



Comprehensive, Coordinated and Collaborative River Planning and Management

Final Report





Comprehensive, Coordinated and Collaborative River Planning and Management Final Report

1.0 Background

Approximately 11,000 miles of rivers, streams and washes run through Maricopa County. While normally dry, this intricate network of watercourses provides critical floodwater conveyance during storm events, plus riparian habitat for wildlife and recreational open space for area residents. In order to enhance and maintain the benefits provided by these watercourses, the Flood Control District of Maricopa County (District) engaged in an effort to refine its role in river planning and management.

The effort came on the heels of the District’s 2009 Comprehensive Floodplain Management Plan and Program (Plan). The Plan outlines five strategic initiatives designed to enhance the District’s ability to identify, regulate and remediate flooding hazards in the county.¹ The strategic initiatives are designed to ensure that the District has the necessary policies, programs and tools in place to protect Maricopa County residents from the devastating effects of flooding by 2020. Initiative No. 4 calls for the preservation and restoration of the natural resources and functions of floodplains and riparian areas; specifically asking “What should be the District’s role in river management?”

What is C3RPM?

To develop an enhanced river planning and management strategy, District staff adopted a process called C3RPM – Comprehensive, Coordinated and Collaborative River Planning and Management. The core C3 process addresses complex issues with a blend of comprehensive information collection to solicit diverse opinions; a coordinated and deliberative assessment of that information; and a collaborative decision-making system free of bias to promote a consensus result.

C3RPM Goal

The goal of the C3RPM effort was to **define** the District’s role in the management of “rivers” in Maricopa County that would maintain flood conveyance and consider the needs of the community. The C3RPM team defined success as the identification of a menu of activities, programs, and best management practices that would comprise the District’s “role” in river management.

¹ The five initiatives are: 1) Strengthen Role as Regional Leader; 2) Streamline Multi-Objective Watershed Planning Approach; 3) Increase Collaboration and Partnering; 4) Preserve and Restore the Natural Resources of Floodplains and Riparian Areas; and 5) Process Improvement.

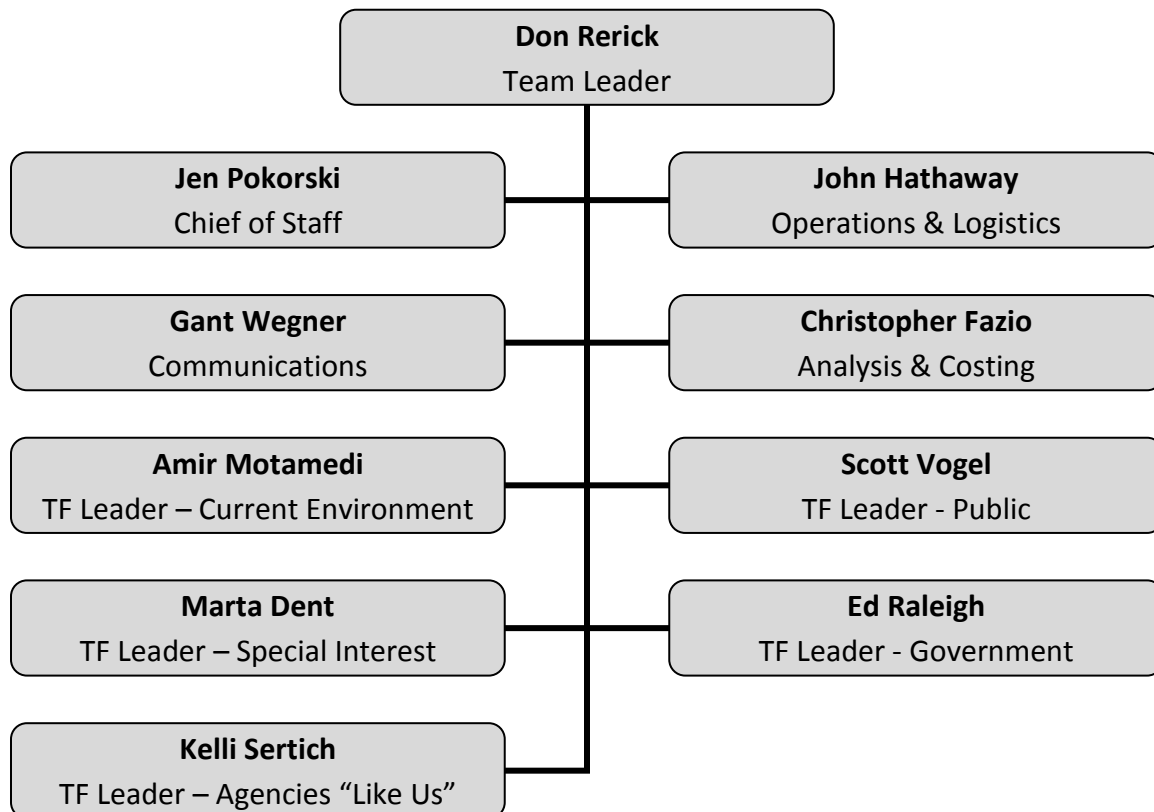
C3RPM Process and Phasing

The following process was used to develop, evaluate and select a menu of recommended river management activities for further analysis or implementation.

- Phase #1: Data collection focused on the identification of the current environment of the rivers in Maricopa County; coordination with similar agencies to identify best practices for river management; and surveys of the public, government agencies and special interest groups.
- Phase #2: Development and evaluation of preliminary alternatives based on the information gained during the survey and data collection process.
- Phase #3: Selection of a menu of river management activities recommended for implementation or further analysis.
- Phase #4: Finalize findings, including developing an action plan, and sharing recommendations.

C3RPM Team

The C3RPM team consisted of staff from several divisions and branches within the District, including Engineering, Floodplain Management and Services and Planning and Project Management. Four Task Force teams collected survey data from the Public; Local Government Agencies; Special Interest Groups; and other flood control agencies. An assessment of the rivers was compiled by the Current Environment Task Force. Additional team members provided communications, cost analysis and data compilation support.



2.0 Data Collection

The C3RPM data collection effort focused on three areas: 1) A compilation of the physical, hydrological and socioeconomic characteristics of the six major rivers and washes in Maricopa County; 2) Status of watercourse master planning actions by the District and others; and 3) Surveys of government agencies, special interest groups and the public.

The information gathered during the data collection phase was synthesized into trends and themes and reviewed by the C3RPM team (see Appendix A). The compiled information was used by the team to:

- 1) Gain an understanding of river management issues and public and stakeholder attitudes regarding management options.
- 2) Serve as a starting point for the brainstorming of potential river management activities.
- 3) Inform the development of alternative evaluation criteria.
- 4) Evaluate the alternative river management activities and select and prioritize a recommended list of activities for further action.

1) Current Condition of Maricopa County Rivers and Washes

The assessment of the current condition of Maricopa County rivers focused on the following watercourses: Salt River (below Granite Reef Dam); Gila River; Agua Fria River; Hassayampa River; Centennial Wash and Waterman Wash. The data collection effort was limited to the floodplain or ½ mile from the edge of the floodway, whichever was greater.

The C3RPM team collected information regarding historical flooding, effective floodplains, population trends, land use and ownership, sand and gravel operations, existing and proposed capital improvements, recreation features and selected environmental data. The information is presented in the *Current Environment Report*, dated May 2010.

Key Findings

The *Current Environment Report* provides an overview of river management issues, (e.g., development that is at-risk for flooding), and identifies areas where the flood hazard is low or may already be mitigated (e.g., District-owned property). Table 1: Maricopa Rivers Vital Statistics is a summary of selected information available in the *Report*.

Table 1: Maricopa County Rivers Vital Statistics

	Agua Fria River	Centennial Wash	Gila River	Hassayampa River	Salt River	Waterman Wash
Drainage Area (square miles)	2,066	1,870	50,910	1,471	13,405	422
Length (miles within Maricopa County)	35	46	95	54	38	16
Total Area within Floodplain	10,583	40,751	117,156	19,570	14,161	9,182
District Fee Land (acres)	1,119	273	3,739	186	433	0
District Easement Land (acres)	3,083	147	1,686	337	173	0
Current Land Ownership (acres)						
BLM	738	4,036	68,001	6,462	309	10,465
National Forest	0	0	0	0	3,315	0
Indian Communities	0	0	694	0	13,113	0
State	6,409	16,360	7,978	12,194	989	2,733
Private	25,344	42,916	91,011	33,012	23,263	22,030
Other	1,731	156	8812	241	1,879	7
Current Land Use (acres)						
Low Density Residential	3,759	60,394	103,258	23,423	4,640	24,202
Medium Density Residential	5,179	0	1,451	168	338	3,360
High Density Residential	5,487	0	1,499	174	1,611	1,215
Industrial	7,096	0	4,798	1,158	12,962	634
Open Space	9,901	2,914	51,498	5,812	16,466	5,590
Other	2,799	126	13,169	21,175	6,852	234
Future Land Use (acres)						
Low Density Residential	2,679	59,204	103,860	22,711	2,134	8,641
Medium Density Residential	3,621	2	1,390	1,914	894	6,509
High Density Residential	5,450	127	2,311	2,682	2,969	4,831
Industrial	8,995	935	7,524	4,631	15,091	2,493
Open Space	7,614	2,961	37,420	12,088	10,659	9,956
Other	5,864	206	23,168	7,255	10,200	2,805

2) Status of Watercourse Master Planning Activities

Two primary agencies – the District and the Army Corps of Engineers (Corps) in partnership with local jurisdictions - develop watercourse master plans for rivers and washes in Maricopa County.

