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Missouri River Recovery Program: Adaptive Management Process Framework

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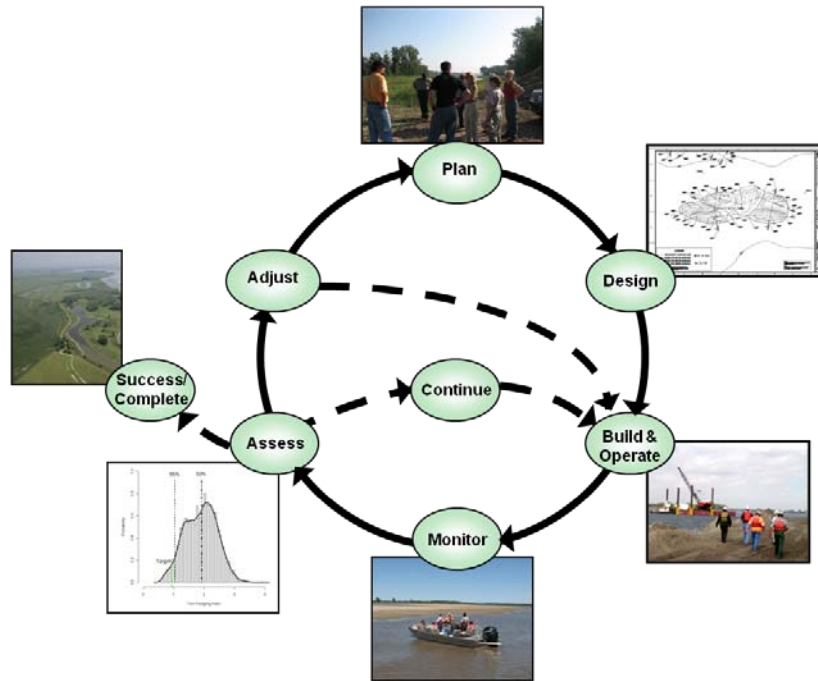
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Missouri River Recovery Program



Adaptive Management Process Framework

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ACRONYMS

AAMR	<i>Annual Adaptive Management Report</i>	MRERP	<i>Missouri River Ecosystem Restoration Plan</i>
AAR	<i>After Action Report</i>	MRRIC	<i>Missouri River Recovery Implementation Committee</i>
AM	<i>Adaptive Management</i>	MRRP	<i>Missouri River Recovery Program</i>
AMIT	<i>Adaptive Management Integration Team</i>	NEPA	<i>National Environmental Policy Act</i>
AMWG	<i>Adaptive Management Working Group</i>	NRC	<i>National Research Council</i>
BiOp	<i>Biological Opinion</i>	NWD	<i>Northwestern Division</i>
BSNP	<i>Bank Stabilization & Navigation Project</i>	NWO	<i>Omaha District</i>
CEM	<i>Conceptual Ecological Model</i>	NWK	<i>Kansas City District</i>
CORE	<i>Cooperating for Recovery Team</i>	O&M	<i>Operation and Maintenance</i>
CWA	<i>Clean Water Act</i>	PDT	<i>Project Delivery Teams</i>
DOI	<i>Department of the Interior</i>	PgM	<i>Program Manager</i>
ESA	<i>Endangered Species Act</i>	PIR	<i>Project Implementation Report</i>
ESC	<i>Executive Steering Committee</i>	PgMP	<i>Program Management Plan</i>
ESH	<i>Emergent Sandbar Habitat</i>	PM	<i>Project Manager</i>
HQUSACE	<i>Headquarters of the U.S. Army Corps of Engineers</i>	RPA	<i>Reasonable & Prudent Alternative</i>
IP&S	<i>Integrated Planning & Science</i>	SPgM	<i>Senior Program Manager</i>
IPgM	<i>Implementation Program Manager</i>	SWH	<i>Shallow Water Habitat</i>
ISAP	<i>Independent Science Advisory Panel</i>	T&E	<i>Threatened and Endangered</i>
ISP	<i>Integrated Science Program</i>	USACE	<i>U.S. Army Corps of Engineers</i>
ISPMT	<i>Integrated Science Program Management Team</i>	USFWS	<i>U.S. Fish & Wildlife Service</i>

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Note to the Reader

The following document describes the current process in place to integrate Adaptive Management principles into the Missouri River Recovery Program. This document is a joint product of the US Army Corps of Engineers (USACE) and the US Fish and Wildlife Service (USFWS). Although other groups and agencies referenced in this document may be involved in the process described, the document has not been endorsed by any of these interests at this time. One exception to this is Appendix E of this document which describes an engagement approach that was developed and approved by the Missouri River Recovery Implementation Committee (MRRIC).

The Missouri River Recovery Program Adaptive Management Process Framework

1. Purpose of this Document

The purpose of this Adaptive Management (AM) Process Framework is to describe the AM process for the U.S. Army Corps of Engineers (USACE) Missouri River Recovery Program (MRRP) and explain how AM principles will be used in the MRRP to reduce uncertainty and ensure that Program objectives are achieved over time. The AM Process Framework is intended to be broad so that it can be applied to all aspects of the MRRP and be understood by a diverse audience of managers, federal and state agencies, scientists, engineers, the Missouri River Recovery Implementation Committee (MRRIC), stakeholders, Tribes, and the public.

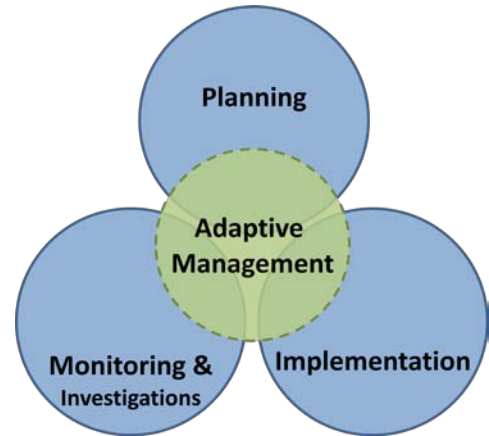
The AM Process described in this document generally follows the U.S. Department of Interior's (DOI) Technical Guide on Adaptive Management and integrates the ideas contained within the USACE Working Draft AM Technical Guide (under development). The AM Process is guided by the following general phases and steps (see Sections 3.1 and 4.4):

- I. Strategy Development
 1. Plan
 2. Design
- II. Strategy Implementation
 3. Build and Operate
 4. Monitor
 5. Assess
 6. Adjust

This AM Process will be used during development of specific AM Strategies on a Sub-Program basis. This document does not describe the specific objectives or monitoring that will be used for individual Sub-Program AM Strategies, but instead explains the teams involved and the processes that will be undertaken in the development and implementation of AM documents. Also described are the processes by which the MRRIC, other stakeholders, and the general public will be engaged as the individual Sub-Program level AM Strategies are developed, the information that will be included in AM documents, and the different types of AM documents that will be developed using the MRRP AM Process. Additionally, this document provides background information on Program-level activities (see Section 2).

By applying the AM process described in this Framework to the MRRP, the USACE seeks to accomplish the following goals:

- Involve MRRIC, stakeholders, Tribes and other federal and state agencies in the MRRP decision-making process
- Integrate Planning, Implementation, and Monitoring & Investigations activities across the MRRP
- Ensure monitoring and investigations are directly tied to clear, measurable objectives
- Ensure data is collected, analyzed, and documented in a way that results in learning from the outcomes of management actions and influences decision-making regarding management actions
- Ensure that necessary adjustments are made to the MRRP to achieve success in meeting objectives (including benefits to threatened and endangered species)



This Framework describes the process by which AM will be used throughout the MRRP to achieve these goals. Additional information on the MRRP and the AM Process is provided in appendices to this framework.

2. Background on the Missouri River Recovery Program

2.1 The MRRP Program Mission and Vision

The mission and vision statements for the MRRP were developed by the USACE to help guide the actions that will be undertaken to implement this Program and can be found at www.moriverrecovery.org along with additional information about the Program.

MRRP Mission Statement

“Implement actions to accomplish Missouri River ecosystem recovery goals in coordination and collaboration with agency partners and stakeholders.”

MRRP Vision Statement

“Develop a sustainable ecosystem supporting thriving populations of native species while providing for current social and economic values.”

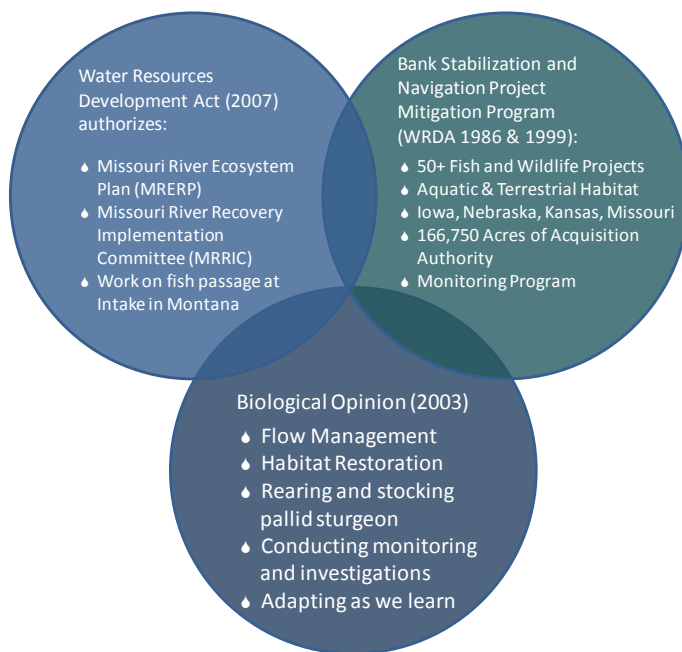
2.2 MRRP Program Activities

The MRRP is being managed as a “Program” rather than a series of individual, stand-alone projects. Program management for MRRP focuses on how the various MRRP Sub-Programs and projects work together to meet the Program’s goals and objectives:

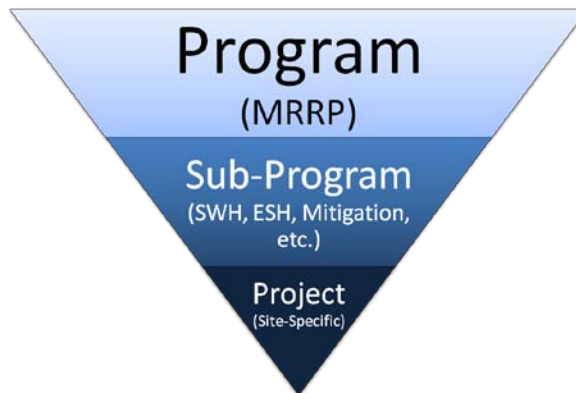
1. Implement the Reasonable and Prudent Alternative (RPA) elements, Reasonable and Prudent Measures, and Conservation Recommendations contained in the 2003 Amended Biological Opinion on the USACE Operation of the Missouri River Main Stem Reservoir System, Missouri River Bank Stabilization and Navigation Project, and Kansas River Projects (2003 Amended BiOp) prepared pursuant to consultation between the USFWS and USACE under Section 7 of the Endangered Species Act (ESA);
2. Implement the Missouri River Bank Stabilization and Navigation Project (BSNP) Fish and Wildlife Mitigation Program as authorized by the 1986 & 1999 Water Resource Development Acts (WRDA);
3. Develop the Missouri River Ecosystem Restoration Plan (MRERP) and Environmental Impact Statement; a study to determine actions required to mitigate, recover and restore the Missouri River Ecosystem;
4. Collaborate and coordinate with Tribes, stakeholders, and agency partners including the MRRIC; and;
5. Implement other congressionally authorized projects (e.g., Yellowstone Intake, Montana).

The Sub-Programs and projects that comprise the MRRP, as well as the congressional authorities can be found in Figure 1. The figure illustrates the overlap between Program goals and objectives given the multiple authorities involved with implementation (see Appendix B for additional information on the authorities and mandates associated with the MRRP).

Figure 1. MRRP Authorities



For the purpose of this Framework, the MRRP will be referred to as the Program, and further divided into Sub-Programs and projects. The Program refers to those elements that are at the level of the overall MRRP such as the Annual Work Plan (AWP) and the Program Management Plan (PgMP). Sub-Programs are groups of related management actions that share common goals and objectives such as the Emergent Sandbar Habitat (ESH) Sub-Program which seeks to create habitat for least terns and piping plovers, two bird species provided federal protection under the ESA. Sub-Programs are typically covered under broad NEPA documents that are then tiered down to projects. Projects are site-specific actions that are taken to implement Sub-Programs, such as the ESH creation project at Missouri River Mile 761.3 that was undertaken in 2005. Actions at the project level are typically described and analyzed in a Project Implementation Report (PIR) which contains site-specific information, alternative designs and project features, the anticipated benefits of the project, and documentation for compliance with the National Environmental Policy Act (NEPA) disclosing the potential affects to the quality of the human environment from project implementation.



3. Adaptive Management Overview

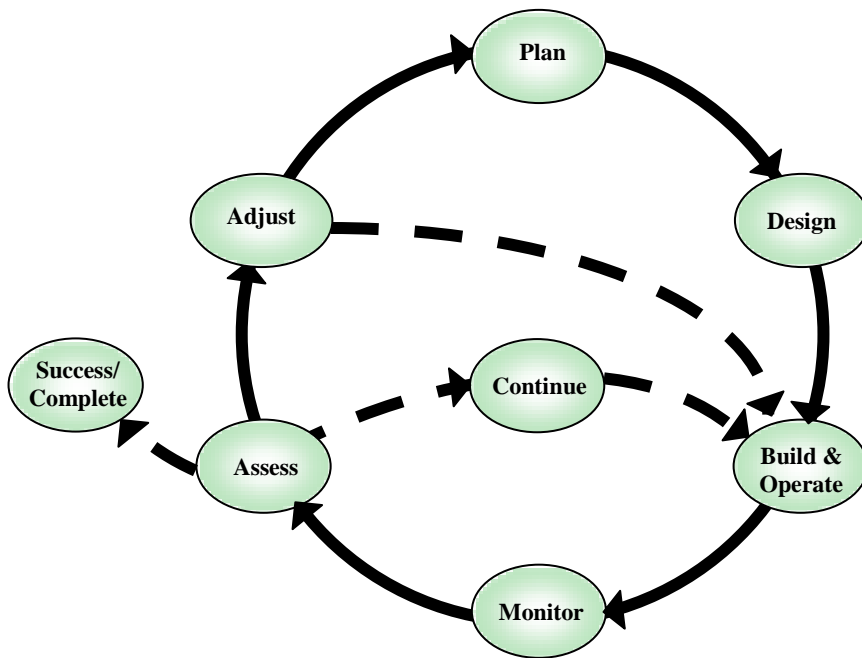
3.1 Definition of Adaptive Management

The National Research Council (NRC) defined AM in the guide *Adaptive Management for Water Resources Project Planning* (2004). This definition has been embraced in the DOI in their AM Technical Guide (2009) as well a national team working on developing an AM technical guide for USACE projects. The MRRP has adopted NRC’s definition (see below) of AM in establishing the MRRP AM Process.

