ACTION PLAN FOR THE SEAHG TO SPECIFY INFORMATION NEEDS FOR A PROPOSED AMP SOCIOECONOMIC PROGRAM

SOCIOECONOMIC AD HOC GROUP OF THE TWG

BACKGROUND

In 2009 AMWG charged the GCMRC and TWG to develop a socioeconomic program proposal for review by AMWG. This effort has involved to prospectus development by the GCMRC and SAs, proposal development by a group of economists working with GCMRC and the TWG, and continued guidance, reviews and proposal input by the TWG Socioeconomic Ad Hoc Group (SEAHG). An outline of elements of a Proposed Socioeconomic Plan, including information needs, was developed by SEAHG in 2011 as a Table 3 which is attached as Appendix A.

Critical in the initial program development process is specification and recommendation of a proposed set of socioeconomic information needs by the AMWG to the Secretary. This critical set of information needs becomes the primary basis for establishing a required set of science and management activities, i.e. the program to respond to these needs.

Completing a proposed set of socioeconomic information needs by the SEAHG/TWG for recommendation to the AMWG is the specific subject of this prospectus. The effort utilizes the following outcomes of related work on the subject that has occurred in 2010 and 2011.

- A summary of socioeconomic information needs developed by the SEAHG (Table 3, SEAHG 1/10/2010). This comprehensive list draws upon earlier work of the Science Planning Group (SPG 2006) as well as ongoing development efforts by the GCMRC and TWG on the Core Monitoring Plan (GCMRC 2009). This list of socioeconomic information needs is referenced in column 2 of Table 3 attached as Appendix A.
- An expanded list of socioeconomic information needs related to wild land recreation developed by the Survey Instrument Ad Hoc Group (SIAHG 2011). These information needs as provided in the SIAHG final report are attached as Appendix B.
- An expanded list of socioeconomic information needs related to hydropower developed by the SEAHG in 2011 (SEAHG 2011). These information needs as provided in the SEAHG report are attached as Appendix C.

These references are provided in this action plan to provide needed tracking as to how socioeconomic INs are being developed and to assure transparency regarding the SEAHG process.

PROPOSED APPROACH FOR MERGING SOCIOECONOMIC NEEDS OF THE SEAHG AND SIAHG AND DERIVING A FINAL SET

When one reviews the developed socioeconomic information needs by the SEAHG and SIAHG in Appendices A-C duplicity is clearly apparent. In addition, greater clarity may be needed in some of the INs.

The SEAHG Co-Chair Dave Garrett, to assist a next step in our process, created a draft total list of Socioeconomic Information Needs by merging the information from Appendix A, B and C into column 1 of the following Table 1. Column one of Table 1 is then simply INs and questions from Table 3 combined with the new Recreation INs (R1-R13) from Appendix B and new Hydropower INs (H1-H11) from Appendix C.

The SEAHG Co-Chair, at the request of the TWG Chair, has reviewed the list of INs and questions in column 1 and provided assessments of how these could be revised to a straw man set of INs in column 4 of Table 1 without losing or compromising the total information set. This revised set is provided to the full SEAHG for review and recommendation for change.

The TWG Chair has asked that you provide your comments on any revisions to column 4 of Table 1 to SEAHG Co-Chair Dave Garrett by COB Thursday October 6. The revised draft will be developed by Garrett and provided to BOR for a TWG mail out Friday October 7. Please make the revisions as tract changes in the text or specify the change to Garrett by e-mail.

TABLE 1: An approach for developing a straw man set of proposed socioeconomic information needs from our current draft socioeconomic needs and questions.

Draft Socioeconomic INs and Questions from Appendices A-C	**Issues and or Concerns**	**Recommended Revisions**	**Proposed New Socioeconomic INs**
GENERAL INs			
GIN 1(IN 12.1) Develop information that can be used by the TWG, in collaboration with GCMRC, to establish current and target levels for all resources within the AMP as called for in the AMP strategic plan.	The AMWG/TWG/ GCMRC/SAs/etc. are using current information to establish DFCs and or resource target levels for each resource	Delete and pursue through developed values for individual resource DFCs	None
GIN 2 (IN 12.2) Determine what information is necessary and sufficient to make recommendations at an acceptable level of risk.	TWG is pursuing an approach for CMP information needs across resources that incorporates tradeoffs of risk, costs, benefits, etc., to improve recommendations	Delete and pursue in CMP process	None
GIN 3 (RIN 12.1.2) What are the use	Specific use and non-use or market and non-	Delete and pursue market and non-	None