Flood Control District of Maricopa County

ARS §48-3609.01 authorizes the District to perform Watercourse Master Plans (WCMPs). The primary goal of the WCMP is to provide information and develop solutions that protect existing and future residents from possible damages associated with floods up to and including the 100-year event.

The District's watercourse master planning process brings together the public, the business community, property owners, and concerned agencies for the purpose of identifying flood hazards and establishing multi-purpose flood mitigation solutions that incorporate recreation and environmental considerations. The District funds the development of WCMPs through its operating budget. Implementation strategies for WCMPs include non-structural (regulation) and structural solutions. The District implements the flood control structural components of the WCMPs in partnership with local communities and private property owners through its Capital Improvement Program. Multi-purpose features are funded by local jurisdictions.

Completed WCMPs include: Upper Cave Creek/Apache Wash (2001), Skunk Creek (2001), Middle New River (2000), Agua Fria & Addendum (2001/2005), El Rio (2006), and Lower Hassayampa Phase I (2005). Rainbow Valley (Waterman Wash) and the Lower Hassayampa Phase II studies are on-going.

Army Corps of Engineers

The Corps has developed several watercourse master plans in Maricopa County. In general, these projects fall into two categories: River control works (e.g. levees and other bank protection to contain flooding along the Salt River, Gila River, and Agua Fria River), and; Habitat restoration projects, such as the Rio Salado, Rio Salado Oeste, and Va Shly 'ay Akimel.

The Corps projects are developed with local sponsorship by the District, City of Phoenix, City of Tempe, City of Mesa, and the Salt River Pima-Maricopa Indian Community. These projects rely on local cost-share and annual appropriations from the United States Congress to fund planning, design, and construction.

3) Survey Data

Input was solicited via electronic and printed surveys from the public, local government officials, special interest groups, other flood control agencies and select District staff. The surveys asked respondents to rank the benefits of rivers (e.g., flood conveyance, habitat), score the importance of various river management activities and indicate how each activity should be implemented. Copies of the survey instrument for each group are found in Appendix B.

Survey Distribution

- Posted on the District website.
- Distributed at Tres Rios Nature Festival, Sun City Health Festival and other events.
- Mailed to 10,000 randomly selected households in Maricopa County.
- Made available at visitor centers, chambers of commerce and other locations throughout the county.
- Emailed to over 100 city managers, economic development, planning and engineering staff from all jurisdictions in the county.
- Phone interviews with 14 flood control agencies.
- Emailed to 26 special interest groups and other government agencies.
- Personal interviews with selected District staff.

Completed surveys were received from officials at 19 local cities/towns and the Gila River Indian Community; nine special interest groups, such as the Audubon Society, Arizona Rock Products Association, and Arizona Game and Fish; 11 “agencies like us” including flood control districts in Texas and California; and from more than 130 county citizens.

Key Findings

Several consistent opinions emerged from the survey data. Support is widespread for maintaining flood conveyance, sustaining wildlife habitat, and preserving open space. Governments are especially interested in the multi-use potential of rivers and working with sand and gravel operators to restore the rivers once mining is complete. They also believe taxes, user fees, and/or grants should fund river improvements. Special interest groups prefer continuing current floodplain regulations and monitoring of sand and gravel mining operations, with the hope for more free-flowing water to support wildlife. The county’s citizens appreciate the natural open space afforded by rivers, and dislike illegal dumping.

3.0 Evaluation and Recommendation

The C3RPM process to develop, evaluate and select a menu of recommended river planning and management activities included brainstorming, feedback from District staff and an independent economist, evaluation criteria development and weighting and alternative evaluation and selection.

- 1) **Brainstorming**: The C3RPM developed a list of preliminary alternatives based on the information gained during the data collection phase. The brainstorming process grouped the alternative river management activities into potential roles the District could perform (e.g., own the rivers, manage the rivers, operate and maintain the rivers). The results of the brainstorming meeting are found in Appendix C.
- 2) **Feedback**: The C3RPM team sought feedback on the preliminary river management activities from District staff, subject matter experts and an independent economist prior to evaluation and selection of the recommended activities.
 - a. District staff. District staff was asked to rate each preliminary alternative based on its overall importance in achieving the District’s mission and 2020 Goal while efficiently serving the residents of the county. See Appendix D for a copy of the staff ranking form.
 - b. Independent economist. A local economist provided qualitative feedback on the economic impact of the alternative activities. The economists identified each activity as providing a positive (+), neutral (N) or negative (-) economic impact. The economic impact was defined as all the cost and benefits of a particular activity, including capital and labor costs, as well as impacts to tax revenue, property value and other fiscal impacts.
 - c. Subject matter experts. Selected District staff that are expert in various disciplines – engineering (sand and gravel), real estate, planning, landscape architecture, environmental, operation and maintenance, and the Community Rating System –gave input on the preliminary river management options. The role of the experts was two-fold: 1) Provide input on the alternatives at a special meeting of the C3RPM team, including suggesting additional activities; and 2) Rank the alternatives by completing the evaluation matrix.
- 3) **Refinement of Preliminary Alternatives**: The preliminary activities developed during the brainstorming process were refined into a concise list of 26 activities for ease of evaluation. The refinements included additions suggested by the subject matter experts, wording changes to clarify the intent of the activity, splitting one activity into two or more distinct activities and deleting redundant items. It is important to note that the list of activities to be evaluated included activities that the District currently performs.

C3RPM Preliminary Alternatives for Evaluation

1. Floodplain regulation for unincorporated county & 12 communities (*current District activity*)
2. Floodplain delineations (*current District activity, including delineations performed as part of an ADMS/ADMP*)
3. Identification of erosion hazard zones as part of Watercourse Master Plans (*current District activity*)
4. Regulation of erosion hazard zones outside of the 100-year floodplain limits
5. Sand & gravel permitting (oversight for conveyance and erosion) for unincorporated county and 12 communities (*current District activity*)
6. Prepare Watercourse Master Plans (WCMP) (*current District activity*)
7. Actively coordinate implementation by others of WCMP recommendations.
8. District implementation of WCMPs.
9. Operate and maintain flood control structures owned by the District or obligated to maintain under agreement (*current District activity*)
10. Floodprone Property Acquisition Program for inhabited structures (*current District activity*)
11. Construct flood control capital projects (*current District activity*)
12. Utilize District property to generate revenue by leasing land for industrial uses such as sand and gravel operations, etc.
13. Utilize District property to generate revenue by leasing land for recreational uses such as golf courses, water parks, etc.
14. Preserve floodplain/floodway for conveyance and habitat through purchase of land or easement.
15. Preserve floodplain/floodway for conveyance and habitat through regulation.
16. Preserve floodplain/floodway for conveyance and habitat through planning and incentives such as transfer of development rights, etc.
17. Restore degraded floodway/floodplains to improve habitat and aesthetic value.
18. Manage vegetation to improve flood conveyance.
19. District maintenance of public recreation features on District structures or property.
20. Develop best management practices for river management such as sample zoning ordinances, vegetation management strategies, water quality, etc.
21. Monitor river conditions – vegetation management, aggradation, degradation, water quality and habitat - and recommend appropriate actions.
22. Obtain adoption of WCMPs by county and cities
23. Develop a Maricopa County Floodplain Management Standards Board to make floodplain management consistent across the county with membership by the cities, towns and county.
24. Create river improvement districts into which property owners pay fees for the construction of flood control improvements.
25. Mentoring or development of best management practices to aid other jurisdictions with the O&M of flood control facilities.
26. Manage Adopt-a-River volunteer program in partnership with other agencies.

- 4) Evaluation Criteria. The C3RPM team identified and developed weights for nine evaluation criteria. In order to develop the relative weights, the team used a matrix to compare and rank each criterion against the others. The most important criteria received the greatest weighting factor. Table 2 lists the criteria and associated weights.