Adaptive management promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a “trial and error” process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.

A conceptual model for AM, adapted from Holling’s Learning Wheel (Holling, 1978) and developed the USACE national AM team, is shown in Figure 2.

Figure 2. Modified AM Learning Wheel. Adapted from Holling.1978



The steps depicted in this graphic are described below:

Step 1 - Plan: Define the scope of the management problem, define Sub-Program or project goals and objectives, collect existing knowledge about the system, and explore the potential outcomes of alternative management actions. Explicit forecasts are made about outcomes, in order to assess which actions are most likely to meet management objectives. During this exploration and forecasting process, key gaps in understanding of the system (i.e., uncertainties that limit the ability to predict outcomes) are identified. During this step metrics of success are defined and an AM Strategy / Plan is developed (see section 4.3 for a description of the difference between AM Strategies and Plans).

Step 2 - Design: Design the management action to provide the flexibility needed to adjust implementation in line with the AM Strategy / Plan. It is useful to evaluate one or more proposed plans or designs, on the basis of costs, risks, information, and ability to meet management objectives.

Step 3 - Build and Operate: Implement plan to build and operate projects.

Step 4 - Monitor: Collect data for selected performance metrics (tied directly to goals and objectives at the appropriate scale) for use in the Assess step. A monitoring plan or program is implemented to provide reliable feedback about the effectiveness of the chosen actions and inform decisions about future options to adjust implementation. Additionally, investigations may be undertaken to generate information that will fill the key gaps in understanding.

Monitoring results can also increase understanding of the relationships between management actions and project outcomes.

Step 5 - Assess: Conduct analyses to compare measured results with anticipated outcomes related to goals and objectives for the Sub-Program or specific management actions to determine whether the project should continue with implementation, adjust the implementation, adjust the plan, or declare success.

Step 6 - Continue: Continue with the current implementation of the management action if the assessment concludes that no adjustments are needed to achieve goals and objectives.

Step 7 - Adjust: If the Sub-Program, project, or management action is not meeting goals and objectives, adjustments are made in either the implementation of the plan or to the plan itself. In the dashed line path, modifications within the scope of the AM Strategy are made to implementation (Build & Operate) to better achieve objectives. In the solid line path, changes are made to the plan which may include the objectives, metrics, management actions, or other elements developed in the “Plan” step.

Step 8 - Success: The monitoring results demonstrate that the Sub-Program or project goals and objectives are being consistently met. No further action is taken.

3.2 Adaptive Management Guidance

The USACE issued implementation guidance on AM related to Sections 2036 and 2039 of WRDA 2007. This guidance provides direction on the application of AM to USACE projects and programs. Aspects of the guidance pertinent to the MRRP AM Process are summarized below:

- An AM plan should be developed for all ecosystem restoration projects
- AM plans should be appropriately scoped to project scale and monitoring efforts should be the minimum required to determine ecological success.
- Plans should discuss the uncertainty of achieving desired outputs.
- Monitoring should be tied to key parameters, desired outcomes and management decisions.
- The nature and costs of monitoring and potential AM adjustments should be explicitly described in the plan.

The MRRP AM Process described in this Framework conforms to this guidance as well as guidance provided by the current draft of the USACE AM Technical Guide (Draft from USACE 2010).

The MRRP AM process is also consistent with the DOI AM Technical Guide (Williams et al. 2009), which outlines two conditions required for a decision-making process that will use AM: 1) the problem must be sufficiently important that actions will be taken even in the face of uncertainty about the best solution, and 2) there is an institutional commitment to the process. These two conditions are clearly met in the MRRP. With regard to the first condition, the operation of the Missouri and Kansas River projects are of significant importance and will continue to operate under uncertainty. Second, the USACE institutional commitment to AM is

explicitly stated in its USACE Biological Assessment of 2003, and the 2004 Record of Decision for the Missouri River Mainstem System Master Water Control Manual (Master Manual). The USFWS commitment to AM is expressed in its 2003 amended BiOp.

4. The AM Process in the MRRP

4.1 AM Role in Decision-Making

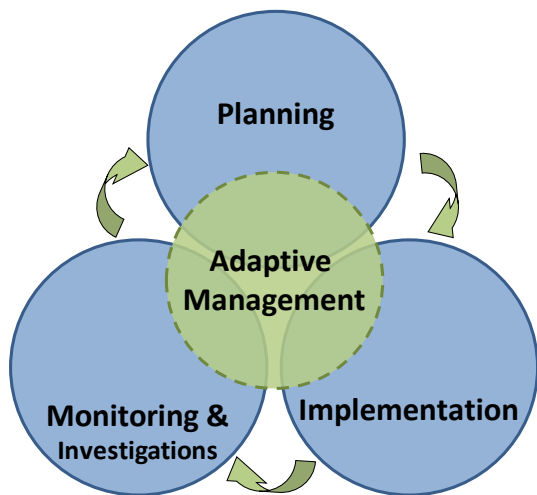
The MRRP AM Process uses a structured approach to facilitate the development of AM Strategies and plans at the Sub-Program and project scale. Actions, metrics and monitoring will be tied directly to goals and objectives at the appropriate scale.

AM provides the tools and forum for improved decision-making using specific, shared objectives and learning gained from new information in order to improve Program success. In the MRRP, the AM Process will be used to influence decision-making by:

1. Organizing actions, objectives, data, and information to specifically address decision-making needs;
2. Providing tools to act in the face of uncertainty and continue to learn about the Missouri River system from actions and their response; and
3. Creating a process to regularly improve understanding of actions and outcomes and ensure incorporation and use of new information within the decision-making process.

In implementing MRRP management actions on an annual basis, projects are broken into stages with different groups responsible for leading each stage. The three primary project stages are 1) Planning, 2) Implementation and 3) Monitoring & Investigations. In the Planning stage the USACE, through the use of Product Delivery Teams (PDTs – see section 4.2), works with MRRIC, stakeholders, Tribes, and other federal and state agencies to identify the management actions that will be undertaken to implement Sub-Programs (such as ESH and SWH). This stage is primarily managed by the Planning Branch of the USACE. Once planning is completed, the Implementation stage begins in which projects are designed and constructed. This stage is primarily managed by the Civil Works Project Management Branch of the USACE. Following this stage, monitoring and investigations are conducted by the MRRP Integrated Science Program. In order to improve the integration of these three stages, the AM process bridges these activities; ensuring that Planning, Implementation and Monitoring & Investigations stages are conducted using a shared Strategy and that analysis and assessment occurs on a regular basis.

Figure 3. Using the AM Process to bridge MRRP project stages.



4.2 AM Process Roles and Responsibilities

The MRRP is a regional USACE Program jointly managed by the Kansas City (NWK) and Omaha (NWO) Districts. The Program includes staff from NWK, NWO, and the Northwestern Division (NWD).

The following teams have been established to ensure that the AM process described in this Framework is employed consistently across the MRRP and adheres to relevant guidance. Numerous other groups and individuals will be involved in the development and implementation of AM for the MRRP. **Appendix A** describes the roles and responsibilities of all the groups and individuals associated with the MRRP. A more detailed description of these positions and teams can be found in Appendix A.

Adaptive Management Process Oversight: The following USACE staff members provide senior leadership and guidance on AM and MRRP; act as liaisons on higher-level coordination of AM-related decisions, budget development, and prioritization of efforts.

Members:

- Omaha District Integrated Planning and Science Program Manager
- Kansas City District Integrated Planning and Science Program Manager
- Integrated Science Project Manager

Adaptive Management Integration Team (AMIT): This inter-agency team is responsible for developing the AM Process, integrating the process throughout the MRRP, leading the Adaptive Management Work Group (AMWG) and ensuring consistency in the application of the process and documents.

Members of the AMIT:

- Omaha District AM Process Manager
- Kansas City District AM Process Manager

- ISP Applied Science Coordinator
- US Fish and Wildlife Service Missouri River AM Lead

Adaptive Management Work Group (AMWG): This interagency team assists Program and Project Managers (PMs) and Product Delivery Teams (PDTs) in the development and implementation of AM Strategies and plans. The AMWG is made up of federal agencies, academics and consultants. The AMWG works with PDTs, PMs and ISP staff on analysis and assessment techniques to build in-house capability to conduct analyses of monitoring data and provides assistance on developing the Annual AM Report.

Members of the AMWG:

- AMIT Members
- Northwestern Division Missouri River Water Management AM Lead
- Engineering AM Lead(s)
- Representatives of the ISP
- AM Process Experts
- Model Development Experts

Product Delivery Teams: PDTs are the primary groups responsible for the development and implementation of AM Strategies and plans. PDTs involved in the development of an AM Strategy will typically consist of between 10 and 15 members representing a variety of interested federal and state agencies and numerous relevant disciplines, including representatives of agencies with additional authorities in the project area (such as the National Park Service in the Missouri National Recreational River segments). PDTs may also have sub-teams for specific tasks such as the ESH Evaluation Team – a subset of the ESH PDT that is focused on monitoring, investigations and data analysis. PDTs and Sub-Program PMs are the primary entities responsible for developing the content of Annual AM Reports with assistance from the AMWG.

Missouri River Recovery Implementation Committee and Work Groups: Part of the purpose and scope of the MRRIC contained in their charter is to “Provide guidance with respect to the existing Missouri River mitigation and recovery plan, including recommendations on: (1) Changes to the implementation strategy as a result of adaptive management”(MRRIC, 2008). The MRRIC charter also contains a provision that allows for the creation of “special work groups or sub-committees as necessary to accomplish its purposes.” According to the MRRIC recommended engagement approach (see Appendix E), AMWG members will interact directly with an appointed MRRIC work group during the development and implementation of AM Strategies. The full MRRIC will also have the opportunity to provide recommendations to the lead agencies on draft AM Strategies as well as the application of AM to MRRP work plans. More information about MRRIC, including their charter and other documents, can be accessed under the “MRRIC” tab at <http://www.moriverrecovery.org>.

4.3 AM Documents

As previously discussed, the MRRP includes a suite of management actions conducted over a large geographic area that are intended to meet the goals and objectives of the Program. This Framework describes the **AM Process** that will be integrated into the MRRP. The AM Process

will be applied to groups of related actions that share common goals and objectives, referred to here as Sub-Programs (See Section 2.2), and captured in an **AM Strategy**. These Strategies will then be tiered down to the site-specific project level in an **AM Plan** which will describe the project's relationship to the larger Strategy and discuss any relevant site or project-specific uncertainties. The implementation of these Strategies and plans will be documented annually in an **Annual AM Report**. Following is a description of each document:

AM Process: The guiding AM principles that will be integrated into the MRRP including stakeholder engagement, document structure and integration, and decision-making. The AM Process is described in the **AM Process Framework** and is developed and updated as needed by the AMIT.

AM Strategy (Sub-Program Scale):

Formalizes objectives, metrics, monitoring and investigations, analysis and assessment techniques, and potential management actions for a suite of related actions within a Sub-Program (such as restoration of ESH). Includes cost estimates for potential

management actions, monitoring and investigations. See Appendix C for a recommended outline of an AM Strategy. AM Strategies are developed by the AMWG and the Sub-Program level PDTs.

AM Plan (Project Scale): A portion of a Project Implementation Report (PIR) that discusses the relationship of a site-specific project to the overall AM Strategy (See Section 2.2 for a description of a PIR). Depending on the nature of the project, site-specific monitoring, investigations, and potential adjustments may or may not be recommended. See Appendix D for a recommended outline for an AM Plan. AM Plans are developed by the site-specific PDTs as part of the PIR with assistance by the AMWG.

Annual AM Report: An annual report describing the implementation of an AM Strategy including monitoring efforts conducted, analyses, assessments and recommendations. These recommendations may include adjustments to a Sub-Program consistent with the AM Strategy or changes to the AM Strategy itself. Annual AM Reports are developed by the Sub-Program level PDTs with assistance from the AMWG.



4.4 Common Elements for the AM Strategies (Sub-Program Scale)

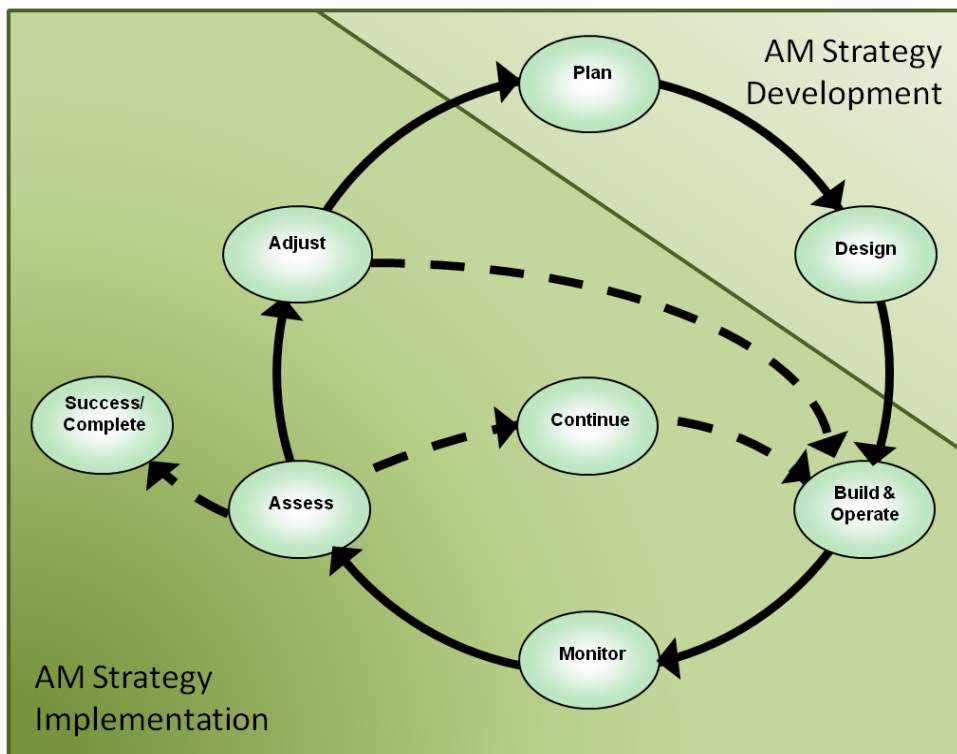
In order to ensure that the process is integrated across these activities, AM Strategies will be developed for sets of related management actions (such as restoration of ESH) that share common objectives, implementation techniques and monitoring activities. These AM Strategies will feature the following elements:

- **Objectives** - specific, measurable and scoped appropriately to address a suite of proposed management actions to be taken
- **Metrics** - determine data necessary to measure progress towards objectives
- **Monitoring** - the process of collecting data to compare against the metrics
- **Investigations** - research activities intended to reduce uncertainty
- **Analyses & Assessments** - the methods used to translate data into management recommendations (includes models)
- **Management Actions** - a suite of proposed or potential actions to be taken by an agency

See Appendix C for a recommended outline of an AM Strategy including a description of each section.