(e.g., hydropower, trout fishing, rafting) and non-use (e.g., option, vicarious, quasi-option, bequest and existence) values of the Colorado River ecosystem	market values should be addressed for individual resources	market IN values by resource	
RECREATION INs			
RIN1 (**IN 12.2)** Determine what information is necessary and sufficient to make recommendations at an acceptable level of risk.	May duplicate the TWG CMP development process	Delete and pursue in TWG CMP development process	None
RIN2 (RIN 11.2.2) What is the baseline measure for resource integrity?	Too vague	Revise and respond in specification of DFCs by resource	None
RIN3 (CMIN 9.1.1) Determine and track the changes attributable to dam operations in recreational quality, opportunities and use, impacts, serious incidents, and perceptions of users, including the level of satisfaction, in the Colorado River Ecosystem.	Too general to develop information unless one includes the universe of recreation and all related socioeconomic change	Delete and develop specific recreation resource INs	None
RIN4 (CMIN 9.1.4) Determine and track the economic benefits of river related recreational opportunities.	Too general	Delete and use RIN5	None
RIN5 (RIN 12.1.1) What is the economic value of the	Minor edits	Retain with edits	**RIN 1**What is the total market and non-market value of the

recreational use of the Colorado River ecosystem downstream from Glen Canyon Dam?			recreational use of the Colorado River ecosystem downstream from Glen Canyon Dam?
RIN 6 (R1.) What is the current total annual market value of the Lees Ferry trout fishery to the regional community, what are its components, hotel, and restaurant, guides, retail purchases, etc. and what are its non-use values?	Minor edit	Retain with edits	**RIN 2** What is the current total annual market value of the Lees Ferry trout fishery to the regional community? What are its components; i.e., hotel and restaurant, guides, retail purchases, etc. and what are its non-market values?
RIN 7 (R 2.) What is the current total annual market value of Lees Ferry recreational boating industry, and what are its non-use values?	Edit for clarity	Retain with edits	**RIN 3** What is the current total annual market value of Lees Ferry recreational boating industry, and what are its non-market values?
RIN 8 (R 3.) How have total annual use and market values for the Lees Ferry trout fishery and recreational boating changed in the pre- and post –rod periods?	None	Retain as is	**RIN 4** How have total annual use and market values for the Lees Ferry trout fishery and recreational boating changed in the pre- and post –rod periods?
RIN 9 (R 4.) Do Lees Ferry recreational boaters and sports fishers express a significant difference in willingness to pay under differing flow conditions?	None	Retain as is	**RIN 5** Do Lees Ferry recreational boaters and sports fishers express a significant difference in willingness to pay under differing flow conditions?
RIN10 (R 5.) How has demand for Lees Ferry and Grand	None	Retain as is	RIN 6 How has demand for Lees Ferry and Grand

Canyon recreational boating (including rafting to Lake Mead) and Lees Ferry sport fishing changed over the pre-and post-rod periods?			Canyon recreational boating (including rafting to Lake Mead) and Lees Ferry sport fishing changed over the pre-and post-rod periods?
RIN11 (R 6.) How has crowding, camp size, multiple campsites in an area, etc. affected the Grand Canyon experience and expressed values	Edit for clarity	Retain with edits	**RIN 7** How has crowding, camp size, multiple campsites in an area, etc. affected the Grand Canyon recreation experience and expressed market and non-market values
RIN 13 (R 8.) How does the social benefit of the Lees Ferry trout fishery differ for walk-in only and boating anglers?	None	Retain as is	**RIN 9** How does the social benefit of the Lees Ferry trout fishery differ for walk-in only and boating anglers?
RIN14 (R 9.) Should case scenarios for contingent valuation more closely approximate expected real variance in operations.	Specific to NPS survey review	Delete	None
RIN15 (R 10.) Regarding the Grand Canyon rafting experience, can questions be added to capture more clearly why people take this special trip, isolating specifically trio attributes like unique wilderness experience, solitude, scenic beauty, etc.?	Specific for NPS survey review	Delete and quantify special attributes of Grand Canyon rafting experience in individual resource IN	None
RIN16 (R 11). Collect data on fishing alternatives	Specific for NPS survey review	Delete	None

for users, focusing on anglers three favorite fishing locations in the southwest.			
RIN17 (R 12). Consider additional survey information from regional fishing groups such as fly fishing groups, or licensed anglers to assess opportunity value foregone.	Specific for NPS survey review	Delete	None
RIN18 (R 13). The survey should reach and qualify anglers that visit walk-in areas only, boat upriver for angling only, and those that do both.	Specific for NPS survey review	Delete	None
HYDROPOWER INs			
HIN 1 (**IN 10.1)** Determine and track the impacts to power users from implementation of Record of Decision dam operations and segregate those effects from other causes such as changes in the power market.	None	Retain as is	**HIN 1.** Determine and track the impacts to federal hydropower consumers from implementation of Record of Decision dam operations and segregate those effects from other causes such as changes in the power market.
HIN 2 (RIN 10.1.1.) What would be the effects on the Colorado River ecosystem and marketable capacity and energy of increasing the daily fluctuation limit?	Minor edit	Retain with edits	**HIN 2** What would be the biophysical effects (list) on the Colorado River ecosystem and marketable capacity and energy of increasing the daily fluctuation limit?
HIN 3 (RIN 10.1.2.)	Minor edits	Retain with edits	**HIN 3** What would

What would be the effects on the Colorado River ecosystem and marketable capacity and energy of increasing the up ramp and down ramp limit?			be the biophysical effects (list) on the Colorado River ecosystem and marketable capacity and energy of increasing the up ramp and down ramp limit?
HIN 4 (RIN 10.1.3) What would be the effects on the Colorado River ecosystem and marketable capacity and energy of raising the maximum power plant flow limit above 25,000 cfs?	Minor edit	Retain with edits	**HIN 4** What would be the biophysical effects on the Colorado River ecosystem and marketable capacity and energy of raising the maximum power plant flow limit above 25,000 cfs?
HIN 5 (RIN 10.1.4) What would be the effects on the Colorado River ecosystem and marketable capacity and energy of lowering the minimum flow limit below 5,000 cfs?	Minor edit	Retain with edits	**HIN 5** What would be the biophysical effects (list) on the Colorado River ecosystem and marketable capacity and energy of lowering the minimum flow limit below 5,000 cfs?
HIN 6 (RIN 10.1.5) How do power-marketing contract provisions affect Glen Canyon Dam releases?	None	Delete	**None**
HIN 7 (SSQ 3-4.) What are the projected hydropower costs associated with the various alternative flow regimes being discussed for future experimental science (as defined in the next phase experimental design)?	Minor edit	Retain with edits	**HIN 7** What are the projected costs to federal hydropower customers associated with the various alternative flow regimes

HIN 8 (CMIN 10.1.1 (as redefined by SPG). Determine and track the marketable capacity and energy produced through dam operations in relation to the various release scenarios (daily fluctuation limit, upramp and downramp limits, etc.).	Duplicates HIN2, HIN3, etc.	Delete	**None**
HIN 9 What are the use and non-use values of the CRE?	Too general	Delete and pursue in individual resource INs	**None**
HIN 10 Segregate and evaluate impacts of differing proposed dam operation experiments on federal hydropower customers i.e., ramping, daily and monthly fluctuations, high and low flows, steady flows, base cases, etc.	Duplicates HIN 7	Delete	None
HIN 11 Develop rapid response capability to evaluate impacts of alternative scenarios on various aspects of power production and related economic implications	Minor edits	Retain with edits	HIN 8 Develop rapid response capability with models to evaluate impacts of alternative proposed flow scenarios on all resources
HIN 12 Develop total economic impact on upper basin water users from alternative dam operations	Minor edits	Retain with edits	HIN 9 Develop total market and non-market impacts on upper basin water users from proposed alternative dam operations
HIN 13 How do market and non-market values change in response to experiments, unanticipated events or other management actions?	Too vague	Delete and pursue for individual resources	None
HIN 14 What are the	Too general	Delete and pursue for	None

non-use values for different resources?		individual resources	
HIN 15 What are the socioeconomic benefits and costs of Glen Canyon Dam operations and experiments to tribal communities?	None	Retain as is	HIN 10 What are the socioeconomic benefits and costs of Glen Canyon Dam operations and experiments to tribal communities?
HIN16 Can multiple cases be used including Pre-Rod and MLFF for change case analysis?	Not an information need	Delete	None
HIN 17 What is the base case for power generation that should be used for change case analysis?	Minor edits	Retain with edits	HIN 11 Define the base case for power generation for change case analysis?
HIN 18 What are the market impacts of differing Glen Canyon flow regimes on customers relative to Pre-Rod?	Minor edits	Retain with edits	HIN 12 What are the market impacts of flow regimes on costs to federal hydropower customers relative to Pre-Rod?
HIN 19 What are the non-market impacts of differing flow regimes on customers relative to Pre-Rod?	Minor edits	Retain with edits	HIN 13 What are the non-market impacts of various flow regimes on federal hydropower customers relative to Pre-Rod?
			HIN 20 Are there non-market values associated with Glen Canyon electrical power, and if so specify and determine these values
			HIN 21 Are there non-market values associated with water released through Glen Canyon Dam, and if so specify and determine these values
CULTURAL RESOURCE INs			
CRIN1 (RIN 11.2.1) What are traditionally important resources and locations for each tribe and other	None	Retain as is	**CRIN1** What are traditionally important resources, and locations for each tribe and other groups

groups?			
CRIN2 (RIN 11.2.2) What is the baseline measure for resource integrity?	Too vague	Clarify and revise	CRIN 2 What is the baseline measure for resource integrity of cultural resources?
QUESTIONS			
Q 1 Resolving questions of how market, non-market, use and non-use values should be integrated into Grand Canyon policy formulation would address questions J and F.	Non an IN	Do not retain as IN; address in plan methods	None
Q 2 C Do we need to determine the value of "specialness" of resources, such as, hydroelectric power generation; visitor satisfaction; value of beaches to support rafting; values of high visibility wildlife e.g., peregrine falcon, big horn sheep; and value of a blue ribbon trout fishery?	This is better determined through assessments of non-market values for individual resources	Do not retain as IN; include as IN under individual resources as appropriate	None
Q 3 D What are points of disagreement on methodologies and assumptions in regard to power analysis?	Not an IN	Do not retain as IN. Pursue in plan methods	None
Q 4 E What would a consensus interagency methodology for modeling hydropower and recreation (e.g., fishing & rafting)	Not an IN	Do not retain as IN. Pursue in plan methods	None

economic outcomes look like?			
Q 5 J What are the requirements for economic information in GCPA, ESA, NHPA, NEPA, CRSPA,?	Not an IN	Do not retain as IN. Pursue in plan methods	None
Q 6 M Can the values of dependable power and water supplies be reflected in future economic analysis?	Not an IN	Do not retain as IN addressed in hydropower INs	None
Q 7 N How much weight should non-use values be given compared to market and non-market use values?	Do not retain as IN.	Do not retain as IN. Address in plan methods	None
Q 8 T What are the non-use values for different resources (including the tribal perspective) so we can include these values in trade-off analysis?	Duplicate of Q 16	Do not retain as IN. Duplicated in Q16	None
Q 9 I What is the base case on optimal power generation?	Duplicated in hydropower INs	Do not retain as IN	None
Q 10 W (partly) Determine impacts on marketed hydropower and recreation values of alternative flow scenarios in real time to support decision making.	Duplicated in hydropower INs	Do not retain as IN	None
Q 11 S (partly) What is the total economic impact to upper basin water users from changes to power generation from base case?	None	Retain as a HIN	HIN 14. What is the total economic impact to upper basin water users from changes to power generation from base case?
Q12B How do high	It is assumed question	Response does exist	None

flow and other experiments affect recreation (river rafting, fishing guides and other associated businesses, including tribes)?	references recreation socioeconomic impacts	in other recreation INs. Do not retain as IN	
Q 13 O What is the economic benefit of river recreation to tribes?	Questions is partly answered in other INs	Do not retain as IN	None
Q 14 L What is the socio cultural impact of recreational use in the Colorado?	Too vague but probably not fully addressed in INs	Clarify so explicit IN can be revised under cultural resources	None
Q 15 R What are the socioeconomic benefits and costs of hydropower generation from HFE to tribal communities?	Minor edit	Retain with edits as CRIN	CRIN 4 What are the market and non-market values of hydropower generation from HFEs to tribal communities?
Q16 T What are the non-use values for different resources (including the tribal perspective) so we can include these values in trade-off analysis?	Major edit; market and non-market values included but not for tribal values	Retain as CRIN	CRIN 5. What are non use and non-market values for different cultural resources from tribal perspective
Q17 A What are the attributes of the river that are important to recreational users?	Exists in IN for recreational boaters	Delete or revise for INs for fisherman and other groups	None
Q18 B How do high flow and other experiments affect recreation (river rafting fishing guides and other associated businesses, including tribes)?	Included in current INs	Do not retain as IN	None
Q 19 G (partly) What are the use and nonuse costs and benefits of HFE	Included in current INs	Do not retain as IN	None

including the marginal costs and benefits of changes in HFE duration and size?			
Q 20 L What is the socio cultural impact of recreational use in the Colorado River on Native American values associated with resources and places in the Grand Canyon?	Included in revised IN	Do not retain as IN	None
Q 21 O What is the economic benefit of river recreation to tribes?	Included in revised IN	Do not retain as IN	None
Q 22 W (partly) Determine impacts on marketed hydropower and recreation values of alternative flow scenarios in real time to support decision making	Revise. Not clear how real time assessments are accomplished	Revise and retain as GIN	GIN 1. Determine impacts on marketed hydropower and recreation values of alternative flow scenarios with real time models to support decision making

APPENDIX A
TABLE 3 PROPOSED SOCIO ECONOMIC PLAN FOR FY 2011-2014 AND INFORMATION NEEDS

Table 3. Proposed Socioeconomic Plan for FY2011-2014, as recommended by the TWG Socioeconomic Ad Hoc Group.

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
1	Socioeconomic research overall and its application to GCDAMP decision-making. Cost: TBD	N/A	Resolving questions of how market, non-market, use and non-use values should be integrated into Grand Canyon policy formulation would address questions J and F.	How will the market, non-market use and nonuse values be integrated into policy analysis? Policy should be developed in a collaborative effort between the AMWG, DOI and DOE/WAPA on how the dollar values of market, non-market and non-use values will be used in the different decision making processes such as NEPA analysis, adaptive management and in any benefit-cost analysis.
2	Staffing. Cost: TBD Time: FY 2012 and beyond	N/A	N/A	As GCMRC shifts to greater emphasis on socioeconomic studies, GCMRC staff with resource economics expertise will be required to conceptualize the required studies, to initiate RFPs and help secure study funding, and to provide study oversight. Resource economics staff, or outside consultants, may be needed to help interpret study results and to outline the implications of these results for agency policy. Additional resource economics staff or contractors may be required to do this effectively. This assumes that most of the socioeconomic research will be conducted by outside consultants. If some of the studies were to be conducted in-house, the requirement for additional staff would be much greater.
	FY 2011			

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
3	Economics 101 educational workshop. Cost: TBD Time: FY 2011	**IN 12.1** Develop information that can be used by the TWG, in collaboration with GCMRC, to establish current and target levels for all resources within the AMP as called for in the AMP strategic plan. **IN 12.2** Determine what information is necessary and sufficient to make recommendations at an acceptable level of risk. **RIN 12.1.1** What is the economic value of the recreational use of the Colorado River ecosystem downstream from Glen Canyon Dam? **RIN 12.1.2** What are the use (e.g., hydropower, trout fishing, rafting) and non-use (e.g., option, vicarious, quasi-option, bequest and existence) values of the Colorado River ecosystem	C. Do we need to determine the value of "specialness" of resources, such as, hydroelectric power generation; visitor satisfaction; value of beaches to support rafting; values of high visibility wildlife e.g., peregrine falcon, big horn sheep; and value of a blue ribbon trout fishery? D. What are points of disagreement on methodologies and assumptions in regard to power analysis? E. What would a consensus interagency methodology for modeling hydropower and recreation (e.g., fishing & rafting) economic outcomes look like? J. What are the requirements for economic information in GCPA, ESA, NHPA, NEPA, CRSPA,? M. Can the values of dependable power and water supplies be reflected in future economic analysis? N. How much weight should non-use values be given compared to market and non-market use values? T. What are the non-use values for different resources (including the tribal perspective) so we can include these values in trade-off analysis?	The panel recommended that GCMRC host a Non Use Values 101 workshop to help TWG & AMWG understand the relevance and value of this type of study for informing future decision making. However, the TWG felt that a more general workshop/training was needed initially to provide AMP stakeholders with a basic introduction to the concepts and rationales underlying socioeconomic studies in general, to clarify terminology, and to provide an overview of how various types of analyses (market, non-market, non-use studies) are conducted and how the resulting data could be to interpreted and applied to inform AMP decisions. This workshop is currently scheduled for March 7, 2011 in Phoenix. This educational workshop is not intended to cover non-use economics in-depth, that will be covered during the non-use workshop now scheduled for FY 2012. Western may provide support for the Economics 101 workshop and to help GCRMC to identify presenters specifically to address power system economics. CREDA will also provide professional opinion to GCRMC on potential power system experts.

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
4	Define GCD operational base case and change cases. Cost: TBD Time: FY 2011 Policy	**IN 10.1** Determine and track the impacts to power users from implementation of Record of Decision dam operations and segregate those effects from other causes such as changes in the power market. **RIN 10.1.1**. What would be the effects on the Colorado River ecosystem and marketable capacity and energy of increasing the daily fluctuation limit? **RIN 10.1.2.** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of increasing the upramp and downramp limit? **RIN 10.1.3** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of raising the maximum power plant flow limit above 25,000 cfs? **RIN 10.1.4** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of lowering the minimum flow limit below 5,000 cfs? **RIN 10.1.5** How do power-marketing contract provisions affect Glen Canyon Dam releases?	I. What is the base case on optimal power generation? W. (partly) Determine impacts on marketed hydropower and recreation values of alternative flow scenarios in real time to support decision making. S. (partly) What is the total economic impact to upper basin water users from changes to power generation from base case?	This task addresses the fundamental need to define a base case (i.e., a "standard") against which proposed changes in GCD operations can be evaluated in the future. The panel recommended that TWG select an operational scenario that reflects current (MLFF) operations. The base case needs to define monthly volumes, hourly (or even within hourly) outputs, amount of peak and off-peak power production, etc. There is disagreement of what the base case should reflect; pre-rod conditions or MLFF. We recommend developing a base cast that captures current MLFF operations. The TWG also believes there would be value in using this base case in the future to assess change relative to pre-rod operation such that the change from various operations could be assessed to show how moving from one scenario to the other either results in net benefits or costs. This step, defining the base cases and the change cases to be analyzed in the future is essential to further analyses. **TWG – we need to discuss this further as the ad hoc group did not reach consensus on this approach. We have disagreement over the base case, pre-rod or MLFF or potentially both.**

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
5	Peer review of the WAPA GTMax power model. Cost: $30,000 Time: FY 2011	**SSQ 3-4.** What are the projected hydropower costs associated with the various alternative flow regimes being discussed for future experimental science (as defined in the next phase experimental design)? **IN 10.1.** Determine and track the impacts to power users from implementation of ROD dam operations and segregate those effects from other causes such as changes in the power market. **CMIN 10.1.1** (as redefined by SPG). Determine and track the marketable capacity and energy produced through dam operations in relation to the various release scenarios (daily fluctuation limit, upramp and downramp limits, etc.).		**Workplan: HYD 10.R2.11-12 p. 150** WAPA will provide the GCMRC with a full description of the GTMax model including equations. GCMRC will organize and host a workshop involving technical staff from WAPA, a representative from National Argonne Laboratories, and a small group of independent hydropower modeling experts. During this workshop, the functions, assumptions, and data needed to run the GTMax model and possibly other models will be described in detail and demonstrated through hands-on involvement of all subject experts. GCDAMP stakeholders will be invited to observe the workshop, but the focus of this workshop will be on providing an opportunity for independent experts to become thoroughly familiar with and be able to independently assess GTMax and other relevant models in terms of their potential suitability for use as an electrical power system economic forecasting tool and post hoc assessment tool in the AMP.

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
6	Power modeling: conduct the base case analysis and initial power modeling using currently available models and test "spill over" effects with the WECC. Cost: TBD Time: FY 2011 WECC = Western Electrical Coordinating Council (i.e., western grid).	**IN 10.1** Determine and track the impacts to power users from implementation of Record of Decision dam operations and segregate those effects from other causes such as changes in the power market. **RIN 10.1.1**. What would be the effects on the Colorado River ecosystem and marketable capacity and energy of increasing the daily fluctuation limit? **RIN 10.1.2.** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of increasing the upramp and downramp limit? **RIN 10.1.3** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of raising the maximum power plant flow limit above 25,000 cfs? **RIN 10.1.4** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of lowering the minimum flow limit below 5,000 cfs? **RIN 10.1.5** How do power-marketing contract provisions affect Glen Canyon Dam releases? **CMIN 10.1.1** (as redefined by SPG). Determine and track the marketable capacity and energy produced through dam operations in relation to the various release scenarios (daily fluctuation limit, upramp and downramp limits, etc.).	I. What is the base case on optimal power generation? W. (partly) Determine impacts on marketed hydropower and recreation values of alternative flow scenarios in real time to support decision making. S. (partly) What is the total economic impact to upper basin water users from changes to power generation from base case?	**Workplan: HYD 10.R2.11-12 p. 150** Implement the report recommendation to complete the base case study for hydroelectric operations in FY 2011. The detailed description of the base case study will be prepared by GCMRC, with input from WAPA and appropriate experts, based on the description in the Socioeconomic Panel's report, and input from the GTMax workshop results, and any additional specifications by the TWG/AMWG. This base case study will also include an analysis of "spill over" with the WECC. The base case and spill over analysis will be completed by WAPA and a report prepared at no cost to the AMP. The report will be submitted by WAPA to GCMRC for peer review. GCMRC will oversee the peer review process and use the Science Advisors as needed. WAPA will incorporate changes into the report based on comments received from the peer review process. If WAPA's power flow models demonstrate changes in flows at the border of WAPA's system, or at interconnection points with other systems, then a more extensive modeling effort may be required, to check for changes in four indicators throughout the WECC (generation, transmission, reliability, and hub prices). If needed in a second step, the panel recommended that GCMRC solicit outside consultants to perform the broader WECC analyses using models that are most appropriate for this purpose. The panel also suggested

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
	FY2012			
7	Non-use values workshop to incorporate review of the 1994 Non Use Value Survey and update the questionnaire. Cost: $0 Time: FY 2012	**RIN 12.1.2** What are the use (e.g., hydropower, trout fishing, rafting) and non-use (e.g., option, vicarious, quasi-option, bequest and existence) values of the Colorado River ecosystem **RIN 12.1.3** How does use (e.g., hydropower, trout fishing, rafting) and non-use (e.g., option, vicarious, quasi-option, bequest and existence) values change in response to an experiment performed under the Record of Decision, unanticipated event, or other management action?	T, Q, G, C, N	A new non-use value study is needed to properly assess resource values associated with Grand Canyon, and potential impacts to those values from dam operations. The focus would be on values that are important to tribes and the broader American public that are not dependent on human use or consumption for their value. Data on tribal values may be gathered as part of this study depending on the outcome of preliminary investigations. Preparing for this study will take considerable time; therefore the panel recommended that GCMRC and TWG start planning early for a future non-use value study, taking into account changes that have occurred in the canyon and to dam operations since 1995. Initiating Step #1 – discussion and review of old questionnaire – could be done at no additional cost to the AMP. However, TWG is recommending that this be accomplished in a workshop format to include a more detailed review of non-use economics.

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
8	Scoping activity: identify tribes for specific surveys of preferences and attitudes and determine if separate tribal studies are needed. Cost: $5,000 Time: FY 2012	**RIN 11.2.1** What are traditionally important resources and locations for each tribe and other groups? **RIN 11.2.2** What is the baseline measure for resource integrity?	B. How do high flow and other experiments affect recreation (river rafting fishing guides and other associated businesses, including tribes)? O. What is the economic benefit of river recreation to tribes? L. What is the sociocultural impact of recreational use in the Colorado? R. What are the socioeconomic benefits and costs of hydropower generation from HFE to tribal communities? T. What are the non-use values for different resources (including the tribal perspective) so we can include these values in trade-off analysis?	There is a need to better integrate tribal values in AMP decision making. This task is intended as a scoping activity to determine how tribal values should be assessed and then integrated into AMP decision making. Future activities per the panel's recommendations are provided below but they are placeholders if scoping finds that a separate process is needed to specifically address tribal preferences and values. This scoping process should fully include the tribes and any similar processes they may be involved in (such as the surveys currently being conducted by the Hopi Tribe as part of their monitoring project).
9	Recreation Use Analysis: Part A (Market): initiate recreation expenditure analysis of Glen Canyon anglers, day-use rafters, and Grand Canyon and Marble Canyon white water users including Diamond Creek to Mead rafters. Part B (Non-Market): initiate development of survey instrument for recreation non-market use analysis and obtain OMB clearances.	**CMIN 9.1.1** Determine and track the changes attributable to dam operations in recreational quality, opportunities and use, impacts, serious incidents, and perceptions of users, including the level of satisfaction, in the Colorado River Ecosystem. **CMIN 9.1.4** Determine and track the economic benefits of river related recreational opportunities. **RIN 12.1.1** What is the economic value of the recreational use of the Colorado River ecosystem downstream from Glen Canyon	A. What are the attributes of the river that are important to recreational users? B. How do high flow and other experiments affect recreation (river rafting fishing guides and other associated businesses, including tribes)? C. Do we need to determine the value of "specialness" of resources, such as, hydroelectric power generation; visitor satisfaction; value of beaches to support rafting; values of high visibility wildlife and value of a blue ribbon trout fishery? G. (partly) What are the use and nonuse costs and benefits of HFE	The panel proposed that GCMRC undertake socioeconomic studies focused on recreational values that include both market and non-market *use* values for specific river reaches. While the panel suggested that economics of scale could be had by gathering recreational data on both market and non market aspects at the same time, this is really a program decision. Market data are easier to gather and can be analyzed easily. Data on recreational consumer surplus (preferences) will require a proper survey design and additional input from stakeholder groups. The expenditure data be gathered and analyzed while the nonmarket survey instrument is being

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
	Cost: $150,000 - $200,000 Time: FY 2012-2013	Dam?	including the marginal costs and benefits of changes in HFE duration and size? L. What is the sociocultural impact of recreational use in the Colorado River on Native American values associated with resources and places in the Grand Canyon? O. What is the economic benefit of river recreation to tribes? W. (partly) Determine impacts on marketed hydropower and recreation values of alternative flow scenarios in real time to support decision making.	developed The regional economic effects of GCD experiments and other DOI actions will be analyzed. This analysis would be devoted to the impact on the regional economy as a result of changes in expenditures resulting from these actions. The groups of interest for this study would be Glen Canyon day use rafters and anglers and Grand Canyon Whitewater rafting of commercial and private boaters from Lees Ferry to Diamond Creek or Lake Mead and the Hualapai white water recreational enterprise that services Diamond Creek to Lake Mead. This expenditure data can be used in the IMPLAN regional input-output model to estimate the positive economic impacts to the surrounding counties and Indian Reservations in terms of direct and indirect personal income and employment generated. Indirect effects would capture the multiplier effects from subsequent rounds of spending in the surrounding region. Separate interviews with the guides and the tribes will be needed to obtain their expenditures associated with the guiding, access fees, food, and other costs. We recommend that the economic impact analysis use two impact areas. For consistency with past research, it would be appropriate to use the counties surrounding the Grand Canyon. However, since many outfitters have their base of operation in

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
				Nevada or Salt Lake City, it would be appropriate to show results using a broader multi-state economic impact area (Report page 16)
10	Power modeling: conduct change case analyses, and power flow studies that show the financial and economic consequences of GCD management alternatives on WAPA and WAPA customers. Cost: TBD Time: FY 2012	**RINS 10.1.1-10.1.5**	I. What is the base case on optimal power generation? W. (partly) Determine impacts on marketed hydropower and recreation values of alternative flow scenarios in real time to support decision making. S. (partly) What is the total economic impact to upper basin water users from changes to power generation from base case?	This task would evaluate economic outcomes from alternative GCD operations in relation to the base case. TWG/AMWG/or DOI first need to define what "change cases" they want to analyze before this can be initiated (see task above).

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
11	[Contingent upon power modeling in FY 2011] WECC power analysis: GCMRC to solicit firms for future WECC analysis and work with WAPA to establish framework for future economic and financial analyses if deemed necessary by power modeling completed in FY 2011. Cost: TBD WECC = Western Electrical Coordinating Council (i.e., western grid).	**IN 10.1** Determine and track the impacts to power users from implementation of Record of Decision dam operations and segregate those effects from other causes such as changes in the power market. **RIN 10.1.1**. What would be the effects on the Colorado River ecosystem and marketable capacity and energy of increasing the daily fluctuation limit? **RIN 10.1.2.** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of increasing the upramp and downramp limit? **RIN 10.1.3** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of raising the maximum power plant flow limit above 25,000 cfs? **RIN 10.1.4** What would be the effects on the Colorado River ecosystem and marketable capacity and energy of lowering the minimum flow limit below 5,000 cfs? **RIN 10.1.5** How do power-marketing contract provisions affect Glen Canyon Dam releases?	I. What is the base case on optimal power generation? W. (partly) Determine impacts on marketed hydropower and recreation values of alternative flow scenarios in real time to support decision making. S. (partly) What is the total economic impact to upper basin water users from changes to power generation from base case?	This project is contingent upon the power modeling done by WAPA in FY 2011 to determine "spill over" effects to the WECC. The panel believed there was a need to more fully analyze how proposed changes in GCD operations may affect the larger western electrical grid, thus influencing power market values. The need to evaluate the impacts on the WECC would be assessed in step 1 under power modeling in FY 2011 and 2012. During FY2011, information generated by the WAPA modeling effort would be used to develop budgets for FY2012 and beyond, once a determination is made about the potential geographical scope of economic effects and whether the expanded WECC-level analysis is deemed necessary to influence GCDAMP decision-making. If determined that WAPA's models are not sufficient to capture "spill over" effects, GCMRC should solicit outside consultants to perform the WECC analyses using models that are appropriate for this purpose. If these tasks are needed, GCMRC should enlist additional expertise to develop the RFQs for the power modeling work (see staffing).
	FY2013			

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
12	Recreation Use Analysis Continues: Part B (Non-Market): initiate recreation surveys of Glen Canyon anglers, day-use rafters, and Grand Canyon and Marble Canyon white water users including Diamond Creek to Mead rafters. Cost: =$150,000 - $200,000 Time: FY 2013-2014	**CMIN 9.1.1** Determine and track the changes attributable to dam operations in recreational quality, opportunities and use, impacts, serious incidents, and perceptions of users, including the level of satisfaction, in the Colorado River Ecosystem. **CMIN 9.1.4** Determine and track the economic benefits of river related recreational opportunities. **RIN 12.1.1** What is the economic value of the recreational use of the Colorado River ecosystem downstream from Glen Canyon Dam?	A. What are the attributes of the river that are important to recreational users? B. How do high flow and other experiments affect recreation (river rafting fishing guides and other associated businesses, including tribes)? C. Do we need to determine the value of "specialness" of resources, such as, hydroelectric power generation; visitor satisfaction; value of beaches to support rafting; values of high visibility wildlife and value of a blue ribbon trout fishery? G. (partly) What are the use and nonuse costs and benefits of HFE including the marginal costs and benefits of changes in HFE duration and size? L. What is the sociocultural impact of recreational use in the Colorado River on Native American values associated with resources and places in the Grand Canyon? O. What is the economic benefit of river recreation to tribes? W. (partly) Determine impacts on marketed hydropower and recreation values of alternative flow scenarios in real time to support decision making.	GCMRC should undertake socioeconomic studies focused on recreational values that include both market and non-market *use* values for specific river reaches. In FY 2013, work would focus on the second phase of this project implementing the non-market use values surveys. This recommendation combines areas from Glen Canyon down to Mead in order to maximize efficiency in developing surveys. The intent of the non-market use work is to determine the broader value of the resource to recreation users beyond the simple expenditure analysis under the market use analysis (above). This broader analysis of "willingness to pay" for changes in resource conditions would help the AMP in determining economic consequences of actions by including overall changes in benefits. For example, changes in operations might increase the value of power but might have a negative consequence on the overall benefits to recreational visitors or other user groups. This analysis would put dollar amounts on those changes in benefits and allow an economic analysis to be performed on GCDAMP decisions.

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
13	[Contingent on scoping results FY 2012] Prepare surveys of tribal preferences and social values. The analysis could include consideration of both use and non-use values and include sociology and socioeconomics. Cost: $40,000 Time: FY 2013	**RIN 11.2.1** What are traditionally important resources and locations for each tribe and other groups? **RIN 11.2.2** What is the baseline measure for resource integrity?	B. How do high flow and other experiments affect recreation (river rafting fishing guides and other associated businesses, including tribes)? O. What is the economic benefit of river recreation to tribes? L. What is the sociocultural impact of recreational use in the Colorado? R. What are the socioeconomic benefits and costs of hydropower generation from HFE to tribal communities? T. What are the non-use values for different resources (including the tribal perspective) so we can include these values in trade-off analysis?	This activity is dependent on the outcome of the scoping exercise in FY 2012. Although it is important to consider tribal values in AMP decision making it is unclear whether these values require separate analyses or whether these values could be adequately considered during the use and non-use tasks described elsewhere in this plan. It is important that this research program incorporates tribal values so that decisions can incorporate those values in a meaningful way. A socioeconomic research program needs to recognize not only the economic impacts but also the social impacts on the tribes that result from changes in dam operations. Socioeconomic impacts to Tribes may suggest both opportunities and constraints that should be considered as changes in river operations are contemplated. Information to be covered in this survey could include attitudinal questions about preferences and impacts of flow regimes. Tribal representatives would be invited to participate in the development and testing of the survey.
14	Initiate OMB clearance to conduct surveys with focus groups in FY 2014 in order to develop a non-use values survey in FY 2015. