancient sea water or 'radium belt' aquifers at greater depths. In wide floodplains these wells are well suited for irrigation since they are located where the water is needed, thereby avoiding the costs of sediment extraction and the power requirements of lengthy buried water lines set back from the river bank. Rarely in Missouri would deep wells in rock aquifers yield sufficient flows for farm crop irrigation purposes. Depending on the amount of water needed for urban purposes, the wells are constructed randomly throughout the floodplain in groups of 2 or 3 grouped 1 or so miles apart in desirable alluvium. The water is usually free of sediment and colloidal matter, making it ideal for irrigation purposes. Of critical importance for potable water treatment from these sources is that the wells are some distance from the river bank. Engineering studies indicate that the set back distances need to be in the range of 1,200+ feet. If tens of millions of gallons of water are needed daily, these set back distances may dictate that thousands of acres are needed for multiple well sites. Buried or overhead power lines and buried water transmission lines power the wells and transmit the raw water to irrigation systems or a treatment plant. For potable water, treatment involves removing high levels of iron, manganese and other elements. This usually involves high rates of aeration in towers and/or the application of oxidizing chemicals and absorption minerals to precipitate the elements in settling basins. Though smaller than basins required for river and lake waters, these basins require periodic cleaning. The potable water is passed through a sand filter into a clear well, then chlorinated and pumped to water towers. All of these facilities are constructed of steel and concrete and the treatment facilities are not adaptable to raw water supplies from streams and lakes. These systems depend on water level management in the streams to maintain a water supply to the water bearing alluvium strata in the floodplains. For all of these facilities to function reliably and provide long service, the banks must remain stable and remain in place. These systems depend on a stabilized channel and banks to secure well set back distances and room for future wells and a flood control system to prevent scouring from flood waters from inundating the floodplain and destroying the pumping facilities, the well casings, as well as the transmission power and water lines and the treatment facilities.

d. Thermal Electric Power

Ameren Missouri This power supply company provides electric service to approximately 1.2 million customers (meters) across central and eastern Missouri, including the greater St. Louis area. Ameren Missouri provides electric service to 63 counties and more than 500

towns. More than half (53%) of Ameren Missouri's electric customers are located in the St. Louis and St. Louis County area. The company relies on water resources from the Missouri River for its Callaway Nuclear (RM 115.2) and Labadie (RM 57.6) coal fired energy centers. Both of these facilities have cooling water intakes on the Missouri River. In addition, the Company operates two additional energy centers below the Mississippi River confluence. These are the Meramec and Rush Island energy centers.

Kansas City Power and Light This power supply company (founded 1882) provides electric service to more than 800,000 customers (meters) in 47 northwestern Missouri and eastern Kansas counties encompassing approximately 18,000 square miles. Approximately 76 percent of the 6,100 megawatts of power comes from lower cost coal. Cooling water is taken from the Missouri River at River Mile 373.4.

Three Rivers Electric Cooperative This power supply company (founded 1939) provides electric service to portions of 7 counties (Cole, Franklin, Gasconade, Maries, Miller, Moniteau and Osage Counties) in central Missouri to more than 21,540 residential, business, commercial, farm and industrial accounts (meters). Cooling water for the Chamois power plant is taken from the Missouri River at River Mile 117.0.

Special notes for thermo power sources: All year long these systems depend on water level management in the reservoirs and the streams; and, flows in the streams. Cooling water is taken from the water source and returned at a higher temperature. The rate of discharge of the higher temperature water is regulated to permit only a set water temperature rise in the receiving waters. For streams, adequate summer time flows are necessary to provide for the regulated discharge rate of the warm water. For all of these facilities to function reliably and provide long term service, the banks must remain stable and remain in place. These systems depend on a stabilized channel and banks to direct an adequate flow of water to the intake and a flood control system to prevent scouring from flood waters, which destroy the pumping facilities, as well as the transmission power and water lines and the generating facilities.

e. Hydro-electric Power

Western Area Power Administration (WAPA; Western) Is one of four power marketing administrations within the U.S. Department of Energy whose role is to market and transmit electricity from multi-use water projects (reservoirs). The service area encompasses a 15-state region of the central and western U.S. in which the transmission system carries electricity from 56 power plants operated by the Bureau of Reclamation, U.S. Army Corps of Engineers and the International Boundary and Water Commission, and one coal-fired plant. Together, these plants have an installed capacity of 10,505 megawatts transmitted through 296 substations. The electricity is marketed wholesale (over 600 wholesale customers) through Federal and state agencies, cities and towns, rural electrical cooperatives, public utility districts, irrigation districts and Native American Tribes. These wholesale customers

in turn provide retail electric service to millions of consumers (meters) in the Western United States.

f. Electric Power, Petroleum and Telecommunication Transmission Lines

Power, petroleum and telecommunication transmission lines cross stream channels in a multitude of places. Where the lines are aligned parallel to the Missouri River, they can be several miles long. Pylons and anchors for the power lines are set near the stream banks to provide permissible non-supported spans across the streams. Though the petroleum lines (diesel, gasoline, kerosene and natural gas) and the telecommunication lines are buried under the river channel, in the floodplains adjacent to the streams the lines have only five feet or less of earthen cover. This places the lines as much as 15 feet above the bottom of streams like the Missouri River subjecting them to exposure and breakage caused by scouring flood waters. The pylons, petroleum and telecommunication lines and land access to them depend on a stabilized channel and banks to prevent scouring from flood waters from destroying them. Flood destroyed pylons and anchors would amount to a period of electric power outage. A break in a petroleum pipeline would amount to a stoppage of petroleum products as well as a discharge of its contents directly into area soils and streams contaminating the environment. The contents of a 10 inch pipeline 4 miles long would have 86,163 gallons (21,500 gallons per mile) of refined petroleum product that could discharge into the environment from one pipeline break. A break in a telephone or fiber optic line would amount to a period of non-service that will affect commerce and security. Historically, breakage from flood damage of these types of transmission lines take several months to restore.

g. Agriculture

Historically, use of soils in floodplains have been used for agricultural purposes the world over for 1,000's of years. Early civilizations worldwide first began in the floodplains and deltas of the large river systems. In the United States, the USDA rates the soils in the Missouri River floodplain as Class I and Class II loam and clay-loam soils (CL-ML, CL, CH). Their natural fertility makes them the most highly agriculturally productive soils in the state and nation, easily producing 200 bushel plus corn per acre, 50 bushel plus soybeans per acre and 50 bushel plus wheat per acre. Given the climate and easy access to irrigation, double cropping of soybeans behind wheat and wheat behind soybeans in many cases is the norm. The soils have a natural Ph of 7 that provide excellent fertility for alfalfa production. Five cuttings per year are not uncommon that yield a ton or more to the acre per cutting. They are no major limitations or hazards for cropping practices on these soils. These soils have a natural slope of 0 to less than 2 percent. The USDA rates all floodplain soils as Not Highly Erodable Soils (NHES). With proper tillage practices this leads to reduced agricultural runoff and sedimentation in streams. Because of the flat slopes and where the terrain is uneven, the soils are subject to pooling of accumulated precipitation and seepage waters during high river stages. Adequate drainage systems via ditching (gravity) and pump stations (mechanical) are necessary for some areas for maximum crop production. The

pump stations are constructed of steel and concrete at a drainage point ‘outlet-in-common’ adjacent to levees and are electric or diesel motor powered. Harvester tailings and residue from farm crops provide a super majority of wildlife food in the floodplains as compared to natural food sources. Wildlife food sources provided by agricultural activity assure an abundance of wildlife for sports like hunting and bird watching as well as a consistent supply of food for keystone and endangered species. These soils, areas and land uses are subject to major flooding events directly from the Missouri River unless protected with a levee system. This too is the case worldwide for floodplain farming. For all of these systems to function reliably and provide long service, the river banks must remain stable and remain in place. These systems depend on a stabilized channel and banks and a local and basin wide managed flood control system (flood control constraints, etc., e.g.) and programs to prevent scouring from flood waters from inundating the floodplain and destroying the pumping facilities and the service roads to them, scouring holes and depositing large amounts of sand in crop fields, and filling in the ditches and roads with flood water borne sediment. Without the levee systems, farming activity, wildlife food sources and wildlife disappear.

h. Wildlife conservation lands

Besides lands authorized for purchase by the MRRP (166,750 acres) a multitude of additional land in the Missouri River floodplain is being used for wildlife conservation. Lands outside of the State of Missouri would be added to these totals.

Acres	Agencies	Source of Information
166,750	USACE & USFWS	Missouri River Recovery Program (MRRP)
141,200	USDA WRP & MDC	MDC Missouri Conservationist December 2011
86,000	NAWCA	North American Wetlands Conservation Act
60,000	USFWS	Big Muddy Wildlife Refuge-St. Louis to Kansas City
7,350	USFWS	Squaw Creek Wildlife Refuge-Holt County, Missouri
46,393	MDC	Conservation Areas- www.mdc.mo.gov
20,000	Private Hunt Clubs	Estimated-no know source
20,000	USACE	Estimated-no know source-wetlands from 404 permits
<u>50,000</u>	Landowners	Estimated-no know source-non crop areas
597,693		

i. Environmental terminology:

Abiotic pertains to an inorganic resource such as water, sand or gravel as opposed to **Biotic** which pertains to living things.

Agonistic Behavior Cooperation between members of the same species.

Aquatic Habitat Habitat that is water related as opposed to **Terrestrial Habitat** that is not water based.