For the purpose of this document, the process of developing and implementing an AM Strategy is broken into two phases: AM Strategy Development and AM Strategy Implementation. Figure 4 shows these two phases in the context of the modified AM learning wheel.

Figure 4: AM Learning Wheel divided into two phases: Strategy Development and Strategy Implementation

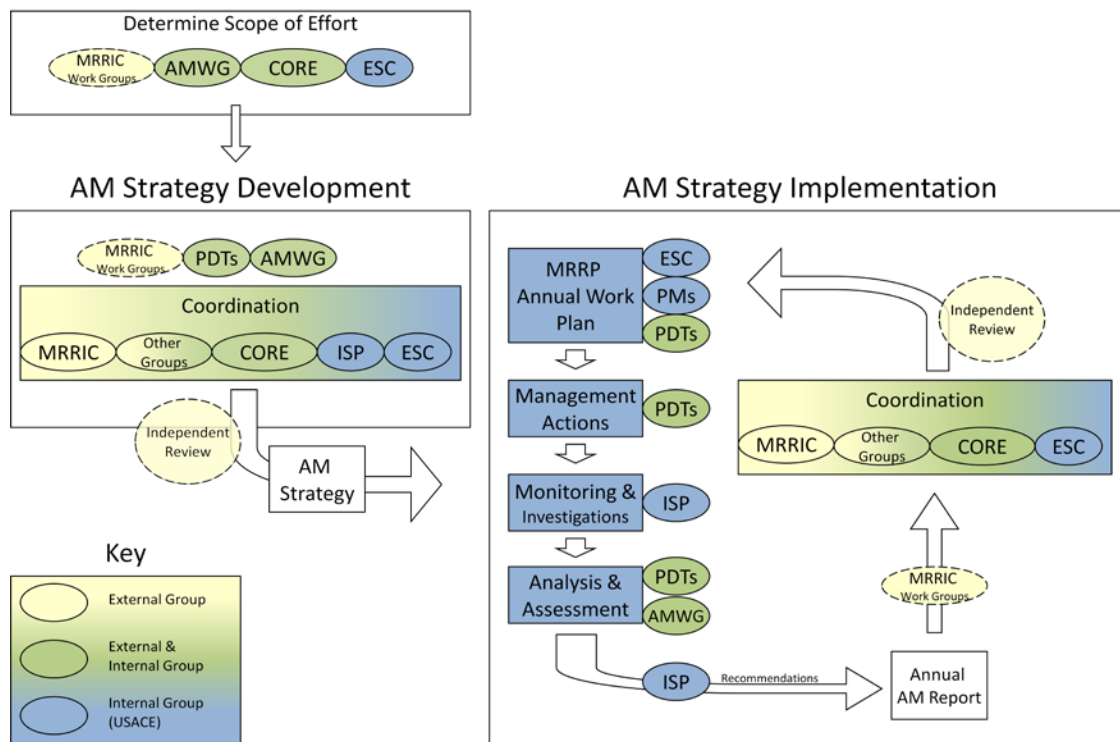


The AM Strategy Development phase encompasses the Plan and Design steps of the wheel while the AM Strategy Implementation phase encompasses the remaining steps (See Section 3.1 for a description of the steps in the AM learning wheel). While AM Strategy Development is the initial phase of the AM Process, note that it may be re-entered when adjustments to the AM Strategy are warranted.

4.5 MRRP AM Strategy Development and Implementation (Sub-Program Scale)

Figure 5 depicts the parties involved in the development and implementation of an MRRP AM Strategy. Following Figure 5 is the process that will be used that integrates the six AM steps shown in Figure 4 and the MRRP steps in Figure 5.

Figure 5. Development and Implementation of AM Strategies



AM Strategy Development Phase

Steps 1 and 2. Plan and Design: As Strategies are proposed for development, the AMIT will work with the Cooperating for Recovery team (CORE), the Executive Steering Committee (ESC), and the appropriate MRRIC Work Group to establish the proper scale and scope for the Strategy (see Appendix A for a description of these teams). Development of the Strategy will then be undertaken by the AMWG working with both a Sub-Program PDT as well as the appropriate MRRIC work group. Representatives of the AMWG will support the PDT in formalizing goals, objectives, actions, metrics, models, potential consequences, uncertainties and trade-offs for potential management actions and ensuring that the process and document are consistent with other MRRP AM efforts.

As these Strategies are developed, draft products such as lists of draft objectives and metrics, will be circulated to the CORE, ESC, representatives of the Integrated Science Program (ISP), and the appropriate MRRIC Work Group for feedback (see Appendix E for a more complete description of the steps involved in the Strategy development phase and the full MRRIC engagement approach). Information will also be shared with other groups including Tribes,

other federal and state agencies, and stakeholder groups such as the Agency Coordination Team (ACT – see Appendix A for a description of this group). This information may be shared through briefings, webinars, email transmittal or other appropriate methods. The PDTs will consider these comments and incorporate them into the AM Strategy as appropriate. The draft AM Strategy will then be completed and further coordinated with MRRIC (according to the engagement approach – see Appendix C) and other groups for comment. At this time, the draft Strategy may also undergo an independent review if warranted. If the AM Strategy is associated with a National Environmental Policy Act (NEPA) document describing the impacts of the proposed action, the AM Strategy will be published for public comment along with this document (typically a 30-45 day review period depending on the document). Additionally, the AM Strategy would undergo any review requirements associated with the NEPA document which may include District Quality Control, Agency Technical Review and Independent External Peer Review consistent with Section 2034 of the Water Resources Development Act of 2007. Comments received from the public will then be incorporated into the AM Strategy and the AM Strategy will then be finalized. Draft AM Strategies not associated with NEPA documents will be circulated for comments during a 30-day review period.

AM Strategy Implementation Phase

Step 3. Build and Operate (Management Actions): Once an AM Strategy is developed and finalized, the next step is to implement it. Each Sub-Program Implementation PM, in coordination with the appropriate PDT, will develop a set of site specific management actions and monitoring and investigations needed associated with their AM Strategy on an annual basis which will feed into the development of the MRRP Annual Work Plan. In addition to the primary management action (e.g. ESH or SWH creation), the Annual Work Plan may also include pilot projects to test new methodologies and adjustments to previously constructed projects.

The ESC will use the input from the Implementation PMs and the PDTs to establish MRRP priorities and create the MRRP Annual Work Plan. The Annual Work Plan includes real estate actions, habitat creation actions, monitoring of physical and biological responses to actions, and research activities. This Annual Work Plan is then used by the PDTs to implement the management actions that make it into the final Annual Work Plan.

Step 4. Monitor (Monitoring and Investigations): As projects are constructed and operated, the ISP is responsible for monitoring the results of these management actions to track progress towards the objectives and metrics identified in the AM Strategy. In addition, the ISP conducts necessary investigations to reduce uncertainty associated with the management actions.

Step 5. Assess (Analysis and Assessment): The data from the monitoring efforts and investigations are provided to the PDTs and the AMWG for analysis and comparison to metrics from the AM Strategy. Following data analysis, the PDTs and the AMWG meet to discuss the results of the data analysis and any implications for the MRRP Annual Work Plan, including an assessment regarding whether the management actions are meeting the objectives or whether adjustments are needed in order to ensure success over time. The analysis and assessment, along with recommendations, are coordinated through the ISP and captured in an Annual AM Report. The Annual AM Report includes: 1) analysis of data collected; 2) evaluation of the effectiveness

of actions towards achieving program objectives; 3) projected outcomes of actions using predictive models; 4) recommended Sub-Program or project adjustments; and 5) data needs and recommended research activities to improve predictive capabilities. As the Annual AM Reports are developed, Independent Review will be incorporated into the process as appropriate.

Coordination: The draft report is then provided to the PDTs, CORE Team, the ESC, the appropriate MRRIC work group, the MRRIC, and other groups as appropriate. This provides an opportunity for these groups to gain an understanding of the MRRP at a key time in the annual cycle – occurring after information is compiled on the previous year’s efforts, and before development of the next Annual Work Plan.

Step 6. Adjust: Feedback from these entities is provided to the PMs and PDTs through interaction with the AMWG and may result in changes to the multi-year action strategy or the development of the next Annual Work Plan. The cycle then repeats.

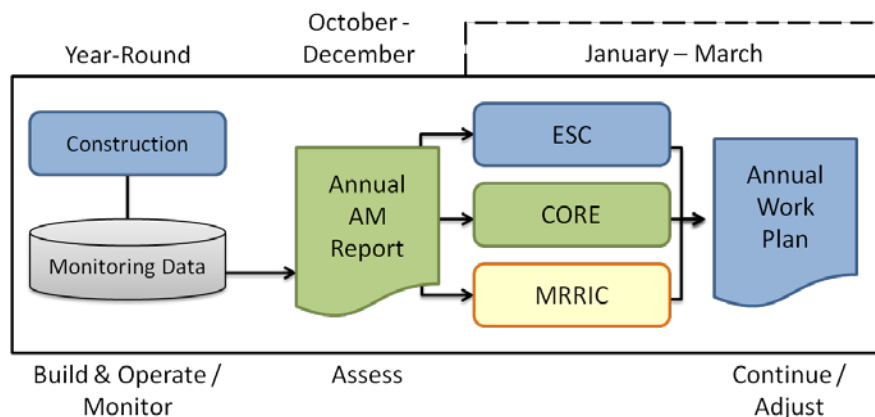
Periodically (every 3-5 years), the AM implementation phase will also involve a critical review of elements of the individual AM Strategies to see if adjustments to the AM Strategies are needed. If a recommendation is made to update an AM Strategy and major changes are warranted, the AM Strategy Development phase may be reinitiated in full or in part. This recommendation would come from the AMWG and the PDT and the decision to reinitiate the Strategy Development Phase would be made by either the CORE or the ESC, as appropriate. Otherwise, general updates would be made and coordinated through the external and internal teams described above under AM Strategy Development.

Additionally, MRRIC and other groups may choose to provide comments or recommended adjustments to AM Strategies at any time during the implementation phase. This could include changes to objectives, incorporation of additional management actions, input on anticipated benefits and tradeoffs, and other pertinent elements of AM Strategies. As these comments are received, they will be considered by the agencies, PDTs and AMWG and the AM Strategies will be updated as appropriate.

4.6 Timeline for Annual Implementation of AM Strategies

In order to meet the necessary deadlines associated with developing the MRRP Annual Work Plan, the development of the Annual AM Report will be conducted in October-December completed by December 31st each year. This allows the findings of the Annual AM Reports to be included in the Annual Report on MRRP activities and provide opportunity to influence development of the Annual Work Plan.

Figure 6: Annual Implementation of AM Strategies.



In this implementation cycle, construction and monitoring activities take place throughout the year as part of the “Build/Monitor” steps of the AM Learning Wheel. In October, the most recent information is compiled from monitoring and investigations. This data is then analyzed and assessments are made by representatives of the Sub-Program PDTs and the AMWG in the “Assess” step of the wheel. This information, along with any recommendations for adjustments, is captured in the Annual AM Report which is completed by December 31. It is then provided to the ESC, CORE and the appropriate MRRIC work group for review in January - March. It is also provided to the PDTs and Implementation PMs for use in refining the MRRP Annual Work Plan for the current fiscal year and developing the MRRP Annual Work Plan for the next fiscal year. In crafting this plan, decisions are made by the ESC whether to continue implementing the MRRP in a similar manner to the previous year or to adjust the implementation for the MRRP based on new information, recommendations or changing priorities. Once the Annual Work Plan is finalized, management actions are implemented that may result in more construction and subsequent monitoring and repeating the implementation cycle shown above. It should be noted that all actions are subsequent to available funding.

4.7 MRRP AM Strategy Documents

Following is a description of the AM Strategies that are either under development or may be developed in the future to fully integrate the AM Process into the MRRP.

4.7.1 AM Strategies Under Development

- **Emergent Sandbar Habitat AM Strategy** – The first AM Strategy that has been developed for the MRRP is the draft AM Strategy for the ESH Programmatic Environmental Impact Statement. This Sub-Program seeks to create and maintain riverine nesting and foraging habitat for terns and plovers. This AM Strategy has completed public review and is currently being revised to address public and agency comments. It is anticipated the AM Strategy will be finalized in the Spring of 2011.
- **Shallow Water Habitat AM Strategy** – Also currently under development is an AM Strategy for Shallow Water Habitat creation efforts for pallid sturgeon and as part of implementation of the Missouri River Bank Stabilization and Navigation Project Fish and

Wildlife Mitigation Program (BSNP Mitigation). The SWH AM Strategy is currently being developed by the SWH AM PDT and the AMWG. Draft objectives, uncertainties, management actions, performance metrics, targets, monitoring plans and investigations have been developed at this time. A preliminary draft SWH AM Strategy is anticipated in July 2011.

Additional AM Strategies that may be developed over time are discussed in the following section.

4.7.2 Potential AM Strategies To Be Developed

- **Program Level AM Strategy** – Looks at the trade-offs between Sub-Program elements, including funding distribution. Integrates Sub-Program elements into a comprehensive AM Strategy for the program. Development of this document will be initiated once at least two AM Strategies for Sub-Programs have been developed. For example, once both the ESH and SWH AM Strategies have been developed, development of this Strategy may be undertaken to look at potential tradeoffs between these two Sub-Programs and assist in prioritizing annual work.
- **Missouri River Ecosystem Restoration Plan (MRERP) and Environmental Impact Statement AM Strategy** – As the MRERP establishes goals, objectives and alternatives, an AM Strategy will be developed and incorporated into the plan. Development of this Strategy will occur according to the MRERP schedule and is not likely to be initiated for a number of years. It is also recognized that MRERP is broader than the MRRP, however it is mentioned in this document as it is funded through the MRRP and is likely to follow a similar process for AM Strategy development. In addition, elements of the MRERP AM Strategy may be closely related to other MRRP AM Strategies. As such, development of both the MRERP and MRRP AM Strategies will be coordinated across the program.
- **Missouri River Bank Stabilization and Navigation Project Fish and Wildlife Mitigation Program AM Strategy** – While elements of the SWH creation Sub-Program are within the scope of BSNP Mitigation, this effort also includes real-estate acquisition, floodplain development, and land management practices above and beyond SWH creation.
- **Spring Pulse AM Strategy** – Further clarify the goals, objectives and potential management actions that can be taken by water management within the context of the existing Missouri River Mainstem Reservoir System Master Water Control Manual related to the Spring Pulse releases from Gavins Point Dam. Development of the Spring Pulse AM Strategy will be initiated following receipt of feedback from the Independent Science Advisory Panel (ISAP).
- **Tern and Plover Reservoir Habitat AM Strategy** – Management actions to create and maintain tern and plover habitat on Missouri River reservoirs are currently being analyzed in a Reservoir Habitat Study. As a set of management actions is developed and proposed, development of an AM Strategy will be developed along with the document. This AM Strategy will be developed so that it can be integrated directly with the ESH AM Strategy.

- **Pallid Sturgeon Propagation and Augmentation AM Strategy** – Management actions to augment the pallid sturgeon population of the Missouri River are ongoing within the MRRP. This AM Strategy would be developed to better determine the objectives, metrics, potential management actions, monitoring efforts and investigations needed to assess the success and potential adjustments to the Sub-Program over time.
- **Sediment Management AM Strategies** – If plans are developed to address sediment management across the system, either through the ongoing study at Lewis and Clark lake or the NRC study, AM Strategies would be developed to guide implementation of the plans.

4.8 Integrating AM Strategies

As AM Strategies are developed within the program, some Strategies may have related elements or may share common objectives. For example, although the management actions between the ESH AM Strategy, the Reservoir Habitat Strategy and the Spring Pulse AM Strategy may differ, they may share common MRRP objectives of supporting tern and plover populations. Strategies that work towards shared objectives will be integrated in three different ways:

1. **Model Development:** As models are developed and updated, they will integrate multiple sets of actions that work towards shared objectives (such as ESH, reservoir habitat, and natural sandbar habitat provided by water management). This will allow for trade-off analyses between different management actions and the development of a collective suite of management actions across multiple Strategies.
2. **Annual AM Report:** As multiple Strategies are implemented, they will be combined into a suite of recommendations in the Annual AM Report, ensuring that Strategy implementation is consistent across the program and suites of management actions are developed that work towards shared objectives.
3. **Program Level AM Strategy:** As AM Strategies are developed, they will be integrated into the broader “Program Level” AM Strategy that addresses trade-offs amongst Sub-Program elements.

Additionally, the AMIT will be involved in the development of all AM Strategies and work to ensure consistency in objectives, metrics, and monitoring amongst multiple AM Strategies.

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Appendix A: Missouri River Recovery Program Roles and Responsibilities

The following sections describe the structure, roles and responsibilities for groups and individuals within the MRRP.

1. MRRP Program Managers, Sub-Program Managers, Project Managers, and Other Leads

1.1 MRRP Senior Program Manager (SPgM): The SPgM oversees implementation of the MRRP and other WRDA authorized programs in the Missouri River Basin that affect or are a result of MRRP activities consistent with USACE policy (*i.e.*, MRERP, MRRIC, Yellowstone Intake). The role of the SPgM is to ensure successful implementation of the overall program through communication of the USACE strategic vision and relevant guidance to all internal and external MRRP team members and stakeholders. The SPgM ensures consistency of messages from and through all subprograms (Implementation and IP&S) and projects to stakeholders, states and Tribes, and works to ensure that these relationships are maintained. The MRRP SPgM is responsible for coordination of MRRP with the ESC and all subprograms/projects, and serves as the lead of the MRRP Program Managers Team. The SPgM assigns budgets and tasks for communications, outreach, and tribal consultation. The SPgM also provides direction and guidance to the subprogram managers and project managers (PMs); the SPgM does not manage the subprogram or the projects. The role of the SPgM is to coordinate efforts between Sub-Programs and projects to ensure that actions and communication are consistent with programmatic goals.

1.2 MRRP Sub-Program Managers and Project Managers

1.2.1 MRERP Project Managers

The MRERP PMs are members of the SPDT. The primary responsibility of the MRERP PMs is to conduct the study authorized in Section 5018 of WRDA 2007. Duties of the MRERP PMs are: (1) accomplish the MRERP study with involvement from basin stakeholders, Tribes, and the Cooperating Agency Team, and in consultation with the MRRIC; (2) accomplish the MRERP study in accordance with USACE policy and applicable laws and policy; (3) develop and evaluate alternatives and as appropriate, identify a preferred plan which results in a Record of Decision (ROD) for the USACE; and (4) establish and manage all aspects of the MRERP study in accordance with the MRERP PgMP and in coordination with the MRRP.

1.2.2 MRRIC Project Manager

The MRRIC PM implements the MRRIC with federal, tribal, and state partners and stakeholders using an AM approach. The MRRIC PM is a member of the SPDT, coordinator of USACE MRRIC internal processes (*i.e.*, coordinating efforts within the USACE, including the vertical team and with the Federal Working Group [FWG]). The critical outputs of the MRRIC PgM are: (1) ensure the establishment of MRRIC with the support of basin stakeholders, agencies, and tribes; (2) sustain MRRIC, once established; (3) develop and use the PgMP for the MRRIC effort; and (4) coordinate MRRIC with MRERP and the MRRP Program and Project Managers.

1.2.3 Implementation Program Managers

The IPgMs are members of the MRRP Program Managers Team and direct the SWH and ESH PMs. The MRRP IPgMs are responsible for implementing the MRRP Habitat Creation Programs in their respective USACE districts. This includes all work to identify, plan, construct, track, and report accomplishments of the habitat creation program including meeting habitat construction goals (*i.e.*, identifying future work; maintaining relationships with stakeholders, states and Tribes; setting and tracking real estate acquisition priorities in coordination with IP&S PgMs; and completing and updating PMPs for individual sites). The IPgMs are responsible for assignment of team members and PMs/site managers as appropriate to achieve goals and position the MRRP strategically for meeting future habitat benchmarks. The IPgMs also assign budgets and tasks for annual design-construction work plans for habitat creation. From a Program perspective, the IPgMs have additional responsibilities as well. The IPgMs are responsible for tracking and reporting of overall MRRP funding through close coordination with other team members and the MRRP Program Managers Team. The IPgMs track budgets in their respective districts and coordinate annual budget reporting based on input from MRRP Program Managers Team. Additionally, the IPgMs are responsible for the development and implementation of an annual work plan (and associated budget) integrated between the districts. The IPgMs also provide input to the three-year budget requests and five-year Program plans developed by the SPgM. The IPgMs collaborate and maintain relationships with stakeholders, states and Tribes, including support to MRRIC. They also attend and report at PRC, PRB, and Mitigation ACT meetings, as appropriate and needed in each district.

1.2.4 Shallow Water Habitat Project Managers

The SWH PMs are members of the SPDT and are directed by the IPgMs. The SWH PMs have the primary responsibility of coordinating SWH habitat creation projects. SWH projects are managed by a PM from each district who collaboratively work together to execute projects. These PMs utilize resources in both the USACE Planning and Civil Works Branches when subject-specific expertise is required (*i.e.*, Planning assists with the reconnaissance-feasibility phase while Civil Works assists during the design-construction phase of project implementation). The SWH PMs provide efficient lifecycle management and effective leadership, coordination, scheduling, and execution of SWH projects. They deliver quality products and projects, as scheduled, within approved budgets. The SWH PMs work together to produce a broad-based plan of viable SWH projects for consideration in the three year budget requests and five year program plans; once this list of project is approved, the PMs work together to execute all approved projects. The SWH PMs are responsible for executing all reconnaissance-feasibility (NEPA compliance, project implementation reports [PIRs], site conceptual plans) and design-construction (real estate acquisition, plans and specifications, construction and O&M) requirements within the approved execution schedules as identified by the MRRP Program Managers Team. The SWH PMs are responsible for development of individual habitat development site PMPs as well as O&M manuals for each. The SWH PMs are responsible for collaborating and maintaining relationships with stakeholders, states and Tribes, including support to MRRIC. In addition, SWH PMs lead the SWH PDT which is responsible for developing and updating the SWH AM Strategy and developing content for the SWH Annual AM Report with assistance from the AMWG.

1.2.5 Emergent Sandbar Habitat Project Manager

The ESH PM (NWO) is a member of the SPDT and is directed by the IPgMs. The ESH PM has the primary responsibility of coordinating ESH habitat creation projects. The ESH PM utilizes resources in both the USACE Planning and Civil Works Branches when subject-specific expertise is required (*i.e.*, Planning assists with the reconnaissance feasibility phase while Civil Works assists during the design-construction phase of project implementation). The ESH PM provides efficient life-cycle management and effective leadership, coordination, scheduling, and execution of ESH projects. The ESH PM delivers quality products and projects, as scheduled, within approved budgets. The ESH PM produces a broad-based master plan of viable ESH projects for consideration in the three-year budget requests and five-year program plans; once this list of project is approved, the PM executes all approved projects. The ESH PM is responsible for executing all reconnaissance-feasibility (NEPA compliance, PIRs, site conceptual plans) and design-construction (real estate acquisition, plans and specifications, construction and O&M) requirements within the approved execution schedules as identified by the MRRP Program Managers Team. The ESH PM is responsible for development of individual habitat development site PMPs as well as O&M manuals for each. The ESH PM is responsible for collaborating and maintaining relationships with stakeholders, states and Tribes, including support to MRRIC. In addition, the ESH PM leads the ESH PDT which is responsible for developing and updating the ESH AM Strategy and developing content for the ESH Annual AM Report with assistance from the AMWG.

1.2.6 Integrated Planning and Science Program Managers

The IP&S PgMs are members of the MRRP Program Managers Team and are responsible for the direction and coordination of the Integrated Science Program (ISP), MRERP, MRRIC and AM. In coordination with their team including the IS PM, the IP&S PgMs are responsible for the direction and coordination of the ISP and approval of the ISP annual and long-term budget. The IP&S PgMs also ensure the ISP budget is aligned with MRRP Programmatic goals and support Program execution. They are responsible for scheduling, tracking, and reporting on ISP tasks on an annual basis and ensuring that ISP develops PMPs when required.

The IP&S PgMs have many responsibilities from the program perspective. They are responsible for the development and oversight of strategic initiatives to meet MRRP requirements and USACE Planning Principles and Guidelines. This includes development of programmatic NEPA documentation and PIRs. The IP&S PgMs are responsible for assigning budgets and tasks for NEPA compliance and annual BiOp reporting, including development of the Annual BiOp Report and tracking of annual success metrics. Additionally, the IP&S PgMs provide direction and oversight to MRERP in close coordination with the MRERP PMs and facilitate development and execution of AM for MRRP. The IP&S PgMs are responsible for the development and implementation of the annual work plan and budget integrated between the districts. They provide input to the three-year budget requests and five-year program plans developed by the SPgM. The IP&S PgMs collaborate and maintain relationships with stakeholders, states and Tribes, including support to MRRIC. They also attend and report at PRC, PRB, and Mitigation ACT meetings, as appropriate and needed in each district.

1.2.7 Integrated Science Project Manager

The IS PM is a member of the SPDT and is responsible for implementation of ISP and its associated budget through close coordination with the IP&S PgMs. The IS PM assists in the development and implementation of the annual ISP budget, including coordinating ISP budget requests. The IS PM implements the research, monitoring, and evaluation requirements for the BiOp and the Mitigation Program in both USACE districts. The IS PM is the technical coordinator for scientific knowledge relative to pallid sturgeon, piping plover, and least tern life history, range-wide recovery activities, and the link to MRRP programs and projects. The IS PM ensure that scientific findings are integrated with the IP&S planning initiatives, shared at conferences, included in reports, and shared via staff integration and participation on Product Delivery Teams (PDTs). The IS PM provide scientific data, analysis, and interpretation that are critical to the planning, design, construction, and operation of MRRP projects; this also includes the development and implementation of independent review of the science process utilized by the ISP to ensure the data and scientific findings are credible and defensible. The IS PM, through close coordination with IP&S PgMs, issues project taskers, charters PDTs, ensure PMPs are developed for ISP work efforts, and assists with the development and implementation of the MRRP AM process.

1.2.8 Adaptive Management Process Managers

The AM Process Managers are members of the SPDT and are responsible for establishing the MRRP AM Process that will be used in the MRRP and integrating this process into ongoing program activities. The AM Process Managers will accomplish this work through the Adaptive Management Integration Team (AMIT), which consists of the AM Process Managers as well as the ISP Applied Science Coordinator and a USFWS Liaison. This group will ensure consistency in the integration and implementation of this process across the MRRP. The AM Process Managers operate in a matrixed environment and coordinate closely with the IP&S PgMs and the IS PM. The AM Process Managers are responsible for coordinating with the MRRP subprograms (*e.g.*, MRERP, MRRIC, Implementation, ISP, etc.) to ensure the AM process is incorporated into all phases of MRRP implementation. While the IS PM provides scientific monitoring and research results for the T&E species and their respective habitats addressed under the BiOp, the AM Process Managers will assist PDTs in the analysis and assessment of this data to ensure information is provided in a format that is easily accessible and understood by members of the SPDT, MRRP Program Managers Team and other managers (*e.g.*, ESC, RRP etc.) for prioritization of future activities and adjustments to program/project planning and operations and to inform the development of the Annual Work Plan. The AM Process Managers lead the AM Work Group (AMWG), which consists of experts in model development, ecology, engineering, socioeconomics and other disciplines, and will work with PDTs in the development of AM Strategies and coordination of these Strategies across agencies, states, Tribes, stakeholder groups, and the public. The AM Process Managers are responsible for coordination of the AMWG and will provide updates to the SPDT and MRRP Program Managers Team and other decision-makers as necessary. The AM Process Managers are responsible for: (1) development of MRRP AM process including production of a MRRP AM Process Framework and Technical Guide; (2) coordination of AM information and education , including training and development of communication tools; (3) coordination of AM amongst the ISP, MRERP, and MRRIC; (4) integration of AM at the programmatic scale for the MRRP (5) integration of AM principles into the project planning process including development of AM Strategies and site-specific plans that

will be incorporated into PIRs; (6) assistance to PDTs in the implementation of the AM process by conducting analysis and assessments of data collected, and development and documentation of recommendations for decision-makers.