Table 2: Evaluation Criteria and Weights

Criteria	Weight (Multiplier)
Flood Conveyance	9
Economic Impact	8
2020 Goal	7
NFIP-CRS Impact	5
Complexity and Risk	5
Wildlife Habitat/Passive Recreation	3
Political Acceptability	3
Active Recreation/Trails Opportunities	3
Scenic Value/Open Space	2

- 5) Alternative Evaluation and Recommendation. The alternative evaluation and recommendation process consisted of: 1) Using an evaluation matrix to score the alternatives; 2) Aggregating the scores and developing a list of top ranked activities; 3) Comparing the rankings of the C3RPM team, subject matter experts and District staff, and; 4) Developing a consensus list of recommended activities.

Scoring

Each alternative activity was ranked on a scale of 1-5, with 1 indicating poor performance or value and 5 indicating excellent performance or value (See Table 3 for a description of the ranking and score for each criterion). The 1-5 ranking was multiplied by the assigned weighting factor. The total score (ranking X weighting factor) for each criterion was summed to give an overall score for each alternative activity. The scores for the National Flood Insurance Program – Community Rating System (CRS) criterion were provided by the District’s CRS coordinator. The positive, neutral and negative rankings provided by the economist were translated into a score in order to populate the “Economic Impact” column of the evaluation matrix. The evaluation matrix is in Appendix E.

Table 3: Guidelines for Scoring Alternative Activities

Criteria	Ranking (1)	Ranking (3)	Ranking (5)
Flood Conveyance	Reduces flood	Maintains flood	Improves flood

	conveyance	conveyance	conveyance
Economic Impact	Negative impact	Neutral	Positive impact
2020 Goal	Diminishes ability to meet goal	Neutral	Improves ability to meet goal
NFIP-CRS Impact	Negatively impacts ranking	Neutral	Enhances ranking
Complexity and Risk	High complexity & risk	Routine	Low complexity & risk
Wildlife Habitat/Passive Recreation	Reduces wildlife habitat	Maintains existing wildlife habitat	Increases wildlife habitat
Political Acceptability	Low acceptance	Partial acceptance	High acceptance
Active Recreation/Trails Opportunities	Reduces opportunities	Maintains opportunities	Improves opportunities
Scenic Value/Open Space	Negative impact	Neutral	Positive impact

Results

The scores of individual team members and subject matter experts were aggregated to obtain a “ranking” for each activity, i.e., the activity with the highest combined score was the top-ranked activity. For the staff ranking, a percentage was calculated (e.g., number of respondents selecting a category (neutral, important, etc.) divided by total respondents) for each category. The percentages for the “important” and “very important” categories were totaled. The activities were then ordered based on the highest combined percentage of “important” and “very important” rankings. Appendix F contains the aggregated scoring sheets for the C3RPM team, subject matter experts and staff.

The evaluation results from all three groups were compared and discussed by the C3RPM team (Appendix G presents a comparison of the top 10 ranked activities from each group). From those discussions, the C3 team developed a consensus list of recommended activities. The list was divided into three classifications: 1) Activities Presently Performed by the District; 2) Activities for Near-term Implementation; and 3) Activities for Future Consideration.

Conclusions & Recommendations

The consensus of the C3RPM team was that all of the activities that the District currently performs for river management are critical to achieving the District’s mission and should be emphasized moving forward. In addition, the team identified a few activities that may fill an existing service gap and warrant further investigation to determine how to implement those activities. These activities are categorized as “Activities for Near-term Implementation.” The

“Activities for Future Consideration” are activities which do not merit advancement at this point in time, but may have relevance in the future given changing conditions or priorities. Table 4 and 5 detail the final C3RPM recommendations for existing activities and activities for near-term implementation.

The activities recommended for future consideration are:

- Original Activity Number (AN) 12: Utilize District property to generate revenue by leasing land for industrial uses
- AN 13: Utilize District property to generate revenue by leasing land for recreational use
- AN 17: Restore degraded floodway/floodplains to improve habitat and aesthetic value
- AN 19: District maintenance of public recreation features on District structures or property
- AN 23: Develop a Maricopa County Floodplain Management Standards Board to make floodplain management consistent across the country with membership by the cities, towns and county
- AN 24: Create river improvement districts into which property owners pay fees for the construction of flood control improvements
- AN 26: Manage Adopt-a-River volunteer program in partnership with other agencies

Table 4: Activities Presently Performed by the District

Original Activity Number	Activities Presently Performed by the District	Conclusions & Recommendations	District Strategic Program	Responsible
6 & 22	Prepare and seek adoption of WCMPs	Continue current program, including seeking adoption or endorsement of WCMP recommendations by cities, FCD Board of Directors and county Board of Supervisors.	Identification	Planning Branch
2	Floodplain delineations	Continue current program with emphasis on delineations in areas where development is expected to occur within the next three to five years	Identification	Planning Branch and Hydrology and Hydraulics Branch
11	Construct flood control capital projects	Continue current program.	Remediation	Planning & Project Management Division
9	Operate and maintain flood control structures owned by the District or obligated to maintain under agreement.	Continue current program	Remediation	Operation & Maintenance Division
1	Floodplain regulation for unincorporated county & 12 communities	Continue current program	Regulation	Floodplain Management & Services Division
5	Sand & gravel permitting (oversight for conveyance and erosion) for unincorporated county and 12 communities	Continue current program	Regulation	Engineering Division
10	Floodprone Property Acquisition Program for inhabited structures	Re-visit evaluation criteria and funding allocation for program.	Remediation	Planning & Project Management Division

Table 5: Activities Recommended for Near-term Implementation

Original Activity Number	Activities for Near-term Implementation	Conclusions & Recommendations	District Strategic Program	Responsible
3 & 4	Identification and regulation of erosion hazard zones (within and outside of the 100-year floodplain limits)	Formulate the District's position regarding the identification and regulation of erosion hazard zones, including developing new procedures, policy or seeking a statutory change, if warranted.	Identification	Engineering Division with support from Planning & Project Management Division & Floodplain Management & Services Division
20, 21 & 25	Develop best management practices for river management to include a framework for monitoring river conditions.	Develop an arid regions river management manual that identifies best management practices (BMPs) for reducing the flood hazard risk along watercourses in arid environments, specifically Maricopa County. BMP topics could include land use and zoning, vegetation management, water quality and operations and maintenance. The manual will also discuss ways to monitor river conditions, and provide guidance as to what conditions should trigger the implementation of a specific BMP.	Remediation & Regulation	Committee led by Planning Branch with support from outside consultant.
14, 15, & 16	Preserve floodplain/floodway for conveyance and habitat through regulation, purchase or through planning and incentives	Develop an internal guidance document that: 1) Identifies how existing regulations can preserve the floodway for conveyance and prevent adverse impact to adjacent property in the floodplain; with habitat preservation as an ancillary benefit; and 2) Addresses when purchase of floodplain property is an appropriate activity for the District.	Remediation & Regulation	Committee led by Floodplain Management & Services Division
7 & 8	District coordination and implementation of WCMPs	The District will unilaterally take the lead to cause the implementation of WCMPs and/or identifying strategies for partnering with communities to implement WCMP recommendations.	Remediation	Planning & Project Management Division

4.0 Action Plan

The implementation strategy for the C3RPM recommendations is dependent on the activity. All activities that are currently performed by the District will continue to be implemented as a matter of District practice. The activities recommended for near-term implementation will be executed as detailed in the following action plan. The activities are listed in order of priority.

- 1) Identification and regulation of erosion hazard zones (within and outside of the 100-year floodplain limits). (Activity Numbers 3 and 4)

Action Item: By the end of calendar year 2011, a committee led by the Engineering Division will:

- Determine the status of erosion hazard identification and regulation in Maricopa County
- Identify areas for improvement, such as increased coordination between the District and other jurisdictions
- Recommend and institute any changes necessary to ensure public safety
- Develop procedures or policy, or if necessary, seek statutory change

Desired End Result: A written procedure or policy that details how the District will identify and regulate erosion hazards within and outside of the 100-year floodplain **or**, if necessary, the initiation of a process to seek a statutory change.

- 2) Develop best management practices for river management to include a framework for monitoring river conditions. (Activity Numbers 20, 21 and 25)

Action Item: By the end of fiscal year 2011-2012, a committee led by the Planning Branch will:

- Determine the key elements of a best practices manual based on issues specific to arid rivers in Maricopa County and input from District staff, stakeholders and other sources. BMP topics could include land use and zoning, vegetation management, water quality and operations and maintenance.
- Produce a scope of work and initiate a contract with an outside consultant
- Coordinate with the Lower Hassayampa WCMP project team regarding a process and guidelines for monitoring river conditions
- Develop an arid region river management manual

Desired End Result: Arid Regions River Management Manual adopted by the District Board of Directors.