Bathymetry The measurement of underwater topography.

Biotic pertains to living things as opposed to **Abiotic** which pertains to an inorganic resource such as water, sand or gravel.

Congener A member of the same specie. The shovelnose sturgeon is the congener of the pallid sturgeon.

Contributing Area(s) Areas outside of the ‘restoration area’ where some ‘management actions’ may or may not take place.

Conceptual Model A type of diagram which shows of a set of relationships between factors that are believed to impact or lead to a target condition. For the purposes of the MRERP FNR Provisional Baseline assessment, conceptual diagrams depict the relationships among elements of an ecosystem (i.e., species, communities) or elements of a species life cycle (i.e., egg, juvenile, adult, etc.)

Coteau Wetlands A wetlands in a stream’s flood plain that may or may not be connected to the stream.

Diurnal Active during daylight hours.

Dominant Working Hypotheses A subset of global hypotheses that represent factors that contribute to population dynamics of a species.

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.

Extirpated A plant or animal species formally occurred in an area, but is not now known to exist within that area. Extirpated species still occur somewhere in their natural range outside of the area.

Ecosystems for FNR in the MRERP, Study of ; synonyms [or variations] ‘Study Segment’. - The Missouri River basin is divided into 5 separate ecosystems (study segments) for the MRERP. They are: Rocky Mountain Foothills Ecosystem-State of Montana; the cold water in this ecosystem separates it from the other warm water ecosystems downstream; Upper Great Plains Ecosystem- State of Montana; the large plains begin in this ecosystem yet still with narrow stream widths with warm water; Middle Great Plains Ecosystem-through the States of North and South Dakota; basically a transition zone with large prairies and more flow augmented with waters from the Yellowstone River; Lower Great Plains Ecosystem-between the States of Nebraska and Iowa; a transition zone from large prairies to forestation in the floodplain and flora and fauna characteristic of that found in the Mississippi River; Central Lowlands Ecosystem-between the States of Nebraska, Kansas, Iowa and Missouri; characterized with large stream widths, floodplains, navigation channels,

forestation, extensive agricultural development and flora and fauna characteristic of that found in the Mississippi River.

Fledge Ratio The ratio of adult pairs of birds to the number of fledged chicks. Applies here to least terns and piping plovers (LT/PP).

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 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.

Geomorphology The branch of physical geography allied to geology analysis and explains the physical form of landscape.

Global Hypotheses A broad list of hypotheses explaining the decline of a species.

Indicators are ecological biological information including factors of environment, nourishment and reproductively to sustain life for a species. Indicators are listed and studied for the purposes of KEA's.

Interior Least Tern Listed as endangered in 1986 and delisted as endangered, threatened or a species of concern in January 2015. It is listed as a geographic subspecies of *Sternula antillarum*. It is a fish eating bird that nests in the open sandy areas and other bare ground areas along rivers and coasts. The adult is 8 to 9 inches long with a wing span of 20 inches with a black "crown" and snowy white underside and forehead, gray wings, orange legs and yellow bill with a black tip. The nests are shallow scrapes in sand, soil or pebbles in open areas with little to no cover. In some instances the eggs and chicks are subject to high rates of predation. The breeding season is April through August. Incubation is 24 days where after a few days the chicks are lead to nearby protective cover by the adults. They breed in the summer along the Missouri, Mississippi, Ohio, Red and Rio Grande river systems; and, winter along the coastal areas of Central and South America.

Intersex Mature pallid sturgeon males containing eggs (highly prevalent in this species).

Initially Modeled Hypotheses will guide near-term modeling by the EA teams.

Irruption The sudden appearance of a species en masse migrating to an area out of its normal habitat range.

Jeopardy A situation for an endangered species resulting from an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. The consequences of jeopardy are potential legal prosecutorial action against the agencies, private and public entities and individuals that are identified as causing the jeopardy situation to come about. Jeopardy could result in either a requirement to re-initiate consultation with the USFWS or potential liability related to mainstem project operations by readdressing USACE actions through the BiOp which may affect flow modifications and the function of the 8 authorized purposes.

Keystone Species A species whose impact on its community or ecosystem is disproportionately large relative to its numbers. It has a disproportionate effect on its environment and plays a critical role in maintaining the structure of an ecological community for many other types and numbers of organisms in a community or ecosystem. In the Missouri River Basin an example of a keystone species would be bison and other wild and domesticated ruminants and herbivores.

Management Hypotheses integrate management actions with the dominant working hypotheses.

Management Actions or Measures Activities composed of the regulation of land use and construction projects of the final MRERP to take place to meet recovery and restoration objectives. Until further notice, the area for these actions is the 'restoration area' (see below). This term is used by other agencies for actions or measures within in their authority.

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.

Morphology Channel morphology is the structure of a channel in relation to form or topographical features produced by erosion.