1.2.9 Missouri River Basin Water Management Representative

The Missouri River Basin Water Management Representative (WM Representative) serves as the interface between the MRRP and the NWD Missouri River Basin Water Management Division (MRBWMD). Providing or limiting flow changes on some Missouri River reaches and limiting some of the reservoir water surface elevation changes provide benefits for the pallid sturgeon, interior least tern, and the piping plover. The MRBWMD regulates the Mainstem Reservoir System to provide benefits to its many authorized project purposes, including fish and wildlife. The WM Representative is responsible for reporting to SPDT on any issues addressing water management decisions and their potential impact on the program. Specifically, the WM Representative is concerned with the issue of habitat availability and allowed take. The WM Representative makes recommendations to the SPDT and the Chief of Water Management on strategies to avoid or minimize take and to provide information on water management forecasting (effects of the Annual Operating Plan [AOP]) in coordination with the ISP.

1.2.10 PM for Other Congressionally and WRDA Directed Work (e.g. Yellowstone Intake)

As of February 2010, Yellowstone Intake is the only other Congressionally and WRDA directed work (PMs for other projects can be added in the future as they are implemented). The USACE and the Bureau of Reclamation are proposing construction, operation, and maintenance modifications to the Intake Diversion Dam. The PM for Yellowstone Intake will serve as a liaison to the MRRP and provide project updates as necessary.

2. Representatives from USACE Branches/Divisions

2.1 Office of Counsel Representative

An Office of Counsel (OC) Representative is appointed by NWD and works with District OC staff (both NWK and NWO) to address intra-district and inter-district MRRP-related issues. The OC Representative provides guidance and advice on all legal matters related to administration and implementation of the program.

2.2 Real Estate Division Representative (NWK and NWO)

The RE Division is responsible for the acquisition, management and disposal of real property in support of MRRP. RE Representatives work primarily with the IPgMs in support of land acquisition and management as it relates to the habitat development program (ESH, SWH, cottonwoods and other mitigation habitats). RE Representatives provide expertise in real estate requirements, project cost estimating and funds control, mapping, appraisal, acquisition, and management and disposal of real property.

2.3 Hydrologic Engineering Division Representative (NWK and NWO)

The ED-H provides engineering and technical design and support to the MRRP. Expertise includes water resources engineering and science including hydraulics, hydrology, water quality/control, flood plain/flood risk management and flood damage reduction, navigation, sedimentation, and environmental restoration. The ED-H Representative will serve as the interface between water resource engineering and MRRP implementation.

2.4 Construction Division Representative (NWK and NWO)

The CD provides construction management services for the MRRP, including the use of state-of-the-art technology and innovative construction practices to manage and build efficient, safe and sustainable projects. The CD Representative will provide a construction perspective to program implementation, especially as it relates to management and implementation of construction at project sites (in support of habitat development projects) as well as other tasks including construction at Yellowstone Intake Dam.

2.5 Operations Division Representative (NWK and NWO)

The OD oversees civil works infrastructure (including operational aspects of the MRRP) and provides flood damage reduction, navigation, hydroelectric generation, environmental stewardship, recreation, emergency management, and a regulatory program. The OD is also responsible for maintenance of the six multipurpose dams on the Missouri River. The OD Representative acts as a liaison for operations as MRRP implementation proceeds.

2.6 Program Controls Representative (NWK and NWO)

The Program Controls Representative provides expertise on all aspects of MRRP program controls including budgets, schedules, reporting, change control, acquisition, and the administrative record.

2.7 Communications Representative (NWK and NWO)

The Communications Representative is responsible for internal and external communication within the MRRP.

2.8 Information Data Management Representative (NWK and NWO)

The Information Data Management (IDM) Representative provides an information data management perspective including knowledge of program and geospatial data management. This includes understanding of IDA, GIS initiatives, and use of collaboration tools such as WebEx and the program website (www.moriverrecovery.org) to facilitate successful implementation of the MRRP.

2.9 Contracting Division Representative (NWK and NWO)

The CT Division provides contracting services to all aspects of the MRRP including construction and architecture-engineering (A-E) services, and provides guidance and advice on the use of contracting tools (purchase orders, awards, indefinite delivery) to ensure implementation of the program is on schedule and within budget. The CT Division Representative will serve as a conduit for contracting information during implementation of the program.

2.10 ISP Applied Science Coordinator: The Applied Science Coordinator serves on the AMIT as the primary liaison between ISP staff and the AMIT. Other responsibilities include reporting on AM related activities, coordination of AM process and products, and managing contracts needed for development of AM products.

2.11 Northwestern Division Missouri River Water Management AM Lead: Represents WM perspective and expertise on the AMWG and serves as a liaison between the AMWG and WM on issues regarding reservoir operations.

2.12 Engineering AM Lead: Represents Engineering perspective and expertise on the AMWG and serves as a liaison between the AMWG and USACE Engineering staff.

2.13 Aquatic Science Coordinator: Responsible for coordinating ISP activities associated with fish, water quality, and other aquatic resources.

3. USFWS Missouri River AM Lead: Serves on the AMIT as the USFWS primary lead on AM. Coordinates the AM Process and Products, including Strategies, Plans and Annual AM Reports, with other individuals in the USFWS.

4. Groups, Teams, and Committees

4.1 Missouri River Regional Review Panel (RRP): The RRP was chartered by the NWD with the purpose of ensuring conformity to broad program objectives and strategic goals in the Missouri River Basin. The RRP determines the strategic direction, overarching guidance, advocacy, and leadership for the MRRP, Missouri River system operations, and other basin-wide programs. The meetings are scheduled on a semi-annual basis or more frequently as issues require. The RRP addresses all civil works issues, not just those related to the MRRP. Specifically, the RRP has the following responsibilities:

- Advocate for Missouri River Recovery Program (MRRP), Missouri River Ecosystem Restoration Plan (MRERP), Missouri River Authorized Purposes Study (MRAPS), and basin programs with Headquarters and Assistant Secretary of the Army for Civil Works
- Set strategic direction for basin programs
- Remove identified obstacles to success
- Communicate important MRRP, MRERP, MRAPS, system operation, and strategic direction, messages nationally and to other agencies
- Determines agency representation and positions at Missouri River Basin Interagency Roundtable (MRBIR), Missouri River Recovery Implementation Committee (MRRIC), and other key basin meetings
- Address any proposed scope changes to the Missouri River Biological Opinion
- Resolve conflict with agencies and Tribes as well as regional issues (e.g.; spring pulse, reservoir and pool issues, recovery actions) not settled at executive steering committee
- Review and approve subordinate committee charters (e.g. ESC charter)
- Receive periodic updates on program and project status/issues

Members of the RRP include:

- NWD Commanding General (Chair of the RRP)
- NWD Director of Programs
- District Commanders (NWO and NWK)
- Deputy District Engineer for Project Management (DPM) (NWO and NWK)

Appendix A

- Special Assistant, Programs Directorate, Missouri River Programs

Project Team Members of the RRP include:

- Chief of Planning, Environmental Resources, and Fish Policy and Support Division (NWD)
- Chief of Civil Works Branch (NWO and NWK)
- Chief of Planning Branch (NWO and NWK)
- Office of Counsel (NWK and NWD)
- Chief of Missouri River Basin Water Management

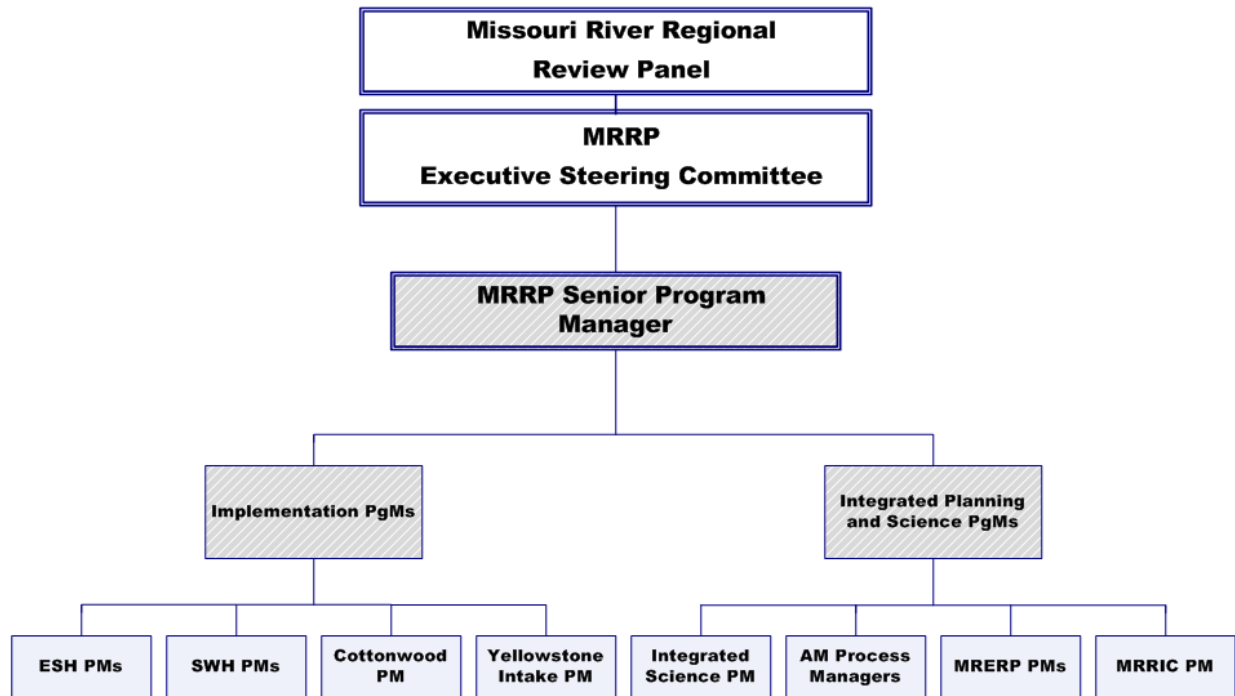
4.2 Missouri River Executive Steering Committee (ESC): The ESC ensures a regional approach is used for Missouri River mitigation, recovery, restoration, and water management activities. The ESC also provides programmatic direction and guidance, regional-level accountability, district-level responsibilities, and decision-making authority for the MRRP. The primary responsibility of the ESC is to provide the MRRP with oversight and formal cross-district decision-making on the overall direction of the program. The ESC meets quarterly or more frequently as issues require (usually the third Tuesday of November, February, May, and August). Specifically, the ESC has the following responsibilities:

- Establish and revise, as appropriate program goals and objectives
- Provides guidance and direction on implementation of program(s) to achieve program goals and objectives
- Resolve interdistrict/interagency conflicts in support of regional operation
- Serve as change control board for high level-scope and priority issues
- Liaison with the Missouri River Regional Review Panel
- Determines agency representative(s) at key basin meetings
- Receive regular science and program status briefings

The ESC is composed of the following members:

- Deputies for Program Management (DPM) (NWK, NWO), Co-chairs
- Chiefs, Civil Works Branch (NWK, NWO)
- Chiefs, Planning Branch (NWK, NWO)
- Chief, Planning, Environmental Resources, and Fish Policy and Support Program (NWD)
- Chief, Missouri River Basin Water Management
- Special Assistant, Missouri River Programs (NWD)

Figure 1. Relationships Between MRRP Programs, Managers, and the Executive Steering Committee



4.3 Missouri River Recovery Program Managers Team: The MRRP Program Managers Team serves as an advisory group to the ESC. The MRRP Program Managers Team is the group charged with leading program execution (implemented at the Senior Product Delivery Team [SPDT] level), providing status and recommendations to the ESC regarding program direction, planning, and execution, and providing direction and guidance to the Senior PDT (SPDT).

The MRRP Program Managers Team is composed of the following members:

- Senior Program Manager (SPgM)
- Implementation Program Managers (IPgMs) – both NWO and NWK
- Integrated Planning and Science Program Managers (IP&S PgMs) – both NWO and NWK
- Office of Counsel (appointed by NWD)
- Project Leads (as agenda necessitates)

4.4 Missouri River Recovery Program Senior Product Delivery Team: The role of the SPDT is to coordinate the activities of the programs and projects within the MRRP. The MRRP Program Managers Team provides leadership and guidance to the SPDT. PgMs (Implementation and IP&S) coordinate efforts between projects but do not manage them; PMs manage projects. Cross-district decisions will be made by the ESC and resolution of conflicts will occur at the lowest possible level beginning with the SPDT and the MRRP Program Managers Team. For administrative purposes, members of the SPDT can be parsed into two groups: (1) PgMs/PMs of MRRP subprogram and projects; and (2) representatives from different USACE Branches/ Divisions. All members are invited to SPDT meetings.

Appendix A

Program Managers and Project Managers

- MRRP Senior Program Manager
- MRERP Project Managers (NWO and NWK)
- MRRIC Project Manager
- Implementation Program Managers (NWO and NWK)
- SWH Project Managers (NWO and NWK)
- ESH Project Managers (NWO and NWK)
- Integrated Planning and Science Program Managers (NWO and NWK)
- Integrated Science Project Manager
- AM Process Managers (NWO and NWK)
- Missouri River Basin Water Management Division (MRBWMD) Representative
- PM for other Congressionally and WRDA Directed Work (*i.e.*, Yellowstone Intake)

Representatives from USACE Branches/Divisions

- Office of Counsel (appointed by NWD) Representative
- Real Estate (RE) Representative (NWK and NWO)
- Hydrologic Engineering Division (ED-H) Representative (NWK and NWO)
- Construction Division (CD) Representative (NWK and NWO)
- Operations Divisions (OD) Representative (NWK and NWO)
- Program Controls Representative (NWK and NWO)
- Communications Representative (NWK and NWO)
- Information Data Management (IDM) Representative (NWK and NWO)
- Contracting (CT) Representative (NWK and NWO)

4.5 Adaptive Management Process Oversight: The following USACE staff members provide senior leadership and guidance on AM and MRRP; act as liaisons on higher-level coordination of AM-related decisions, budget development, and prioritization of efforts.

Members:

- Omaha District Integrated Planning and Science Program Manager
- Kansas City District Integrated Planning and Science Program Manager
- Integrated Science Project Manager

4.6 Adaptive Management Integration Team (AMIT): This inter-agency team is responsible for developing the AM Process, the strategy for integrating the process throughout the MRRP, leading the Adaptive Management Work Group (AMWG) and ensuring consistency in the application of the process and documents.

Members of the AMIT:

- Omaha District AM Process Manager
- Kansas City District AM Process Manager
- ISP Applied Science Coordinator
- US Fish and Wildlife Service Missouri River AM Lead

4.7 Adaptive Management Work Group (AMWG): This interagency team assists Program and Project Managers (PMs) and Product Delivery Teams (PDTs) in the development and implementation of AM Strategies, plans and Annual AM Reports. The AMWG is made up of Federal and State agencies, academics and consulting expertise. AMWG works with PDTs, PMs and ISP staff on analysis and assessment techniques to build in-house capability to perform analyses.