- 3) Preserve floodplain/floodway for conveyance and habitat through regulation, purchase or through planning and incentives (Activity Numbers 14, 15 and 16)

Action Item: By the end of calendar year 2012, a committee led by the Floodplain Management and Services Division, will:

- Identify opportunities and areas of overlap where existing regulations and other tools can preserve floodways/floodplains for conveyance, wildlife habitat and other environmental purposes
- Develop guidelines for when purchase of floodplain property is an appropriate flood hazard mitigation activity for the District (e.g., cost/benefit, high habitat value, etc)
- Consider opportunities for additional NFIP-CRS credit when identifying means for floodplain preservation or developing guidelines for purchase of property
- Develop policies or procedures

Desired End Result: Policy or procedures endorsed by management that provide guidance to staff regarding floodplain preservation opportunities.

4) District coordination and implementation of WCMPs (Activity Numbers 7 and 8)

Action Item: As an on-going matter of practice, the Planning Branch will take the lead in actively coordinating the implementation of completed and future Watercourse Master Plans. This implementation effort can take the form of coordinating meetings between jurisdictions, drafting intergovernmental agreements, providing technical support and other activities designed to support the WCMP recommendations.

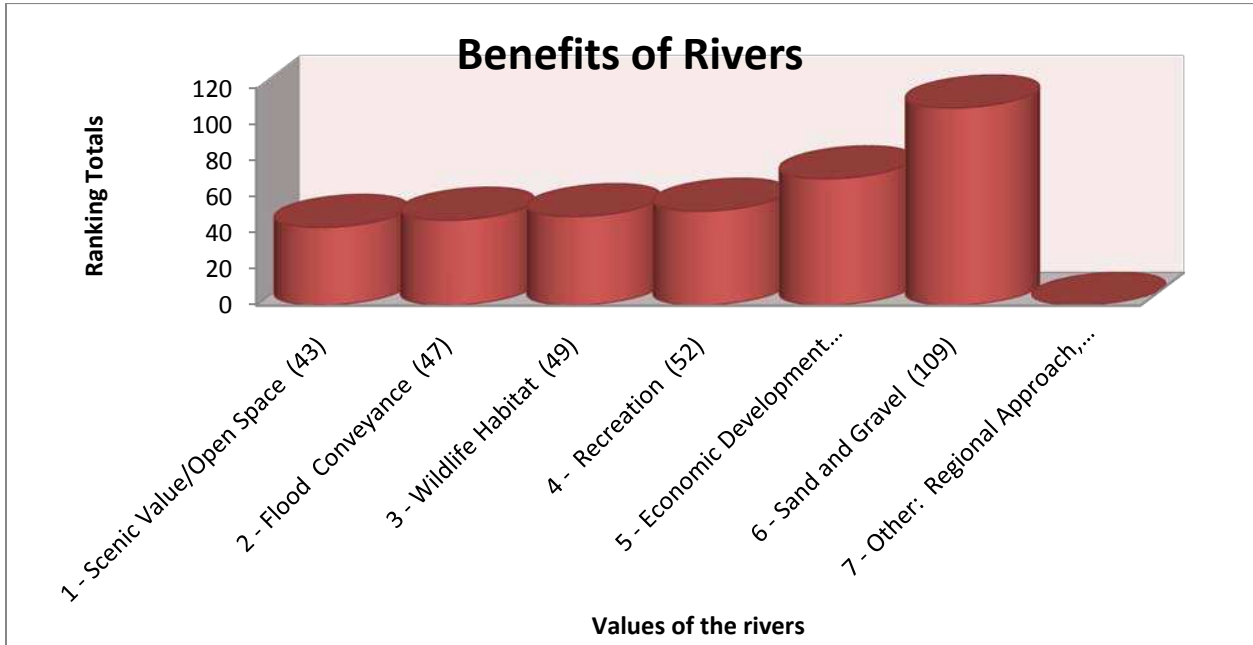
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Appendix A
Survey Responses

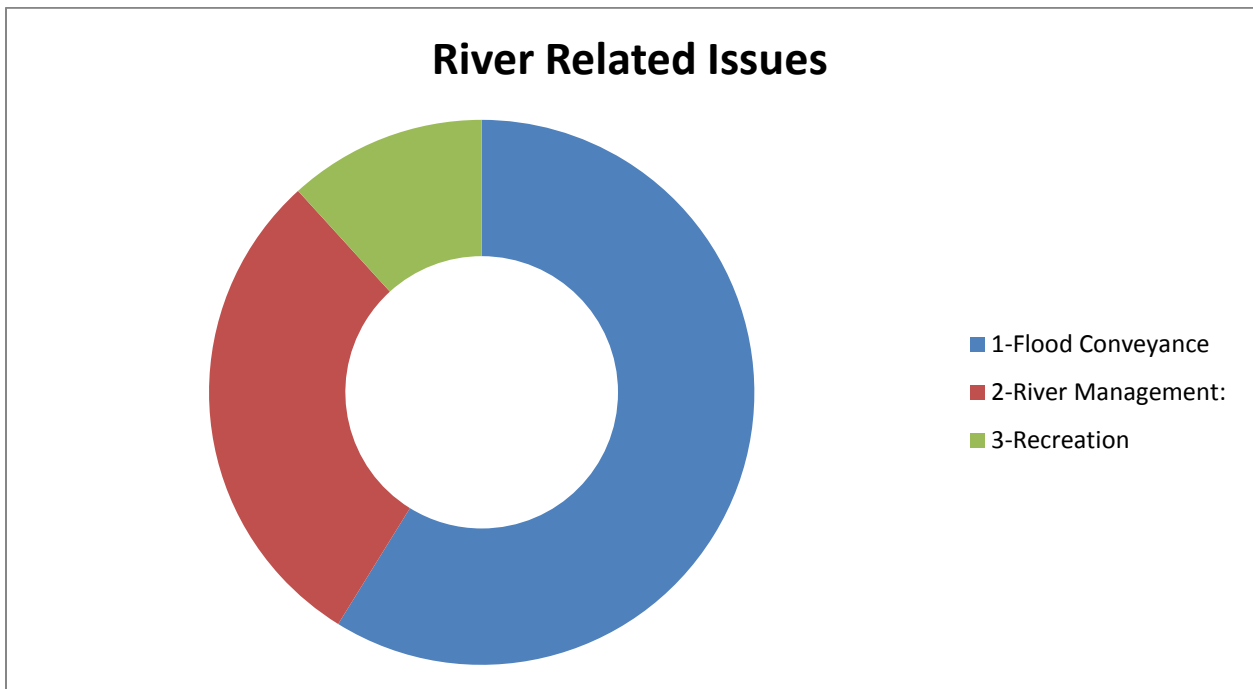
Appendix A: Survey Responses

A. Government

1. Rank on a scale of 1-7 (1 being the most important) the following benefits or values of rivers.

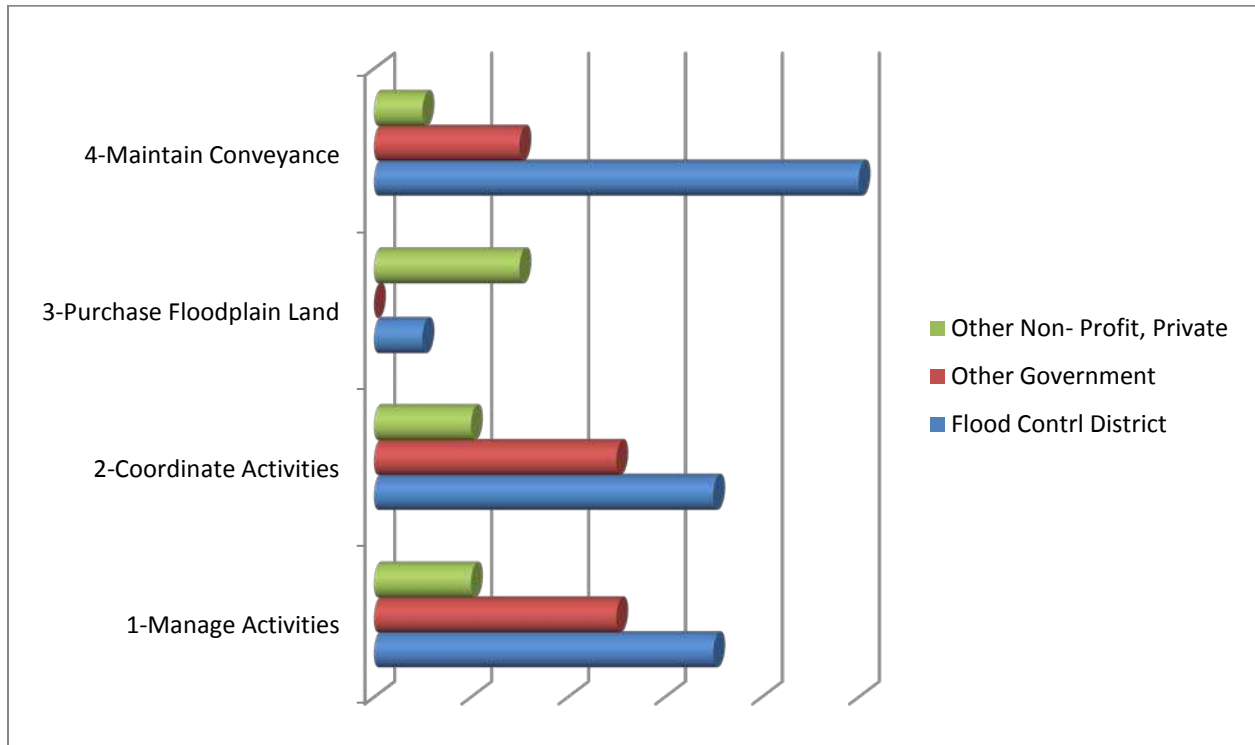


2. What are the top three river related issues?

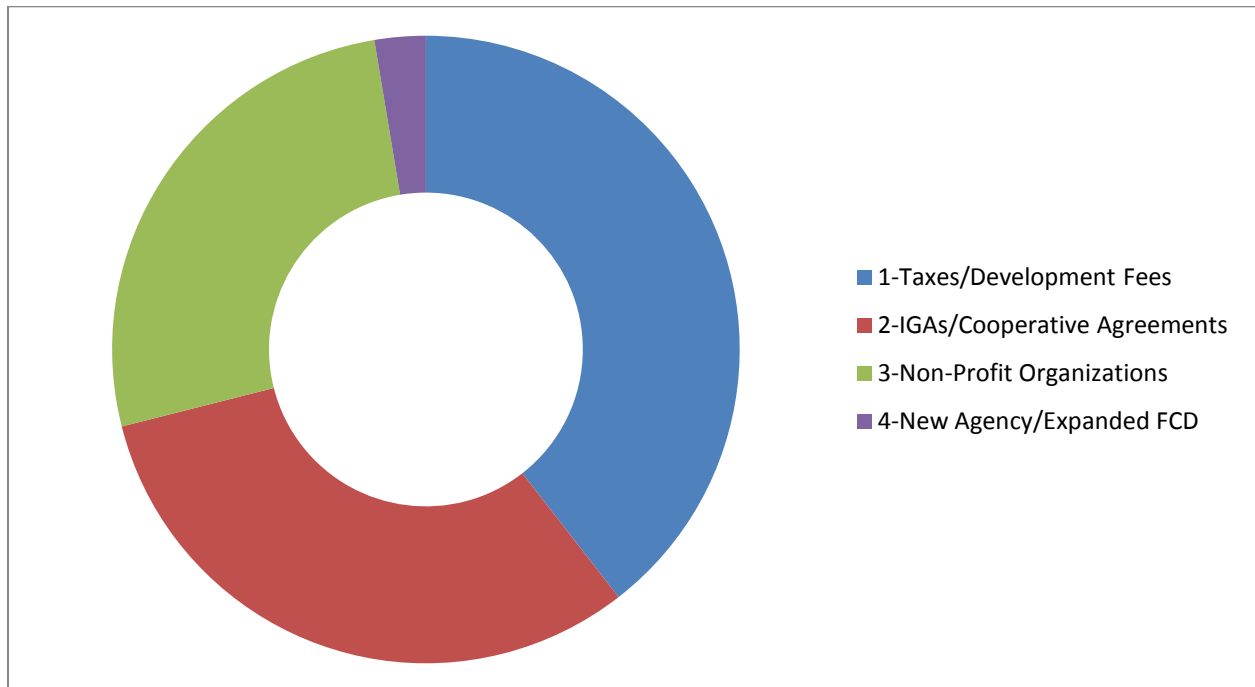


Government, con't

3. Rank importance of river management strategies

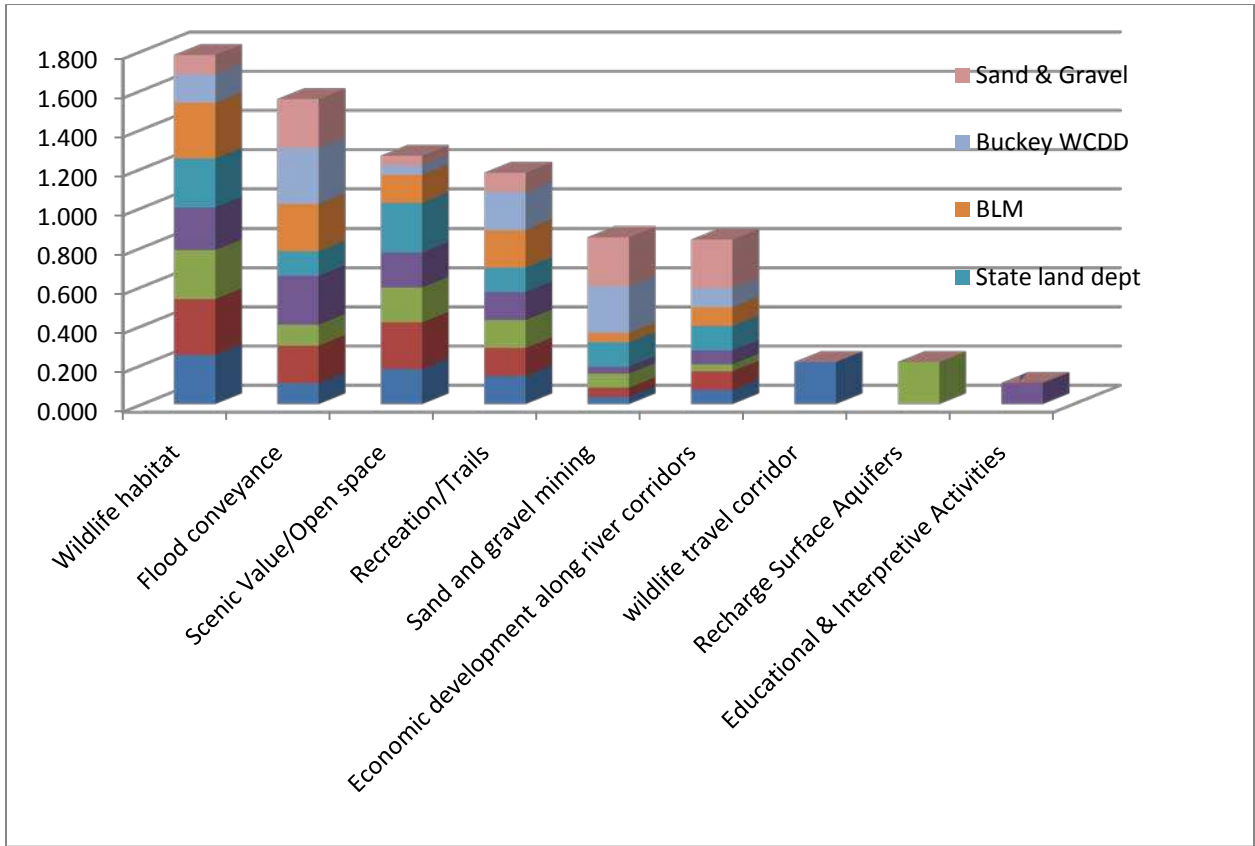


4. How should the activities ranked as important be implemented?



B. Special Interest

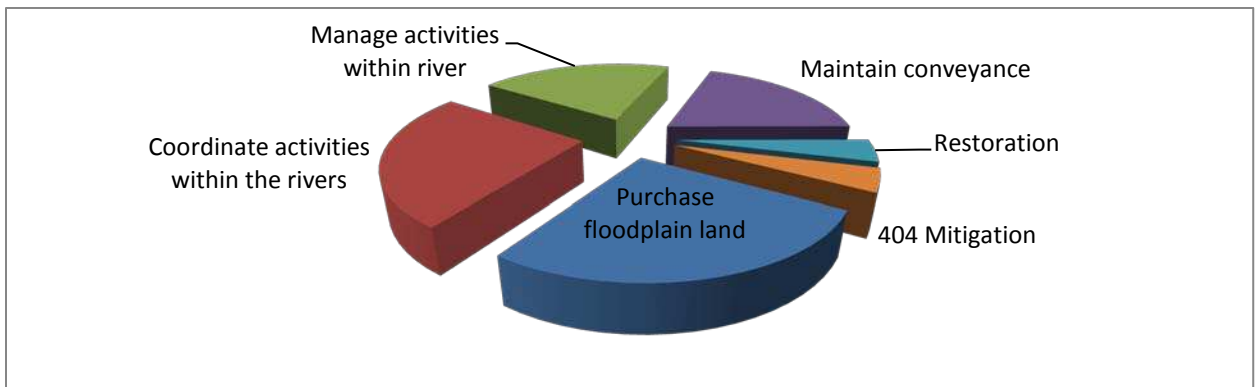
1. Rank on a scale of 1-7 (1 being the most important) the following benefits or values of rivers.



2. What are the top three river related issues?

- a. Natural Functioning Floodplain including Management of Invasive Species and Environmental Protection
- b. Recreation and Education
- c. Economic Development

3. Rank importance of river management strategies

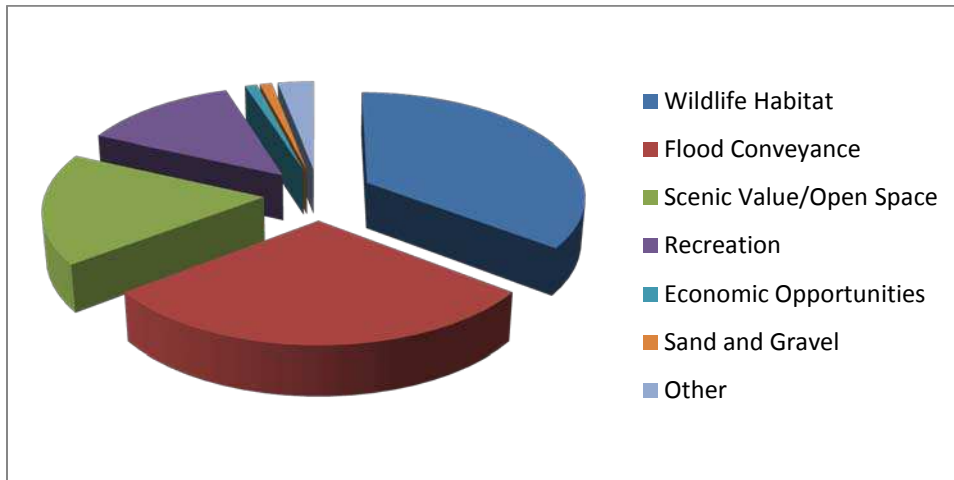


Special Interest, con't

4. How should the activities ranked as important be implemented?
 - a. Purchase Floodplain Land: Involvement from Flood Control District, other government agencies, private interests and non-profit organizations
 - b. Maintain Conveyance: Lead Agency --- Flood Control District
 - c. Coordinate Activities within River: Lead Agency --- Flood Control District with support from other government agencies, private interests and non-profit organizations
 - d. Manage Activities within River: Lead Agency---Flood Control District with support from other organizations

C. Public

1. Rank on a scale of 1-7 (1 being the most important) the following benefits or values of rivers.



2. What are the top three river related issues?
 - a. Illegal Dumping/Pollution
 - b. Sand and gravel/Unsightly
 - c. Dams/Lack of Perennial Flow
3. Rank importance of river management strategies.
 - a. Purchase Floodplain Land: Very Important
 - b. Maintain Conveyance: Extremely Important
 - c. Regulate Activities: Extremely Important
4. How should the activities ranked as important be implemented?
 - a. Purchase Floodplain Land: Flood Control District in conjunction with other government agencies
 - b. Maintain Conveyance: Flood Control District
 - c. Regulate Activities: Flood Control District in conjunction with other government agencies

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Appendix B

Survey Forms
for Government and Special Interest, Public,
and Other Flood Control Agencies (Agencies "Like Us")



**Comprehensive, Coordinated, Collaborative
River Planning and Management Survey**

The goal of the C3RPM effort is to define the District’s role in the management of “rivers” in Maricopa County that will maintain flood conveyance and consider the needs of the community.

How would you rank the following uses or benefits of rivers from most to least important (with 1 being most important and 7 being least important)?

- Scenic Value/Open space _____
- Sand and gravel mining _____
- Recreation/Trails _____
- Wildlife habitat _____
- Flood conveyance _____
- Economic development along river corridors _____
- Other (please specify) _____

What are the top three river-related issues in your community or from the perspective of your organization?

What is your “vision” for the rivers?

How would you implement and fund your “vision” for the rivers?

There are a variety of activities or strategies that can be implemented to plan and manage rivers in Maricopa County. Mark how important you feel each river planning and management strategy is in the column labeled “Importance of Activity.” In the column listed “Party Primarily Responsible for Implementation,” mark which group or agency should be primarily responsible for implementing each activity.

	Importance of Activity					Party Primarily Responsible for Implementation				
	Not at all Important			Extremely Important		Flood Control District	Other Gov’t Agency*	Private/For-Profit Interests*	Non-profit Organizations *	Other *
	1	2	3	4	5	1	2	3	4	5
Purchase floodplain land										
Maintain conveyance										
Coordinate activities within the rivers										
Manage activities within river										
Other (please specify)										

*Please indicate a specific agency that should be responsible for implementation.

Please explain how the party or parties should implement the activities that you ranked as important (ranked as 4 or 5 in the previous question).

What do you think of the District's current approach to the rivers?

Any additional comments?



Comprehensive, Coordinated, Collaborative

River Planning and Management Survey

The goal of the C3RPM effort is to define the District’s role in the management of “rivers” in Maricopa County that will maintain flood conveyance and consider the needs of the community.

How would you rank the following uses or benefits of rivers from most to least important (with 1 being most important and 7 being least important)?

- Scenic Value/Open space _____
- Sand and gravel mining _____
- Recreation/Trails _____
- Wildlife habitat _____
- Flood conveyance _____
- Economic development along river corridors _____
- Other (please specify) _____

What do you like about rivers in Maricopa County? What don’t you like?

What is your “vision” for the rivers?

How would you implement and fund your “vision” for the rivers?

There are a variety of activities or strategies that can be implemented in order to plan and manage rivers in Maricopa County. Mark how important you feel each river planning and management strategy is in the column labeled “Importance of Activity.” In the column listed “Party Primarily Responsible for Implementation,” mark which group or agency should be primarily responsible for implementing each activity.

	Importance of Activity					Party Primarily Responsible for Implementation				
	Not at all Important			Extremely Important		Flood Control District	Other Gov’t Agency*	Private/For-Profit Interests*	Non-profit Organizations *	Other *
	1	2	3	4	5	1	2	3	4	5
Purchase floodplain land										
Maintain floodwater capacity										
Manage activities within river										
Other (please specify)										

*Please indicate a specific agency that should be responsible for implementation.

Please explain how the party or parties should implement the activities that you ranked as important (ranked as 4 or 5 in the previous question).

Public Survey

Is there anything else that you would like to add?



Comprehensive, Coordinated, Collaborative

River Planning and Management Survey

The goal of the C3RPM effort is to define the District's role in the management of "rivers" in Maricopa County that will maintain flood conveyance and consider the needs of the community.

Do you have a Plan/Program for River Planning and Management, and why? How is the program/plan being implemented? (Regulation; Purchase of Floodplain Land)

What other agencies are involved in your river management plan or program? Did you work with agencies like the Corps, or NRCS? Why?

What were the specific river management problems that you were trying to solve with the plan or program?

What is the financing structure?

Agencies "Like Us" Survey

What is your current statutory authority? Did you have to develop any new or special regulations or policies in order to implement the plan/program?

Who is taking the lead on maintenance? How is it being paid for? What problems or issues are you having with maintenance? What kind of maintenance needs to be done?

During the planning and implementation process, what were the "unknowns"? What happened that you didn't anticipate happening?

Is there anything else that you would like to add?

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Appendix C

Brainstorming Meeting Summary



Brainstorming Meeting Summary

May 27, 2010

9:00-11:30 a.m.

Meeting Purpose

The purpose of the meeting was to brainstorm potential alternative roles for the District in river planning and management for further evaluation.

Alternative Formulation and Definition

The C3 Team brainstormed potential alternative roles for the District in river planning and management. The brainstorming process included defining the associated activities and characteristics of each alternative role¹.

1.) Status Quo

The District historically focused on stabilizing and confining the river in an attempt to reduce the overall floodplain footprint. The District's current approach to river planning and management is a combination of numerous activities performed under various District programs and authorities. For example, the District's planning branch develops watercourse master plans that identify river management strategies and flooding solutions to be implemented by others. Regulatory functions are performed for unincorporated Maricopa County and the 12 communities that have elected to have the District perform their floodplain management responsibilities. Flood control structures are generally constructed in partnership with local communities or federal partners.

Activities

- Floodplain management and permitting for unincorporated county and 12 communities
- Purchase (fee & easement) of floodplain land for construction of flood control structures (includes land purchased for mitigation)
- 100-year FEMA delineations and identification of erosion hazard zones
- Sand and gravel permitting for unincorporated county and 12 communities. Oversight restricted to conveyance and erosion.
- Prepare Watercourse Master Plans; implementation by others.
- Operate and maintain property and flood control structures that the District owns or is obligated by agreement to maintain.
- Grants trail/recreation easements to other agencies (County and cities) for District property/structures
- Purchase inhabited structures in floodplain/floodway through FPAP

¹ The preliminary alternatives listed in this document (items 2-6) build upon or modify the activities listed under "status quo". If one of the preliminary alternatives is selected for implementation some or all of the status quo activities will still be performed.