Nested Species are those that have established themselves in a designated area.

Pallid Sturgeon were listed as endangered in 1990. They have a unique dinosaur-like appearance. They are armored with lengthwise rows of bony plates instead of scales. Their mouth is positioned under the snout for sucking small fishes and invertebrates from the river bottom. Pallid sturgeons can weigh up to 80 pounds, reach lengths of 6 feet and are long lived

with individuals reaching 50 years of age. Pallid sturgeons are scarce in the upper Missouri River above Ft. Peck Reservoir, scarce in the Missouri and lower Yellowstone Rivers between Ft. Peck Dam and Lake Sakakawea, very scarce in the other Missouri River reservoir reaches from Lake Sakakawea to Gavins Point Dam, scarce in the Missouri River downstream of Gavins Point Dam, scarce but slightly more common in the Mississippi and Atchafalaya Rivers and, are absent in other tributaries. Pallid sturgeons evolved and adapted to living close to the bottom of large silty rivers. Their preferred habitat has a diversity of depths and velocities formed by braided channels, sand bars, sand flats and gravel bars. Sexual maturity for males is estimated to be 7-9 years, with 2-3 year intervals between spawning. Females are not expected to reach sexual maturity until 7-15 years, with up to 10-year intervals between spawning. The life cycle includes lengthy upstream travel before spawning which is followed by the larval stage drift of a moderate distance to feeding, growing and resting areas wherein they develop into juveniles before further travel downstream. The reservoirs on the Missouri River prevent travel of the fish and account for 32 percent of the stream's length. The low oxygen levels in the septic zone in the bottom 20 percent of a lake's depth prevent pallid sturgeon survival in the reservoirs. (See Montana State University MSU News Service/USGS January 23, 2015, Report on decline of Missouri River pallid sturgeon. msunews@montana.edu c/o Sepp Jannotta (406) 994-7371 seppiannotta@montana.edu) Commercial angling for roe, predation by introduced sport fishes and environmental contaminants affect pallid sturgeon survival too.

Particulate Nitrogen Nitrogen pollution attached to particles in the water.

Patch Size The water or land surface area (usually in hectares or acres) of a natural substrate or vegetation type unit on a stream or the landscape.

Piping Plover Listed as threatened in 1986 and listed as a geographic subspecies of *C. m. circumcinctus*. The population has been increasing since 1999. It is an aquatic worm and insect eating bird that nests in the open sandy areas and other bare ground areas along rivers and coastlines. The adult is white and 6 to 8 inches long with a wing span of 14 to 16 inches. It has a large rounded head, a short stout neck and short bill with a black tip. The nests are shallow scrapes in sand, soil or pebbles in open areas with little to no cover. In some instances the eggs and chicks are subject to high rates of predation. Nesting starts in late March and the breeding season is in April. Incubation is 27 days where after a few days the chicks are lead to nearby protective cover by the adults. The chicks can fly in about 30 days. Abandonment of the nests and young occurs with human disturbance and abnormal high tides and river levels. They breed in the summer along the inland rivers and the eastern coastlines of the United States; and, winter along the coastal areas of the Gulf of Mexico.

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 (drainage) consisting of the 'outlet in common' of all of the tributaries in a watershed (drainage). 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.

Residual Properties and Lands For those purchased lands with sites utilized for the purpose of recovery of an endangered specie, these are lands not used for recovery of the specie.

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.*

Restoration Area The 'area' in the FNR of the final MRERP plan where "management actions (regulation of land use and construction projects) will take place to meet recovery and restoration objectives". Until further notice from this date (October 1, 2010), the 'area' may be all or part of the area of 'bottom of bluff to bottom of bluff' and some reaches of tributaries of the Missouri River. This includes forested and non-forested 'bench or terrace' areas that may have been inundated in ancient times yet have not experienced flooding in more recent times (decades, centuries, etc.). Areas outside of this 'restoration area' will be merely considered as 'contributing areas' where some 'management actions' may or may not take place. A GIS map of the proposed 'bottom of bluff to bottom of bluff' area is available at < www.moriverrecovery.com > . NOTE: On the web site, use magnifying glass with "+" to zoom in.

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.

Riverine Living flora and fauna and items situated on the banks of a stream.

(The) River For environmental regulation purposes it is now defined as the area between the bases of the bluffs instead of the river's water surface.

River Segment A term used to designate an area of study or action. The area begins at the base of a dam and proceeds downstream including the area of the separate area of the river channel and the separate area the lake waters with the segment ending at the top of the next downstream dam.

Run of River Flows that are basically uncontrolled, as was experienced before the construction of the dams. Data from the Corps' simulation of 'run-of-river' was used to develop the reference hydrograph.

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 of river waters 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 (pulse). 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.

Stress A change in an ecological condition that adversely affects the key ecological attribute.