Members of the AMWG:

- All AMIT Members
- Northwestern Division Missouri River Water Management AM Lead
- Engineering AM Lead
- AM Process Experts
- Model Development Experts

4.8 Integrated Science Program Management Team: This team coordinates monitoring and research activities associated with the MRRP and provides technical analysis of recovery activities. The purpose of the ISP is to: 1) provide support to the MRRP in meeting its goals and purposes by applying an integrative system perspective to the planning and implementation of the program, 2) conduct scientific and technical evaluations and analysis to improve the MRRP's success, and 3) communicate and coordinate the results of these evaluations. The ISP MT is also responsible for issuing recommendations to the SPDT and the ESC as to the level of funding needed for monitoring and research and the priorities for the various efforts. Thus, decisions about which monitoring and research efforts are conducted on an annual basis, and the justifications for these efforts, are the responsibilities of the ISP MT. Members include the following:

- Integrated Planning and Science Program Manager (Omaha and Kansas City Districts)
- Integrated Science Project Manager
- Adaptive Management Process Managers (Omaha and Kansas City Districts)
- Aquatic Science Coordinator, Omaha District Threatened and Endangered Species Section

4.9 Product Delivery Teams (PDTs): Product Delivery Teams are managers, staff and external partners (agency and stakeholders) involved in implementing a particular RPA element, such as the Emergent Sandbar Habitat PDT, or Shallow Water Habitat PDT. Project PM's (ESH PM, SWH PDT) use PDT's to develop program direction and actions. The AMIT and AMWG will work with project PDTs to develop and implement AM Strategies and Plans.

4.10 Cooperating for Recovery Team (CORE): The CORE Team is comprised of USACE and FWS staff and makes management and policy recommendations to implement the MRRP and will provide oversight and guidance related to adaptive management, unless expressly elevated to appropriate leadership within the USACE and USFWS. The CORE Team will provide review and recommendations on prioritization of MRRP budgets and MRRP activities and criteria. As part of an annual review of MRRP implementation and accomplishments, the CORE Team will provide recommendations on draft budgets and work schedules for staff necessary for

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implementation of the MRRP for a three year budgetary cycle in coordination with the MRRP Senior Product Delivery Team (SPDT) and the USACE Executive Steering Committee.

Members of the CORE Team:

USACE:

- MRRP Senior Program Manager
- MRERP Project Managers (Omaha and Kansas City Districts)
- MRRIC Project Manager
- Implementation Program Managers (Omaha and Kansas City Districts)
- Integrated Planning and Science Program Managers (Omaha and Kansas City Districts)
- Integrated Science Project Manager
- Missouri River Basin Water Management Representative
- Adaptive Management Process Managers (Omaha and Kansas City Districts)

USFWS:

- Missouri River Coordinator
- Geographic Supervisor
- Integrated Science Program Lead
- MRRIC Lead
- MRERP Lead(s)
- Adaptive Management Lead
- Tern/Plover ESH Lead
- Pallid Sturgeon Recovery Lead
- BSNP Fish and Wildlife Mitigation lead (CMFO) Columbia, MO Ecological Services

4.11 Missouri River Recovery Implementation Committee (MRRIC): The MRRIC is made up of the various Federal, State, and Tribal governments and various stakeholders with interest in the Missouri River Basin representing different social, economic, historical, and cultural interest and issues such as; flood control, irrigation, agriculture, internal drainage, water supply, water quality, navigation, hydropower, science, natural resources, conservation, and recreation. The MRRIC was authorized by Section 5018 of the 2007 WRDA to provide guidance and recommendations to the Secretary of the Army on a study of the Missouri River and its tributaries and on the existing Missouri River recovery and mitigation plan. Aside from the PDTs, outside stakeholders will be engaged primarily through the MRRIC in the development and implementation of AM Strategies.

4.12 Federal Working Group (FWG): The FWG consists of staff of federal agencies who are members of the MRRIC. They were appointed by the federal executives of the MRBIR. The FWG seeks to develop a unified and consistent position regarding Federal agency endorsement of substantive MRRIC recommendations.

4.13 Agency Coordination Team (ACT): The ACT consists of representatives from State and Federal fish and wildlife agencies within the four-state area affected by the MRRP; Iowa,

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Kansas, Nebraska, and Missouri. The ACT was formed to provide a forum for consistent and effective communication, coordination, and issue resolution among the agencies regarding site projects implemented within the BSNP Mitigation Project. The members of this group are the authorized fish and wildlife experts from their respective State and Federal agencies. On certain projects, the ACT may also be directly engaged as an additional outside stakeholder group.

Appendix B: Missouri River Recovery Program Authorities, Mandates and Guidance

The following discussion of the MRRP Authorities, Mandates and Guidance is adapted from Section 1.3 of the MRRP PgMP.

1.3 Authorities, Mandates, and Guidance

The following points describe the authorities, mandates, and guidance for the MRRP. The initial authority for the MRRP is the Mitigation Program, derived from WRDA 1986 and amended by WRDA 1999. Additional authority specific to the MRRP was provided by WRDA 2007. The MRRP's primary focus is compliance with the 2003 amended BiOp.

1.3.1 Authorities

1.3.1.1 Fish and Wildlife Coordination Act of 1958

This Act provides authority to modify projects for the enhancement of fish and wildlife populations.

1.3.1.2 U.S. Army Corps of Engineers Missouri River Mainstem Master Water Control Manual

The Missouri River Mainstem Master Water Control Manual (Master Manual) provides guidelines for the regulation of the six major USACE dams on the river, their associated reservoirs, and the downstream reaches of the mainstem river. Section 9 of the 1944 Flood Control Act authorizes the mainstem to be regulated for the purposes of flood control, navigation, irrigation, hydropower, water supply, water quality, fish and wildlife preservation, and recreation. The Master Manual addresses these uses while ensuring that the resulting regulation complies with other federal acts such as the Clean Water Act (CWA), National Environmental Policy Act (NEPA), and Endangered Species Act (ESA). Water control manuals have been prepared for each of the six mainstem projects; therefore, the Master Manual's purpose is to ensure the regulation of the six projects is integrated to remain effective in meeting the project purposes. Specifically relevant to future restoration efforts on the mainstem, the Master Manual also addresses spring pulses from Gavins Point Dam, regulation options during the nesting season for the least terns and piping plovers, and intra-system unbalancing criteria. The Master Manual was first published in 1960 with revisions in 1973, 1975, 1979, 1989 and 2006.

1.3.1.3 Section 216 of the Flood Control Act of 1970

This Act authorizes the USACE to review the operation of completed federal projects and to recommend modifications due to changed conditions and for improving the quality of the environment in the public interest.

1.3.1.4 Missouri National Recreational River

The USACE, who shares jurisdiction with the National Park Service over the Missouri National Recreational River segments, is authorized to construct features necessary to support the values

for which the river was designated. This includes fish and wildlife preservation for a 59-mile section of the Missouri River from Gavins Point Dam, South Dakota to Ponca State Park, Nebraska, as authorized by a 1978 amendment to the National Parks and Recreation Act (Public Law [PL] 95-625) that amended the Wild and Scenic Rivers Act of 1968 (PL 90-542). An additional 39 miles of the Missouri River below Fort Randall Dam to Running Water, South Dakota were included in 1991 (PL 102-50).

1.3.1.5 Water Resources Development Acts of 1986, 1988, 1996, and 1999

The Mitigation Program is focused on fish and wildlife management during construction of the BSNP and will be completed as authorized. The Mitigation Program is originally authorized under Section 601(a) of WRDA 1986. Section 33 of WRDA 1988 directs measures to alleviate bank erosion and related problems associated with reservoir releases along the Missouri River between Fort Peck Dam in Montana and Gavins Point Dam in South Dakota and Nebraska. Section 206 of WRDA 1996 provides for aquatic ecosystem restoration. Section 334 of WRDA 1999 increased the acreage of habitat to be mitigated for the Mitigation Program.

1.3.1.6 Water Resources Development Act of 2007

Section 5018 (S5018) of the WRDA 2007-Missouri River and Tributaries, Mitigation, Recovery and Restoration, Iowa, Kansas, Missouri, Montana, Nebraska, North Dakota, South Dakota, and Wyoming-Subsection (a) directs the Secretary of the Army, in consultation with the MRRIC, to conduct a study of the Missouri River and its tributaries to determine actions required to:

- a) mitigate losses of aquatic and terrestrial habitat;
- b) recover federally listed species under the ESA; and
- c) restore the ecosystem to prevent further declines among other native species.

The study conducted under S5018(a) should identify a single, comprehensive, and integrated plan (*e.g.*, this MRRP PgMP) to guide the implementation of programs associated with mitigation, recovery, and restoration activities in the Missouri River Basin. The study shall be conducted in accordance with Engineering Regulation (ER) 1105-2-100, and should follow a watershed approach consistent with the geographic scope and complexity of issues within the Missouri River Basin. However, the study should not be a broad, multi-purpose effort; rather, its focus should be on addressing opportunities for mitigation of lost aquatic and terrestrial habitat, recovery of ESA listed species, and restoration of degraded aquatic ecosystems.

Subsection (b) of S5018 directs that within six months of enactment of the Act, the Secretary is to establish the MRRIC. The full responsibilities of this committee are set forth in subsections (a) (1) and (b) (3) of S5018. These duties include consultation with the Secretary concerning the study to be conducted under subsection (a) as well as provide guidance to the Secretary with respect to the Missouri River recovery and mitigation plan in existence on the date of the Act's enactment. S5018 specifically exempts MRRIC from the provisions of the Federal Advisory Committee Act (FACA). In July 2008, John Paul Woodley, Jr., Assistant Secretary of the Army for Civil Works,

signed the Implementation Guidance for Section 5018 of the WRDA 2007, thus approving the Charter for MRRIC and establishing the MRRIC. The MRRIC Committee Charter was drafted by a basin-wide multi-stakeholder group facilitated by the U.S. Institute for Environmental Conflict Resolution.

Additionally, S3176, Subsection (a) allows funds made available for recovery or mitigation activities in the lower basin of the Missouri River to be used for such activities in the upper basin of the Missouri River, including the states of Montana, Nebraska, North Dakota, and South Dakota.

1.3.1.7 Other Authorities

There are a variety of other authorities that may be used to develop ecosystem restoration projects. Generally, these authorities require cost-share sponsors and have a limited scope. Nevertheless, the authorities contribute to the overall MRRP and recovery mission and include: Section 22, 1135, 206, 514 programs as well as the USACE General Investigations Program.

1.3.2 Mandates

The following are key mandates that the MRRP has all or some responsibility for executing. It does not include the general mandates and laws that the MRRP must comply with to meet its mission.

1.3.2.1 Section 7 of the Endangered Species Act

Under Section 7 of the ESA, the USACE initiated formal consultation with the Service in 1999 to address the operation of the Missouri and Kansas Rivers. Formal and informal consultation between the USACE and the Service continued until the original BiOp was issued in 2000. The Service found that operation of the system would result in the jeopardy of the piping plover, least tern, and pallid sturgeon. A Reasonable and Prudent Alternative (RPA) was provided to the USACE that would preclude the species from jeopardy. Additionally, the 2003 amended BiOp called for an adaptive management (AM) framework for resource management actions on the Missouri River (*e.g.*, creating spring rises on the lower river, unbalanced intra-system regulation, and habitat restoration, creation, and acquisition).

In 2003, the USACE and the Service reinitiated formal consultation in light of the 2002 designation of critical habitat (under the ESA) on the reservoirs for piping plover and a new report on mortality of least terns and piping plovers. The 2003 amended BiOp also found that USACE management actions for the piping plover and least tern adopted after the 2000 BiOp, if continued, would preclude jeopardy for these two species. However, the USACE action still jeopardized the existence of the pallid sturgeon and the Service issued a RPA. The 2003 amended BiOp acknowledged that changes to Reasonable and Prudent Measures (RPMs) proposed by the USACE would create more acres of habitat for the species.

Appendix C: Adaptive Management Strategy Outline and Technical Guidance

The Adaptive Management (AM) Strategies in the MRRP will follow the process outlined in the Framework and will be developed at the scale of a Sub-Program for a suite of related management actions. The following appendix is an outline that can be used as a basis for developing an AM Strategy. Under each section is a description of the types of information to be included.

1. Introduction

1.1 Overview

Include an overview of the Sub-Program / set of related management actions and the rationale for why an AM approach is warranted. Discuss the goals of the Sub-Program, the scope and scale of the effort.

1.2 Uncertainties

Provide a general overview of the major uncertainties related to achieving the goals of the Sub-Program.

1.3 Strategy Development

Discuss those involved in the development of the AM Strategy and the process through which it was developed.

2 Objectives

Discuss the specific objectives of the Sub-Program or suite of proposed management actions. Objectives should be clear and measurable to ensure that success or failure to achieve them can be documented over time. Each objective should include the “Performance Metric” that will be used to measure progress towards the objective, the “Measurement” or what will be monitored in order to collect the necessary data, and the “Target” or desired result of the performance metric. For objectives that may take a long-time to achieve the desired target, thought should be given to the use of short-term targets as well as longer-term targets to measure success. This may result in the development of a related interim metric.

An example of an Objective for MRRP Emergent Sandbar Habitat Sub-Program that includes an interim metric is as follows:

***Objective:** Increase and subsequently stabilize tern and plover populations*

Performance Metric: Adult population size

Measurement: Annual tern and plover census

Target: Increasing and ultimately stable populations, currently set by Species Recovery Plans at a minimum of 1,139 piping plovers for 15 consecutive years and a minimum of 900 interior least terns for 10 consecutive years

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Interim Metric: Annual population growth rate, λ

Measurement: The growth rate for year t is the population size at year $t + 1$ divided by the population size at year t

Target: When the population size is below target, $\lambda > 1$ indicates a growing population, and therefore a population that is on track to reach the population size target.

This objective, while not specified in the BiOp, is included because directly connecting the relationship between fledge ratios and acreage targets requires information on population size. An interim metric, population growth rate, is included in this objective in order to track progress towards the population size target, and is applicable when the population is below target. If faster progress towards the population size target is desired, a higher value of λ can be specified, while recognizing that population growth rates are expected to decrease over time as populations grow within a set quantity and quality of habitat. In addition, this objective ensures that outcomes predicted by the AM Strategy can be related to the Species Recovery Plans. The population estimate is conducted at the system scale and will also be used to calibrate a numerical population model.