- Maintain select stream gages
- Construct capital improvement projects through partnerships with local and federal agencies.
- Participation in AFMA, NAFSMA and FEMA river-related committees
- Water quality responsibilities on District property/structures
- Constructed and monitor two pilot studies for replacement of salt cedar with native species

2.) Own

The following three scenarios relate to District purchase and ownership of floodplain/floodway land to maintain flood conveyance and possibly serve other functions desired by the public and local communities. The scenarios differ on the District's management strategy for the land. Details such as what land to purchase (floodplain or floodway along entire rivers or selected reaches) and whether to purchase in fee versus easement will be determined during the C3RPM implementation phase if one of these alternatives is ultimately selected.

- A. Revenue Generation: Purchase land to generate revenue (e.g., sand and gravel leases, golf course, water parks, etc.)
- B. Preserve and Protect: Deed restriction, maintain flood conveyance capacity, habitat and open space preservation. Under this scenario the purchase priority would be for undisturbed land with high quality habitat that is not "secured", i.e., under the ownership of a government agency that is managing the land as open space or wildlife habitat.
- C. Own and Restore: Under this scenario, the purchase priority would be for disturbed, degraded floodway/floodplains (e.g., abandoned sand and gravel mines, areas with low habitat value/invasive species, etc.). This could also include the restoration of land currently owned by the District.

3.) Operate and Maintain

There are four possible operation and maintenance scenarios:

- A. The District maintains its property and the integrity of flood control structures that it owns or is obligated by agreement to maintain. This approach includes:
 - Structural and functional maintenance of structures
 - Trash/graffiti clean-up on District property
 - Preventing trespassing
- B. The District maintains its property and the integrity of flood control structures that it owns or is obligated by agreement to maintain and performs additional maintenance functions including:
 - Structural and functional maintenance of structures
 - Trash/graffiti clean-up on District property
 - Preventing trespassing
 - Vegetation management
 - Maintenance of public recreation amenities (e.g., trails)

- Constructing/maintaining public/worker safety measures (e.g., handrails, etc)
- C. In addition to maintaining flood control structures that the District owns, the District outsources its operation and maintenance services to private entities and/or other government agencies. The possible operation and maintenance services to be outsourced include:
- Structural and functional maintenance of structures
 - Trash/graffiti clean-up
 - Preventing trespassing
 - Maintenance of public recreation amenities (e.g., trails)
 - Vegetation management
 - Constructing/maintaining public/worker safety measures (e.g., handrails, etc)
- D. The District transfers all operation and maintenance of flood control structures to the jurisdiction where the structure is located or to the project partner.

4.) Coordinate

The “Coordinate” alternative assumes that the District plays a leadership role in river planning and management by facilitating intergovernmental cooperation and organizing all planning, permitting, policy and implementation issues.

Activities

- Conduct Watercourse Master Plans and other studies to identify river-related issues and develop solutions
- Provide technical expertise to local jurisdictions
- Take lead in initiating agreements to implement Watercourse Master Plan recommendations
- Develop best management practices for river management such as sample zoning ordinances, and vegetation management strategies
- On-going monitoring of river conditions or “health”
- Evaluation of permitting activities to ensure compatibility with WCMP and other activities

5.) Manage

The “Manage” role focuses on *regulating* activities in the rivers as opposed to the “Coordinate” role which is a facilitative approach with voluntary participation. The “manage” role could be implemented in unincorporated county and the 12 communities for which the District performs floodplain management duties, or in all jurisdictions.

Activities

- Flood Conveyance/Floodplain Permitting/NFIP
- Land Use Ordinances
- Adoption of Watercourse Master Plans
- Leadership role in implementation of WCMPs

6.) River-specific

Each of the above alternatives could be applied to individual rivers or reaches of individual rivers. For example, the District could purchase land in the Gila River, coordinate activities on the Agua Fria and regulate the Salt River. River-specific strategies will be further discussed during the alternative selection process, and then fleshed out during the implementation planning phase.

7.) Other

The following is a list of ideas that could be incorporated into any of the above strategies.

- Land swaps with ASLD or other government land owner – coordinate with private property owners to swap/trade “river bottom” land for developable land outside the floodplain.
- Eliminate all salt cedar and invasive species, replace with native vegetation.
- Coordinate to a greater extent floodplain management activities for the entire county. Develop a Maricopa County Floodplain Management Agency, to make floodplain management more consistent across the county, with voluntary membership by cities. This idea lends itself for incorporation in the “Manage” alternative, if participation is required, or the “Coordinate” alternative, if participation is voluntary.
- Adopt-a-River volunteer program funded through corporate donations (similar to California’s “Adopt-a-Storm Drain” program)
- Establish hunting and fishing preserves on District-owned land
- Facilitate/preserve wildlife corridors
- Create improvement districts within river floodplains into which developers pay fees for the District to construct flood control improvements

Implementation Considerations

- Consider the character of each river when developing implementation strategy. For example, a WCMP may be needed for the Gila River between SR85 and Gillespie Dam to consider the unique character of that area (e.g., mostly agriculture).
- Expanded sand and gravel permitting
- Possible statutory changes on use of tax dollars
- Legislative action to modify authorized function/activities of the District
- Expanded partnerships with non-profit groups (e.g., American Rivers, etc.)

Next Steps

- Identify Evaluation Criteria (Mtg on June 14)
- Receive feedback on preliminary alternatives from C3RPM Task Force and staff from various disciplines (regulatory, sand and gravel permitting, planning, CRS program, environmental, etc.) (Mtg on July 1)
- Select Recommended Alternative (Mtg to be scheduled later in July/August)

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Appendix D

Alternative Activities Ranking Sheet

C3RPM
Alternative Activities Ranking Sheet

Activity	Description	Not Important	Somewhat Important	Neutral	Important	Very Important
1	Floodplain regulation for unincorporated county & 12 communities					
2	Floodplain delineations					
3	Identification of erosion hazard zones as part of Watercourse Master Plans					
4	Regulation of erosion hazard zones outside of the 100-year floodplain limits					
5	Sand & gravel permitting (oversight for conveyance and erosion) for unincorporated county and 12 communities					
6	Prepare Watercourse Master Plans (WCMP)					
7	Actively coordinate implementation by others of WCMP recommendations					
8	District implementation of WCMPs					
9	Operate and maintain flood control structures owned by the District or obligated to maintain under agreement					
10	Floodprone Property Acquisition Program for inhabited structures					
11	Construct flood control capital projects					
12	Utilize District property to generate revenue by leasing land for industrial uses such as sand and gravel operations, etc.					
13	Utilize District property to generate revenue by leasing land for recreational uses such as golf courses, water parks, etc.					
14	Preserve floodplain/floodway for conveyance and habitat through purchase of land or easement.					
15	Preserve floodplain/floodway for conveyance and habitat through regulation					
16	Preserve floodplain/floodway for conveyance and habitat through planning and incentives such as transfer of development rights, etc.					
17	Restore degraded floodway/floodplains to improve habitat and aesthetic value					
18	Manage vegetation to improve flood conveyance					
19	District maintenance of public recreation features on District structures or property					
20	Develop best management practices for river management such as sample zoning ordinances, vegetation management strategies, water quality, etc.					
21	Monitor river conditions – vegetation management, aggradation, degradation, water quality and habitat - and recommend appropriate actions					
22	Obtain adoption of WCMPs by county and cities					
23	Develop a Maricopa County Floodplain Management Standards Board to make floodplain management consistent across the county with membership by the cities, towns and county					
24	Create river improvement districts into which property owners pay fees for the construction of flood control improvements					
25	Mentoring or development of best management practices to aid other jurisdictions with the O&M of flood control facilities.					
26	Manage Adopt-a-River volunteer program in partnership with other agencies					