Study Segment See 'Ecosystems for FNR in the MRERP, Study of'.

Substrate Deposits of Granules (sand) 0.1" to 0.2", Pebbles 0.2" to 2.5" and Cobbles 2.6" to 10.0". It is believed that areas (patches) composed exclusively of these deposits provide ideal spawning areas for the pallid sturgeon. Location of these deposits include natural "bars mid-channel", tributary fans, USACE constructed chute projects, USACE dike modifications (notching, etc.) and USACE constructed shallow water habitat (SWH).

Tagging of Fish Fish tags include T-bar, spaghetti tag, PITs and CWTs. Tags are used to identify fish caught by anglers who in turn return the tags to state conservation authorities and tags to identify individual fish and groups of fish for agency research of fish movement and survivability.

Terrestrial Habitat Habitat that is not water based as opposed to **Aquatic Habitat** that is water related.

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.

Tiers Presently there are 6 tiers, 1 through 6, for rating the degree of 'departure' from the historic and natural state of an area undisturbed by European immigration and settlement (Tier 1); to 'total departure' (Tier 6) for an area where there is no semblance of features evident from before European immigration and settlement. The 'Tier' numbers between 1

and 6 will illustrate various levels of 'departure'. To accomplish environmental restoration for conservation of endangered species in select critical areas, the MRERP will recommend alternative 'Management Actions (Measures)' that will upgrade areas from the higher numbered 'Tiers' toward or to Tier 1.

Transect A plot of a topographic cross-section along a line showing spot distances and elevations; and, soil sample analyses at various depths along the same line.

Transgenic Any organism, or progeny thereof, that contains DNA from species that was not a parent of that organism.

Ungulate Hoofed animals.

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.

j. Stream flow terminology:

Baseflow is that portion of stream flow that is contributed by groundwater seepage, springs, etc., and typically contributes the bulk flow of a stream or river during periods of non-runoff and drought.

Bi-modal release of flows of a few days or weeks from Gavins Point Dam for two spring pulses or rises. The first occurs around the 1st of April and the 2nd occurs around the end of May.

Head Water(s): The beginning of a stream from its highest (elevation) point. Also characterized as the point where a stream "rises".

Mouth: The ending of a stream at its lowest (elevation) point.

Spiking is water releases from Gavin's Point with a sharp rise/flow increase producing a peak flow of short duration (2 to 3 days ±) 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.

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, Missouri. 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.

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.

Stream Piracy Theft or diversion of water by manmade or natural means from one stream to another.

Streams; Perennial, Ephemeral and Intermittent Perennial Streams maintain flow and a continuously visible water surface through out the year except during times of extreme drought. Ephemeral Streams maintain a water surface only in direct relation to precipitation runoff and are dry the rest of the year. Intermittent Streams have a water surface during precipitation runoff and an intermittent water surface areas (surface pools) during dry times of the year with water trickle or flow underground through rock fissures and gravel and sand deposits.

Tail Water(s): The water in the river channel immediately downstream from a dam.

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 Gavin's 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.

k. Study Terminology:

Crevasse Study A study of natural crevasse or diversion development in the floodplain adjacent to a stream.

Drainage coefficient: Usually expressed as the depth of water in inches which is to be removed in a 24-hour period from the entire water shed.

Ecohydrology An ecological assessment relating the diversity of habitats to the hydrology of a river.

Engagement Strategy: A procedural time table adopted by the MRRIC for when the MRRIC receives, deliberates on and returns comments and recommendations to the respective agency on aspects or phases of the agency’s studies, recovery actions and other items.

Fecundity The quality or state of being prolific or fertile.

Gamete A reproductive cell

Photo Period Length of daylight during a 24 hour day.

Potamology The study of rivers

Sampling- elutriate or ambient Elutriate sampling is taking the sediment in a river and analyzing the pollutants that can be dissolved into water. Ambient sampling is analyzing directly the dissolved pollutants in a water sample.

Spatial or geographic scope: The area of the plan.

Substantive scope: The purpose and focus of the plan.

Technical Team(s) *synonyms [or other variations]* ‘Tech Team’; A team recognized in their field for their expertise in knowledge and experience with the subject matter involving data and study results

Temporal scope: The time horizon for a plan.

I. Vocabulary and Miscellaneous:

Aggradation Modification of the earth’s surface by deposition of sediment as within a stream bed or floodplain.

Agitation Dredging The dredging of a stream channel with a device that dislodges the sediment and allows the current to relocate the suspended particles in alternative locations.

Alluvium A deposit of intermittent water bearing layers of earth and sand laid down by rivers in their floodplains.

Alluvial Well A water well constructed exclusively in alluvium to extract water from the water bearing strata. They consist of vertical steel casings to full depth with incorporated properly sized screens vertically and horizontally to minimize sand passage.

Anoxic (water) Water with a lower level of dissolved oxygen as compared to that found in waters with varying levels of hypoxia.

Attenuation Reduction in observed measurement error; usually applied to downstream water levels in the river at given points as compared to a set water level and flow rate from an upstream point. Though a river may be flooding over bank at an upstream point, farther downstream where the channel is larger the water levels can be lower and well below overbank flooding.

Attributes Essential qualities; critical factors or components.

Benthic Invertebrates are those found in the deepest portions of a stream.

Consensus All decisions and actions of the MRRIC must be by consensus. There are three levels of consensus. **Process Consensus** is for immediate or single meeting 'decisions' and 'recommendations' that do not require the two meeting rule for final action as described in the Charter. The MRRIC must agree by consensus that an item can be acted on with a **Process Consensus**. Such items may or may not be agenda items. **Substantive Consensus** is for MRRIC 'decisions' and 'recommendations' of such importance that the MRRIC agrees by consensus that the two meeting rule must apply. For **Substantive Consensus**, the first consensus polling sets the item up as a **Tentative Consensus** item until final action. For the first consensus polling, the item may or may not be an agenda item. The final consensus polling at the second meeting the item must be an agenda item.

Consent Agenda is a way to efficiently address procedural and routine matters. It is a bundle of items that is voted on as a package without discussion. It generally differentiates between routine noncontroversial matters and more complex issues needing discussion.

Coulee A steep walled canyon.

De Rigueur According to strict form.

Drainage or Watershed Terms used in the Missouri River basin states to describe the catchment for a stream, e.g. the Osage River '*watershed*', the Tongue River '*drainage*'.

Endogenous feeding The larva pallid are receiving nourishment from their yoke sac as opposed to **exogenous** feeding (e.g. nourishment from their environment).

Enology The science and/or study of wine making.

Environmental Justice Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and

health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work." (Source: EPA)

Epilimnion Warmest zone of the stratified water layers in a reservoir.

Exogenous feeding The larva pallid are no longer receiving nourishment from their yoke sac (e.g. **endogenous** feeding) but are receiving nourishment from their environment.

Flood Control Activities and policies by levee districts and others that make every effort to prevent seepage, encroachment or inundation of water in the root zone (3 feet down) and all water levels upward to any level of standing water on the land's surface. This accounts for subsurface and surface water level management and drainage works. It includes discharge management from flood control reservoirs levees and pumps.

Flood Damage Reduction Flood waters of any depth are presently in an area in the range of depths described for **Flood Control** (ruined crops, etc.) and that the goals are to reduce higher anticipated flood levels in the same river bottom area so that other certain properties are not flood damaged (highways, railroads, factories, airports, houses, sewer and water, etc.).

Flood Risk Reduction Allows for crop fields across the river or up and downstream to be flooded so that the local levees protecting highways, railroads, factories, airports, houses, sewer and water works, etc. are not over topped.

Floodplain Management The operation of a community program of corrective and preventative measures for reducing flood damage (source: WRDA legislation).

Flood Control Systems Generally there are two flood control systems. One is where during periods of overbank flow ("**flood stage**" for a given site along the river) a constructed earthen levee or constructed steel or concrete flood wall system prevents inundation of the floodplain. This system relies on maintenance of the earthen embankment or floodwall so that flood heights of runoff from expected storm events remain below the top of the levee crown or the top of the floodwall. For roads at grade, temporary operation of constructed "**closure structures**" (flood gates) provide flood protection. When needed, constructed pump stations discharge accumulated runoff from precipitation and accumulated seepage waters into the stream. The second system is a "**channel-only**" system where no levees or floodwalls exist. For these systems the channels are kept free of obstructions, debris and sedimentation so that flows from expected storm events are kept within the channel's banks.

Fluvial Corridor An area through which a river flows.

Fyke A long bag fish catching net kept open with a series of hoops.

Geo-Tubes Tubular devices constructed of geo-fabric placed in the river that are filled with sand slurry pumped from the river. The tubes are anchored perpendicular to stream flow, rest on the bottom of the river and encourage downstream deposition of sediment in the river for sandbar habitat.

Holistic A planning or study approach that considers all things.

Hydric Soil A clayey soil conducive to wetlands. Sandy soil is not considered to be a hydric soil.

Hypolimnion Coldest zone of the stratified water layers in a reservoir.

Hypoxia Low oxygen levels in the water reaching into the Gulf of Mexico. The low oxygen levels are caused by oxygen consumption of bacteria consuming excessive dead plant life in the water. NOTE: See orthophosphate, NPS and particulate nitrogen

Institute (The); The US Institute of Environmental Conflict Resolution (USIECR).

Invertebrate Having no skeleton or backbone; protozoan, worms, etc.

Iteration Repeating a process until the desired solution is achieved.

Lek A mating ground area for ground nesting birds like grouse and prairie chickens.

Listserv An e-mail discussion group; an online mailing list (see dictionary.com)

Marine Highway Program The national program places an emphasis on transportation and navigation and allows for County, City, State and Federal interests to proceed with activities for building port facilities and upgrades; and, enhanced government maintenance of the river channel and infrastructure like locks, etc. The Marine Highways are river navigation routes that essentially run parallel to existing Interstate highways designated with an “M” and the highway route number. M-70 is from St. Louis to Kansas City; M-29 is from Kansas City to Sioux City; M-Avenue of the Saints is from St. Louis to St. Paul; and, M-55 is from Chicago along the Illinois River.

Metapopulations Subsequent or repeatedly reoccurring populations of animals or nested species established and reproducing in a given area.

Metrics A standard of measurement or criteria used to gauge performance of ‘management actions’.

Missouri Breaks A mostly uninhabited 8 million acre area in Montana westerly of Fort Peck Lake along the Missouri River towards Great Falls, Montana consisting of rolling hills, buttes, rock outcroppings, scattered forests and massive prairie flats surrounding the Fort Peck Lake

(245,000 acres), the Charles M. Russell Wildlife Refuge (1.1 million acres), the Upper Missouri River Breaks National Monument (375,000 acres) and approximately 150 miles of the river upstream from the waters of the Fort Peck Lake. Areas outside of the refuge and the National Monument consist of scattered ranches and sizable blocks of BLM lands. The area lies within the 'Upper Great Plains Ecosystem' FNR for purposes of the MRERP.

Nexus A tie, link or connection between members of a group; a connected group or series.

Orthophosphate Some times referred to as '*Active phosphorous (P) and/or bio-available P*' which is usable for plant growth in the form of PO₄ (phosphate). It will strongly bond with water borne clay particles and organic matter and in this form is basically unavailable for plant and algae growth. It does, however, become readily available when it comes into contact with sea water (Gulf of Mexico). In sea water it causes excessive algae blooms that eventually decay and remove oxygen from the water with hypoxia being the result.

Ovicular Atresia Pertaining to an egg in that there is an absence of a natural passage or channel; imperforation.

Phytoplankton Minute plants which float in great quantities near the surface of water and provide the only source of food for fish.

Plankton Minute plants and animals which float in great quantities near the surface of water and provide a source of food for fish.

Programmatic Pertaining to or the nature of a project or program underway by one of the agencies or others.

River Bottom First Bottom, Second Bottom, etc. '*River bottom*' is a colloquial term used in Missouri to describe the flood plain adjacent to a river. Often times there are different ground levels in the flood plain/river bottom. '*First Bottom*' is the highest ground level area and was formed during the initial development of the flood plain. It can be described as '*the bench*'. This area is noticeably higher by as much as 2 to 10 feet ± than the present existing ground level in the flood plain immediately adjacent to the river. The lower ground area next to the river is known as the '*second bottom*'. In river bottoms several miles wide there can be third, fourth and fifth bottoms. The term '*bottom*' also applies to the area adjacent to any stream ('*creek bottom*' e.g.).

Ridiculous Official MRRIC term of disapproval permitted to be uttered or written anywhere by anyone to express an opinion either publicly or privately about anything during meetings of the MRRIC, as defined by the Charter, without being offensive to anyone. " 'You cannot unsay a cruel or unkind word.' (Anonymous)"

Silviculture, Sylviculture The science of forestry dealing with development, cultivation and reproduction of forest trees.

Silver Jackets A USACE program on a state by state basis composed of a core committee bringing together stakeholders and local, county, state and federal agencies to coordinate and work on emergency and flood risk management before, during and after a flood event.

Spatial Of or relating to space.

Splay The description of the deposition of sand in a broad and flat manner over a flood plain as the result of over bank flood water levels.

Synergy The working together of 2 or more things.

Thalweg The deepest part of stream channel

Trust Lands Usually mean Tribal lands.

Watershed or Drainage Terms used in the Missouri River basin states to describe the catchment for a stream, e.g. the Osage River watershed, the Tongue River drainage.

Water Quality The quality of water with respect to its contents and/or its degree of suitability to support a designated life form.

Zooplankton Minute animals which float in great quantities near the surface of water and provide the only source of food for fish.

SPECIAL NOTES

Historical Flows in the Missouri River Columbia Daily Tribune, Columbia, Missouri www.columbiatribune.com (573) 815-1700, has a special section once a week by columnist Bill Clark on *"This Week in Local History"*. In it are articles gleaned from Missouri area papers from years past (10 Years Ago..... 50 Years Ago.....193 Years Ago, e.g.) With permission of the Columbia Daily Tribune, I have copied here entries relating to the Missouri River in the order that they appeared in the Tribune. Items in parentheses are my entries.

January 1980, **150 Years Ago**, The "Glasgow Times", January 5th 1830, "Ice on the river is a foot thick . Teams (horses) have been crossing on it for several days." (R.M. 226.3)

June 2010, **150 Years Ago**, The "Glasgow Times", June 14th, 1860, "The river has several feet since our last printing and is in fine boating (steam boat) order. It really begins to look like a river again." (R.M. 226.3)

February 2012, **100 Years Ago**, The “Columbia Times”, February 14, 1912, “Farmers along the Missouri River in Boone County were harvesting a plentiful crop of ice. The ice on the river was 20-22 inches thick.” (R.M. 187.0 to 149.0 = 38 miles)

March 2013, **170 Years Ago**, “The Statesman”, Columbia, Missouri, March 17, 1843, “The Missouri River was frozen over tight and strong at St. Charles on March 11.” (R.M. 27.8)

September 2014, **170 years ago**, “The Statesman”, Columbia, Missouri, September 23, 1844, “The Missouri River, it is said, has never been lower and navigation more difficult than at the current time.”

March 19, 2015, **170 years ago**, “The Statesman”, Columbia, Missouri, March 21, 1845, “.... an ad for the regular weekly run of the “splendid and fast steamer, Lewis Lin.” It left St Louis at 6 p.m. on Monday and docked at Jefferson City and Nashville on Tuesday (144 miles in 2015 river miles), going to Rocheport, Boonville, Glasgow and Brunswick on Wednesday (an additional 109 miles in 2015 river miles).

April 9, 2015, **170 years ago**, “The Statesman”, Columbia, Missouri, April 11, 1845, “From Council Bluffs comes welcome news that there was no snow to melt, and thus no reason to see flooding this spring.”

March 24, 2016, **150 years ago**, “The Statesman”, Columbia, Missouri, March 30 1866, “Businessmen Kaiser and Wiggins have established a new steam ferry boat at Rocheport, (River Mile 186.5) well fitted, capable of carrying 16 wagons at each trip.”

June 15, 2017, **193 years ago**, “The Franklin Intelligencer”, Howard County, Missouri, June 19, 1824, “In the debate in the U.S. House of Representatives on the bill appropriating money for the improvement of navigation of the western rivers, Mr. Conway of Arkansas proposed an amendment the subject of which was to give the President a general power to apply \$75,000 to the improvement of the Mississippi, Ohio and Missouri Rivers as high as Franklin. In what shape the bill finally passed, we have not heard.”

History of the UGLAA The need for an acronym list and glossary occurred when the MRRP WG (now SAM WG) reviewed their first annual USACE annual “Work Plan” with budget figures for the MRRP. Mary Roth provided the initial list of acronyms in October 2009. I added to it glossaries from alternate sources like those for MLDDA. An **APPENDIX** was added to the UGLAA as a separate *.pdf file in January 2013 to provide graphical information. The sole purpose of the publications is to provide information on the Missouri River basin. Updated versions are sent with meeting literature by Resolve via e-mail as attachments the week before an upcoming regular face-to-face meeting of the MRRIC.

Status, Authorship and Publication Credit From time to time documents and other printed material become part of the information, study material and records for the MRRIC. Often text is presented without page numbers and any indication as to the version, author,

status or source of the materials in the document. Documents have been edited from time to time with no change in the version number. With the vast number of documents over the years involved with the MRRIC process, a notation system is needed to facilitate record keeping and help eliminate confusion as to current document version for the MRRIC members.

At a minimum, the pages should be numbered and showing the total number of pages and the file name with version number indicated in a foot note on each page.

Additionally, it is recommended that a simple abbreviated system be developed that is notated in a foot note on each page that indicates the status of the document; and, the source(s) and/or authorship(s) of the document. This document has such an example system. The 'MRRIC?' means that it is a MRRIC authored document. For a publication or document by any one else, the MRRIC would be replaced by the acronym for the agency or initials of the author. The question mark '?' means that the document has not received acceptance by consensus of the MRRIC. When it has the consensus of the MRRIC, the question mark is changed to an exclamation mark '!'. The next part of the foot note notation (-A-M) gives the source of the material in the documents. In this case, 'A' means agency or agencies and 'M' means MRRIC member(s) and 'P' means personal.

These suggestions aid persons in finding files, the version that is being worked on, the author(s) and status of the document and the sources of the materials in the document. An appropriate place to keep the description of the acronyms for the publication credit system would be in a document such as this UGLAA.

Epilogue

"We meet in our river basin representing our constituencies and agencies tempered by their and our own agendas. And, during our while, we set aside our differences while we discover and ponder the truths. Yet in the end, given our charge, only by all present embracing the rule of reason can we succeed."

Joseph B. Gibbs, PE Editor and Publisher 2009-to date