3 Management Actions

Discuss the suite of potential management actions, their relationship to the stated objectives, cost of the action, the benefits associated with the action, and the management considerations / uncertainties related to either implementation of the action or achievement of the objectives. Actions should be separated into the primary management actions employed by a Sub-Program (such as project types, design and construction methods) and potential adaptive management actions intended to improve project performance over time.

3.1 Primary Management Actions

Describe the suite of primary management actions that will be taken to meet the objectives of the Sub-Program. This could include habitat types to be restored, construction methodologies, project features or any other major project type taken to implement the Sub-Program.

3.2 Potential Adjustments

Describe how projects implemented using the primary management action may be adjusted over time to better meet the stated objectives. This could include the addition of project features, changes to projects, changes to operation of projects, management actions to control outside factors (such as predation), or other similar adjustments.

3.3 Potential Future Management Actions

Describe management actions that are not proposed at this time but may be taken in the future to meet objectives. This could include additional sets of management actions that are being looked at under separate planning studies and factors that are outside of the agencies discretion at the time the AM Strategy is developed.

4 Implementation

4.1 Strategy(s)

Describe the AM Strategy(s) that will be used to implement the Sub-Program over time. Include any conceptual models related to implementation. Include a discussion of when adjustments may be made and when the Planning phase may be reinitiated.

4.2 Implementation cycle

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Describe the time frame in which monitoring data, through analysis and assessments, is translated into management recommendations for the development of the annual work plan

4.3 Responsible Parties

Discuss the group or groups that will be responsible for implementing the AM Strategy(s).

5 Monitoring and Investigations

5.1 Selected Performance Metrics and Targets

Include a table summarizing the metrics and targets related to each objective as discussed in the Objectives section.

5.2 Monitoring

Discuss the plan for collecting the data necessary to measure progress towards the stated objectives / performance metrics. For each discuss the metric, measurement, methodology, relationship to existing monitoring programs (if applicable), collection time and cost. In addition to the text descriptions, the information should be captured in a summary table.

5.3 Investigations

If there are specific scientific investigations that should be conducted in order to reduce uncertainties associated with implementation, they should be captured here. Describe each investigation including its relationship to the objectives, uncertainties, model parameters (if applicable), cost, and time frame.

5.4 Priorities

Rank each monitoring and investigation effort in terms of the information that is of greatest need to implementation of the AM Strategy. Include rationale for the ranking.

5.5 Data Storage and Reporting

Discuss where the data will be stored and if/how it will be reported.

6 Analysis and Assessment

6.1 Analysis Methods

Discuss the methods by which the data collected through monitoring and investigations will be analyzed and compared to performance metrics. This may include a description of any conceptual or numeric models that will be used in analysis.

6.2 Assessment

Discuss how the data analysis will be used to make assessment as to whether a change in implementation strategy or adaptive management action is warranted.

6.3 Frequency of Assessments

Discuss when assessments will be made.

6.4 Documentation

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Describe how and where these assessments will be documented (normally this will be within the Annual AM Report)

7. Decision-making

7.1 Decision-makers

Description of who will be responsible for making the decision to institute a change in implementation strategy or to take an adaptive management action.

7.2 Decision-making Process

Describe the process by which a decision will be reached.

7.3 Reporting on the decision

Describe where the decision will be documented.

Appendix D: Adaptive Management Plan Outline and Technical Guidance

Adaptive Management (AM) Plans will be developed for site-specific projects in the MRRP and will be tied to an existing AM Strategy, if applicable. The following appendix is an outline that can be used as a basis for developing an AM Plan as part of a Project Implementation Report (PIR). Under each section is a description of the types of information to be included.

1. Introduction

Describe the need for monitoring and adaptive management, including any uncertainties associated with achieving the desired project objectives. Reference and summarize any existing AM Strategy that the project may be tied to.

2. Objectives

Reference and summarize existing Objectives, Metrics and Targets from the relevant AM Strategy and discuss any additional site-specific Objectives for the particular project. As with an AM Strategy, any new Objectives listed should be clear and measurable and should include the “Performance Metric” that will be used to measure progress towards the objective, the “Measurement” or what will be monitored in order to collect the necessary data, and the “Target” or desired result of the performance metric.

3. Monitoring

Reference and summarize any existing monitoring programs that will be used to monitor this site-specific project or reference how this project fits within the larger context of monitoring programs identified in the AM Strategy. If new or unique site-specific monitoring is proposed for this project, include a description of the monitoring protocol that will be used, the timeframe for completion and the cost associated.

4. Analysis and Assessment

Reference and summarize the analysis and assessment techniques described in the AM Strategy that are applicable to the specific project being proposed. If new monitoring is being proposed, describe the timeframe and techniques by which the data will be analyzed and used to make a decision whether or not take and adaptive management action at the site.

5. Adaptive Management

Reference and summarize the potential site adjustments described in the AM Strategy as well as any other site-specific adjustments that may be warranted at the specific project being described. Describe the criteria that will determine whether or not an adaptive management action may be taken.

6. Implementation

Describe the teams and/or individuals that will be involved in data collection, analysis and assessment and the ultimate decision of whether or not to adjust the project in the future to better meet the intended objectives.

Appendix E: MRRIC Engagement Approach for the Development and Implementation of Adaptive Management Strategies

The following text is taken from an Engagement Approach approved by MRRIC via a process recommendation on February 15, 2011. Note that the text refers to an “Annual Strategic Review” and an “Annual Strategic Review Document”. This terminology was previously used in the MRRP AM Process Framework but was updated in this version of the document to describe an “Annual Implementation Cycle” and “Annual AM Report”, respectively.

**Development and Implementation of Adaptive Management Strategies
MRRIC Engagement Approach**

Approved by MRRIC on February 15, 2011

I. General Introduction

Adaptive management is an on-going systematic process to improve management actions which requires inclusion of pertinent and current science as well as use of information and experience from all users. Below is a generic timeline and schedule for development and implementation of adaptive management strategies along with the approach for how MRRIC would engage in the strategy development and implementation phases. The exact timeline and schedule for development of each AM strategy will be affected by other factors (e.g., urgency, staffing and workload considerations, involvement of external reviews, schedule for any associated work products) and as such each strategy will include a development timeline at the beginning of the development process.

The engagement approach is intended to:

1. Be understood and trusted by MRRIC members
2. Provide a satisfactory level of participation in the systematic process for MRRIC members as well as provide an opportunity for MRRIC to identify any social, economic, or cultural issues that may result from the proposed action(s)
3. Be implementable for both the agencies and MRRIC
4. Be focused on resolving scientific uncertainties necessary to inform management decisions
5. Provide for collaboration that allows the agencies to implement the MRRP in a timely manner

As described in WRDA Section 5018 (3) (B) (i) “The Committee (MRRIC) shall provide guidance to the Secretary with respect to the Missouri River recovery and mitigation plan in existence on the date of enactment of this Act, including recommendations relating to changes to the implementation strategy from the use of adaptive management.” The engagement approach should be considered the vehicle for the MRRIC, in collaboration with the Corps, to achieve this objective.

In addition, the Charter for the MRRIC includes, as part of the Committee’s purpose and scope [1) a) iii]): “Provide recommendations and guidance that will include:

1. Recognition of local stakeholders' social and economic, historical and cultural, flood control, irrigation, agriculture, internal drainage, water supply, water quality, navigation, hydropower, thermal power, science, natural resources, conservation, and recreation issues, and any other issues identified by the Committee
2. Identification of impacts to stakeholders
3. Identification of actions that will benefit multiple uses of the river
4. Avoidance, minimization, and/or mitigation of adverse impacts

Independent science can be utilized to assist in development and implementation of adaptive management strategies. The USACE has specific guidance to incorporate independent review for planning products (i.e., District quality control, agency technical review, and independent external peer review from Sections 2034 and 2035 from WRDA). In addition, the Independent Science

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Advisory Panel and Independent Science Review processes developed by the MRRIC and the agencies can be triggered as appropriate (and as resources permit).

Under the process laid out below, development of each adaptive management strategy will likely take between 18 and 24 months. Implementation of the strategies will then be an on-going process with annual assessment of the results in order to make adjustments along with periodic (between three and five year) review efforts in order to review trends and consider possible significant changes to the strategy. As more strategies are developed, the timing for the periodic review efforts for each will naturally be staggered across multiple years (i.e., not every strategy will have the more significant review in the same year) which will allow for a balanced effort from the agencies and MRRIC.

II. Strategy Development Phase¹

Below are the steps to be taken in the Strategy Development Phase of the adaptive management process. During Steps 1-5 the MRRIC engagement is proposed to be primarily implemented through a Work Group and the agencies' AM leads. Agencies AM leads will bring their preliminary efforts (developed by participating agencies which will be made up of the Product Delivery Team and an agency Adaptive Management Working Group) to the Work Group for review and feedback throughout those steps. The agency AM leads will take Work Group deliberations back to the participating agencies and then document responses to share with the Work Group.

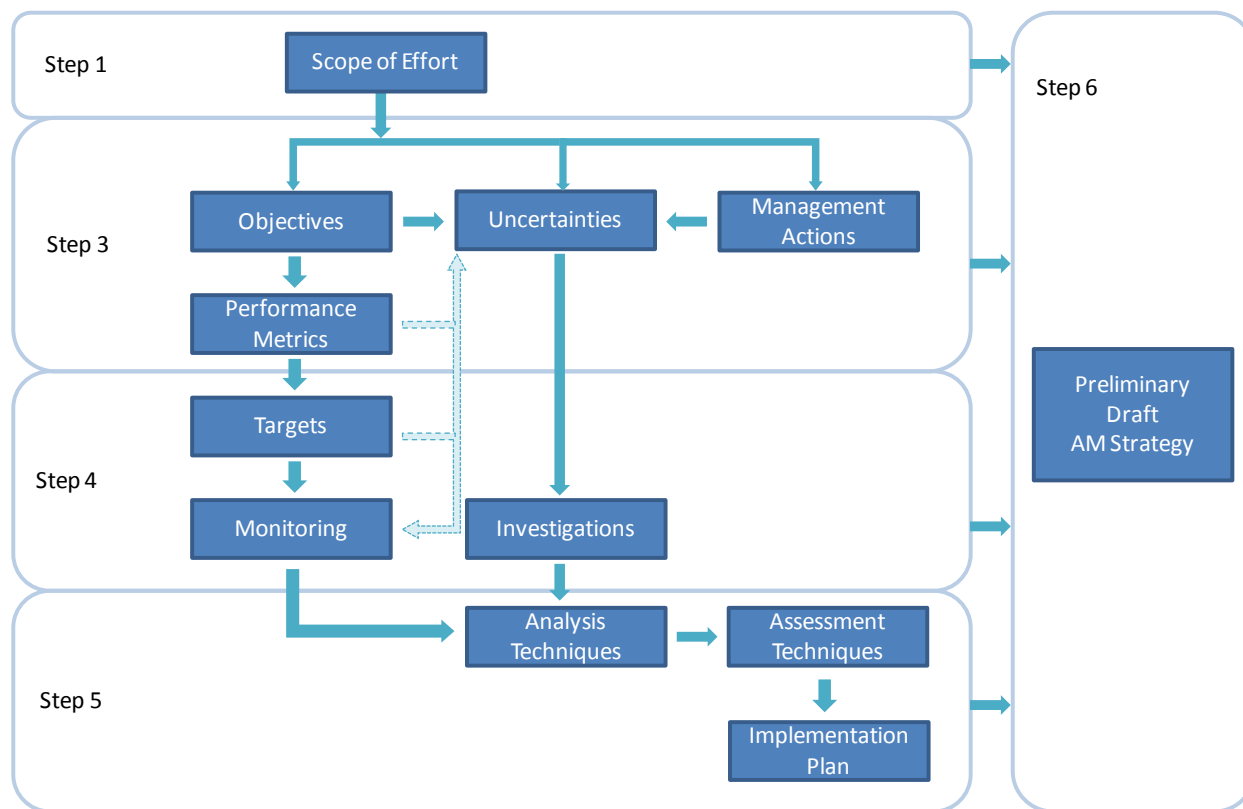
Given the significant level of effort it will take for participating agencies to develop initial drafts it is not intended that the Work Group members will engage in agency meetings. Most interaction between the agency AM leads and the Work Group will be via conference calls, though there may be opportunities for meetings (e.g., if timing allows at a full MRRIC meeting). Throughout these steps, progress updates will be provided to the MRRIC and, if necessary, the Work Group may bring issues back to the MRRIC. Upon completion of the preliminary draft AM strategy (Step 6) MRRIC will be briefed by the agencies' AM leads.

Developing adaptive management strategies requires fairly interactive and timely deliberations. As with other MRRIC Work Group efforts, the Work Group will be providing insights and suggestions along the way without either MRRIC approval, or necessarily even Work Group consensus. At the same time, the approach creates specific opportunities for the full MRRIC to weigh in on the full products following the decision making rules.

The process would enable a sub-set of MRRIC to develop a working knowledge of the MRRP AM Process that will encourage efficient collaboration on AM, while also keeping MRRIC updated on the strategy development progress.

¹ See Figure 1

Figure 1: Flow chart for the development phase of an Adaptive Management Strategy showing relationships between the various strategy elements.



Steps 1-5 – Work Product Development

1. Determine **Scope of Effort** including the **Goal** – Executive Steering Committee Decision with input from Cooperating for Recovery Team, Adaptive Management Integration Team, others²
Approximate Duration: 2-3 months

After the participating agencies meet and prepare the initial scope of effort in draft form, the agencies’ AM leads will share them with the Work Group at least two weeks in advance of a conference call where the Work Group will share their feedback. As noted above, the exact timeline and schedule for each strategy could vary and as such Step 1 will include a proposed development timeline for the specific strategy which will be agreed to by the agency AM leads and the Work Group. Step 1 will also include an assessment of NEPA compliance and the implications for development of the strategy.

In some instances, the Work Group may choose to provide feedback. As such, during the call for initial feedback Work Group members will have the opportunity to determine if they would like to

² Text in **Red** indicates major elements to be included in the AM Strategy being developed; other text in **Bold** indicates key aspects of particular steps.

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provide additional feedback. If so, it would likely require formation of a drafting group to prepare the feedback and to distribute it and have a follow-up phone call to discuss before submitting.³

2. IF NECESSARY: **Identification of Participating Agencies** – Implementation Managers/Project Managers for related efforts will be responsible for identifying the participating agency members to be involved in strategy development

Approximate Duration: Developed concurrent with scope

The Work Group will not be involved directly in the participating agencies' deliberations (as noted above). A list of participating agency members will be provided to the Work Group.

3. Develop draft list of **Uncertainties, Objectives and Metrics, Management Actions, and Potential Adjustments** – 2 to 3 day participating agencies' meeting

Approximate Duration: 3 months

After the participating agencies meet and prepare their draft list, the agency AM leads will share it with the Work Group at least two weeks in advance of a conference call where the participants will share their feedback.

In Step 3, the participating agencies will incorporate an assessment of the possible costs and potential tradeoffs associated with management actions.

4. Develop draft **Targets, Monitoring, and Investigations**; refine previously developed strategy elements – 2 to 3 day participating agencies' meeting

Approximate Duration: 2 months

After the participating agencies meet and prepare their draft targets, monitoring, and investigations (and refinements of the earlier strategy elements), the agencies' AM leads will share them with the Work Group at least two weeks in advance of a conference call where the participants will share their feedback.

In Step 4, the participating agencies will incorporate an assessment of the possible costs and priorities for monitoring efforts and investigations.

5. Develop **Analysis and Assessment Techniques, Implementation Plan**; review previously developed strategy elements – 1 to 2 day participating agencies' meeting

Approximate Duration: 2 months

After the participating agencies meet and prepare their analysis and assessment techniques and an implementation plan (and refinements of the earlier strategy elements), the agencies' AM leads will share them with the Work Group at least two weeks in advance of a conference call where the participants will share their feedback. The implementation plan will also include a proposed timeline for the periodic review (between three and five years – see section III-B below) for consideration.

³ The Work Group will be able to provide feedback in this manner for each step.

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Steps 6-10 – Work Product Review and Input by MRRIC

6. Complete **Preliminary Draft AM Strategy**

Approximate Duration: 2 months

Upon completion of the preliminary draft AM Strategy, the agencies' AM leads will share the draft with the Work Group at least two weeks in advance of a conference call where the participants will share their feedback. In addition, the preliminary draft AM strategy will be presented to the full MRRIC at a meeting or via webinar to provide an opportunity for MRRIC members to raise initial questions and offer perspectives. A summary of the work group deliberations and agency responses during steps 1-5 will be provided to the MRRIC as background information.

7. Internal Coordination and Participating Agency review of Preliminary Draft AM Strategy

Approximate Duration: 1-2 months

The lead Agencies will be working internally to ensure the preliminary draft AM strategy is consistent with policy and with other aspects of the MRRP. Concurrently, the participating agencies will be conducting a review of the preliminary draft document to ensure that it adequately describes the strategy.

Concurrently, the Work Group, using the preliminary draft AM strategy, will have the opportunity to begin developing potential recommendations.

8. Complete **Draft AM Strategy**

Approximate Duration: 1-3 months

The lead Agencies will finalize the first draft AM Strategy and the agencies' AM leads will share the draft with the Work Group. The Work Group will have the opportunity to develop potential recommendations, either through conference calls and/or meetings, to present to the full MRRIC.

9. Coordinate completion of the Draft AM Strategy for public review with MRRIC

Approximate Duration: 2-6 months

The first draft AM Strategy, and any recommendations developed by the Work Group, will be presented to the full MRRIC for consideration at a MRRIC meeting. If MRRIC tentatively approves a recommendation at their meeting that could substantively affect the AM Strategy, release of the final draft for public review will in most cases be deferred until after the next MRRIC meeting to enable final (second) consensus to be reached. MRRIC and the agencies will do everything in their power to meet the project schedule as developed in Step 1. When MRRIC has made a final consensus recommendation, the lead Agencies will utilize the prescribed Charter process in responding to consensus recommendations from MRRIC.

The lead Agencies will also provide to MRRIC any proposed changes to the schedule and plan for public review developed in Step 1. In most cases the lead Agencies' schedule and plan will incorporate opportunity for the MRRIC to reach final consensus following their two-meeting rule prior to release of the draft for public review. As such, in most if not all cases, the lead Agencies will

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consider the recommendations of MRRIC and incorporate changes as appropriate into the draft AM Strategy before releasing the draft strategy for public review.

In cases where MRRIC has reached tentative consensus on a recommendation but the recommendation does not substantively affect the draft AM Strategy, the lead Agencies may consider releasing the draft AM Strategy for public review prior to MRRIC finalizing their recommendation. Also, in certain situations, such as when MRRIC review of the draft AM Strategy has taken longer than allotted for in the agreed upon schedule (Step 1), the lead Agencies may have the need to initiate a public review of a draft AM strategy prior to MRRIC finalizing its recommendation. In such cases the lead Agencies will make this known at a full MRRIC meeting and MRRIC members will have the opportunity to offer comments during the meeting to the lead Agencies on the proposal for moving forward.

If the lead Agencies initiate public review prior to MRRIC finalizing a recommendation, then the recommendation will inherently only be tentative at that point. As such, the lead Agencies will not include any of the tentative MRRIC recommendation in the draft AM Strategy for public review. While the strategy may include a statement regarding the extent to which MRRIC has been involved in development up until this point it will also clearly state that MRRIC has not indicated support for the strategy at this point in time (e.g., MRRIC, through a Work Group and plenary session provided input to the lead agencies during development of the strategy however that should not be interpreted as MRRIC support for the product at this point in time). Regardless, the document will not be characterized in any way as a MRRIC document.

If the lead Agencies initiate public review prior to MRRIC finalizing a recommendation and assuming MRRIC reaches final consensus on their recommendation at the next meeting, the lead Agencies will not finalize the AM Strategy prior to responding to that final MRRIC recommendation.

10. Public Review of Final Draft AM Strategy

Approximate Duration: 2 months

As discussed in Step 9, the lead Agencies will share the draft AM Strategy with the public for the appropriate period of review prior to finalizing the document.

11. Changes to the Draft AM Strategy as a result of the Public Comments

Approximate Duration: 2 months

If the public review process results in proposed changes to the AM strategy by the lead agencies, those proposed changes will be provided to the work group two weeks before a call for discussion. The Work Group may provide feedback during the call and may schedule another call to provide additional feedback on the proposed changes. The results of these conversations will be shared with the full MRRIC.

12. Finalization of the AM Strategy

The Corps will finalize the AM strategy and provide it to the full MRRIC.

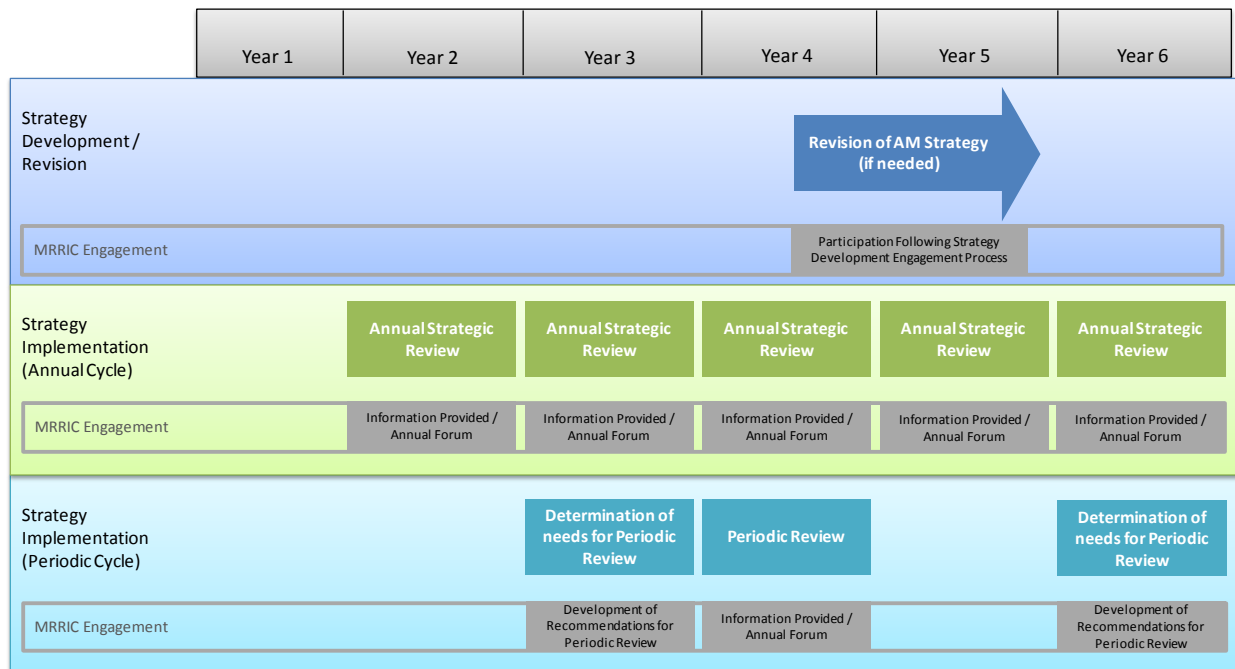
III. Strategy Implementation Phase

Following development of an AM Strategy, the next step is implementation which will be accomplished regularly through an annual strategic review. During this annual review, the participating agencies will focus on conducting analyses of data collected from the previous year’s monitoring efforts, documenting observations, and developing recommendations that will influence development of the Annual Work Plan for the Missouri River Recovery Program. These recommendations could include the amount of habitat to be restored, types of management actions to be implemented, use of pilot projects, changes to previously created sites, or other related recommendations.

Following three to five years of implementation, a periodic review of the AM Strategy will be conducted that will focus on the AM Strategy Elements including Objectives, Performance Metrics, Monitoring, and Management Actions to determine if portions of the AM Strategy should be updated. If it is determined that the AM Strategy should be updated, a scope would be developed to determine the necessary steps, timeframe and engagement process needed in order to accomplish this. It is likely that such an effort would closely mirror the “Strategy Development” process, although it is likely to require less effort and time to complete.

The following figure illustrates an annual and periodic review schedule using a three-year periodic review as an example.

Figure 2: Adaptive Management Strategy Implementation Example: Three-Year Cycle



A. Annual Strategic Review

The following steps will be taken each year to implement AM strategies after they are developed. MRRIC engagement will be focused on tracking progress on an annual basis. While MRRIC will have

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the ability to influence strategy implementation on an annual basis, this is not the primary objective of engagement in the annual cycle. Rather, the objective is to understand the recommendations that may influence the development of the MRRP annual work plan and to prepare for engagement in the periodic review.

1. Call with participating agencies to discuss **data** needs for upcoming meetings (September)

While the data needs are laid out in the AM Strategy, this first meeting will be used to ensure that they data will be gathered and made available in time for Step 2. This call will also be used to establish meeting times and location for Step 2.

2. Meeting with participating agencies to discuss **data, observations, and analyses** to be conducted as part of Annual Strategic Review (Early October)
3. Conduct **analyses** and begin to draft Annual Strategic Review Document (October)
4. Meeting / Call with participating agencies to review analyses and **form recommendations** (Early November)

Recommendations will be based on both observations and the results of data analysis. They are intended to focus on the amount of habitat to be restored, types of management actions to be implemented, use of pilot projects, changes to previously created sites, refinement of monitoring techniques and sites or other related issues.

5. **Preliminary Draft of Annual Strategic Review Document** (November)
6. Participating agency review of Preliminary Draft and Internal coordination [USACE and FWS] (November – December)
7. Complete **Draft Annual Strategic Review (ASR) Document** (January 1)
8. Coordinate Draft ASR with MRRIC (January – March)

The draft ASR will be shared with the appropriate Work Group. The agency AM leads will participate with the Work Group on a conference call to discuss the results of the ASR and implications for both the annual work plan and the agenda for the annual forum.

In some instances, as in the Strategy Development phase, the Work Group may choose to provide feedback. As such, during the call Work Group members will have the opportunity to determine if they would like to provide feedback. If so, it would likely require formation of a drafting group to prepare a response based on the feedback and to distribute it and have a follow-up phone call to discuss before submitting.

9. Update the current MRRP Annual Work Plan and begin to develop the following year's MRRP Annual Work Plan based on recommendations from the Annual Strategic Review Document (January – March)

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Depending on the nature of the recommendations developed during the annual strategic review, minor changes may be made to the current fiscal year MRRP Work Plan and larger scale changes may influence the development of the MRRP Work Plan for the upcoming fiscal year.

10. Finalize document for inclusion with **MRRP Annual Report** (March)

The ASR(s) will be summarized in the MRRP Annual Report which will be distributed to the full MRRIC and presented at the annual forum.

B. Periodic Review⁴

Following three to five years of implementation (depending on the specific strategy), a scheduled periodic review of the AM Strategy will be conducted that will focus on the AM Strategy Elements including Objectives, Performance Metrics, Monitoring, and Management Actions to determine if portions of the AM Strategy should be updated. Other periodic reviews may be added by the agencies or MRRIC if warranted. The following steps describe the process of preparing for and conducting a Periodic Review and the process by which an AM Strategy may be updated based on this review.

1. Determination of Needs/Development of Information for the Periodic Review

Approximate Duration: 12 months

In the year preceding the Periodic Review, the participating agencies will work to determine if special studies, independent review, or other necessary steps should be taken to prepare for the Periodic Review. This process will be initiated during the Annual Strategic Review but will continue throughout the year as needed. The appropriate MRRIC Work Group will receive updates on the participating agencies' anticipated needs as part of the Annual Strategic Review Document and will initiate a review of the AM Strategy to develop potential recommendations. Any recommendations that are developed will go through the full MRRIC. These recommendations will be provided to the participating agencies for consideration during the Periodic Review.

2. Periodic Review

Approximate Duration: 3 months

The Periodic Review will be conducted along with the Annual Strategic Review and follow the same steps [which include interaction with the appropriate MRRIC Work Group], however additional analyses may be conducted based on the determination of needs such as a statistical power analysis of monitoring methods or independent science review. The participating agencies will develop any necessary recommendations for revisions to the AM Strategy to include refinements of objectives, metrics, targets and changes to management actions. The appropriate MRRIC Work Group will receive these agency recommendations and review them to determine if any actions are necessary. Any recommendations developed will go through the full MRRIC. Additionally, the participating agencies will respond specifically to recommendations submitted by MRRIC.

⁴ The engagement approach for the periodic review may be developed more fully as the initial periodic reviews are undertaken.

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There are three potential outcomes of the periodic review:

- No Change: the AM Strategy is still appropriate and does not require revision
- Minor Change: the AM Strategy should be updated to reflect a minor change to a target, monitoring protocol or other similar strategy element.
- Major Change: the AM Strategy Development phase should be re-initiated in full or in part to significantly revise the AM Strategy

3. Revision of AM Strategy

Approximate Duration: Up to 24 months

Based on the outcome of the periodic review, a scope and schedule will be developed for addressing the recommendations. The process will depend upon the nature and scale of the anticipated revisions but will generally follow the Strategy Development process outlined in Section II.