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Appendix E

Alternatives Selection Matrix

Alternatives Selection Matrix
C3RPM

Weighting Value		7	9	5	3	3	2	8	3	5		
Scoring values (Highest Score is Preferred Option)		1..3..5	1..3..5	1..3..5	1..3..5	1..3..5	1..3..5	1..3..5	1..3..5	1..3..5		
Activity	Description	2020 Goal	Flood Conveyance	NFIP-CRS Impact	Wildlife Habitat/Passive Recreation	Active Recreation/Trails	Scenic Value/Open Space	Economic Impact	Political Acceptability	Complexity & Risk	Alternative Weighted Score	Notes/Justification
1	Floodplain regulation for unincorporated county & 12 communities										0	
2	Floodplain delineations										0	
3	Identification of erosion hazard zones as part of Watercourse Master Plans										0	
4	Regulation of erosion hazard zones outside of the 100-year floodplain limits										0	
5	Sand & gravel permitting (oversight for conveyance and erosion) for unincorporated county and 12 communities										0	
6	Prepare Watercourse Master Plans (WCMP)										0	
7	Actively coordinate implementation by others of WCMP recommendations										0	
8	District implementation of WCMPs										0	
9	Operate and maintain flood control structures owned by the District or obligated to maintain under agreement										0	
10	Floodprone Property Acquisition Program for inhabited structures										0	
11	Construct flood control capital projects										0	
12	Utilize District property to generate revenue by leasing land for industrial uses such as sand and gravel operations, etc.										0	
13	Utilize District property to generate revenue by leasing land for recreational uses such as golf courses, water parks, etc.										0	
14	Preserve floodplain/floodway for conveyance and habitat through purchase of land or easement.										0	
15	Preserve floodplain/floodway for conveyance and habitat through regulation										0	
16	Preserve floodplain/floodway for conveyance and habitat through planning and incentives such as transfer of development rights, etc.										0	
17	Restore degraded floodway/floodplains to improve habitat and aesthetic value										0	
18	Manage vegetation to improve flood conveyance										0	
19	District maintenance of public recreation features on District structures or property										0	
20	Develop best management practices for river management such as sample zoning ordinances, vegetation management strategies, water quality, etc.										0	
21	Monitor river conditions – vegetation management, aggradation, degradation, water quality and habitat - and recommend appropriate actions										0	
22	Obtain adoption of WCMPs by county and cities										0	
23	Develop a Maricopa County Floodplain Management Standards Board to make floodplain management consistent across the county with membership by the cities, towns and county										0	
24	Create river improvement districts into which property owners pay fees for the construction of flood control improvements										0	
25	Mentoring or development of best management practices to aid other jurisdictions with the O&M of flood control facilities.										0	
26	Manage Adopt-a-River volunteer program in partnership with other agencies										0	

Scoring Explanation: 1=Poor Value; 3=Average Value; 5=Excellent Value

<u>Evaluation Criteria</u>	<u>Score/Ranking 1</u>	<u>Score/Ranking 3</u>	<u>Score/Ranking 5</u>
1) Flood Mitigation 2020 goal Flood conveyance NFIP-CRS Impact	Diminishes ability to achieve 2020 goal Reduces flood conveyance Negatively impacts CRS ranking	No impact on 2020 goal Maintains flood conveyance Neutral	Improves ability to achieve 2020 goal Improves flood conveyance Enhances CRS ranking
2) Public/Partner Expectations Economic Impact Wildlife habitat opportunities Recreation/trails opportunities Scenic value/open space	Negative economic impact Reduces wildlife habitat Reduces multi-use opportunities Negative impact on scenic value	Neutral Maintains existing wildlife habitat Maintains existing multi-use opportunities Neutral	Positive economic impact Improves wildlife habitat Increases multi-use opportunities Positively impacts scenic value
3) Implementation Political acceptability Statutory Authority Complexity and Risk	Low acceptance Requires substantial change to existing statutory authority High complexity & high risk	Partial acceptance Requires minor change to existing statutory authority Routine	High acceptability Existing statutory authority Low complexity & low risk
<u>Secondary Evaluation</u> Cost Initial/Upfront Cost Life cycle net costs	High Cost	Medium Cost	Low Cost

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Appendix F

Activity Aggregate Ranking

**C3RPM
Activity Aggregate Ranking**

Original Activity Number	Activity	Ranking			Aggregate Ranking
		Staff	Expert	Team	
8	District implementation of WCMPs	12	1	2	15
6	Prepare Watercourse Master Plans (WCMP)	6	8	3	17
2	Floodplain delineations	2	10	7	19
11	Construct flood control capital projects	5	14	1	20
9	Operate and maintain flood control structures owned by the District or obligated to maintain under agreement	1	17	6	24
15	Preserve floodplain/floodway for conveyance and habitat through regulation	7	7	10	24
1	Floodplain regulation for unincorporated county & 12 communities	3	13	9	25
16	Preserve floodplain/floodway for conveyance and habitat through planning and incentives such as transfer of development rights, etc.	18	3	5	26
7	Actively coordinate implementation by others of WCMP recommendations	11	9	8	28
20	Develop best management practices for river management such as sample zoning ordinances, vegetation management strategies, water quality, etc.	15	2	11	28
3	Identification of erosion hazard zones as part of Watercourse Master Plans	8	6	20	34
14	Preserve floodplain/floodway for conveyance and habitat through purchase of land or easement.	14	11	14	39
21	Monitor river conditions – vegetation management, aggradation, degradation, water quality and habitat - and recommend appropriate actions	9	12	19	40
17	Restore degraded floodway/floodplains to improve habitat and aesthetic value	19	4	18	41
18	Manage vegetation to improve flood conveyance	13	16	15	44
25	Mentoring or development of best management practices to aid other jurisdictions with the O&M of flood control facilities.	20	15	12	47
5	Sand & gravel permitting (oversight for conveyance and erosion) for unincorporated county and 12 communities	4	23	24	51
23	Develop a Maricopa County Floodplain Management Standards Board to make floodplain management consistent across the county with membership by the cities, towns and county	17	21	13	51
13	Utilize District property to generate revenue by leasing land for recreational uses such as golf courses, water parks, etc.	21	20	17	58
24	Create river improvement districts into which property owners pay fees for the construction of flood control improvements	26	19	16	61
10	Floodprone Property Acquisition Program for inhabited structures	16	24	23	63
26	Manage Adopt-a-River volunteer program in partnership with other agencies	23	18	22	63
4	Regulation of erosion hazard zones outside of the 100-year floodplain limits	22	22	21	65
12	Utilize District property to generate revenue by leasing land for industrial uses such as sand and gravel operations, etc.	25	25	25	75
19	District maintenance of public recreation features on District structures or property	24	26	26	76

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Appendix G
Rankings

Aggregate Ranking

1. District implementation of WCMPs
2. Prepare Watercourse Master Plans (WCMP)
3. Floodplain delineations
4. Construct flood control capital projects
5. Operate and maintain flood control structures owned by the District or obligated to maintain under agreement
6. Preserve floodplain/floodway for conveyance and habitat through regulation
7. Floodplain regulation for unincorporated county & 12 communities
8. Preserve floodplain/floodway for conveyance and habitat through planning and incentives such as transfer of development rights, etc.
9. Actively coordinate implementation by others of WCMP recommendations
10. Develop best management practices for river management such as sample zoning ordinances, vegetation management strategies, water quality, etc.

Staff Ranking

1. Operate and maintain flood control structures owned by the District or obligated to maintain under agreement
2. Floodplain delineations
3. Floodplain regulation for unincorporated county & 12 communities
4. Sand & gravel permitting (oversight for conveyance and erosion) for unincorporated county and 12 communities
5. Construct flood control capital projects
6. Prepare Watercourse Master Plans (WCMP)
7. Preserve floodplain/floodway for conveyance and habitat through regulation
8. Identification of erosion hazard zones as part of Watercourse Master Plans
9. Monitor river conditions – vegetation management, aggradation, degradation, water quality and habitat - and recommend appropriate actions
10. Actively coordinate implementation by others of WCMP recommendations

Expert Ranking

1. District implementation of WCMPs
2. Develop best management practices for river management such as sample zoning ordinances, vegetation management strategies, water quality, etc.
3. Preserve floodplain/floodway for conveyance and habitat through planning and incentives such as transfer of development rights, etc.
4. Restore degraded floodway/floodplains to improve habitat and aesthetic value
5. Identification of erosion hazard zones as part of Watercourse Master Plans
6. Preserve floodplain/floodway for conveyance and habitat through regulation
7. Prepare Watercourse Master Plans (WCMP)
8. Actively coordinate implementation by others of WCMP recommendations
9. Floodplain delineations
10. Preserve floodplain/floodway for conveyance and habitat through purchase of land or easement.

Team Ranking

1. Construct flood control capital projects
2. District implementation of WCMPs
3. Prepare Watercourse Master Plans (WCMP)
4. Preserve floodplain/floodway for conveyance and habitat through planning and incentives such as transfer of development rights, etc.
5. Operate and maintain flood control structures owned by the District or obligated to maintain under agreement
6. Floodplain delineations
7. Actively coordinate implementation by others of WCMP recommendations
8. Floodplain regulation for unincorporated county & 12 communities
9. Preserve floodplain/floodway for conveyance and habitat through regulation
10. Develop best management practices for river management such as sample zoning ordinances, vegetation management strategies, water quality, etc.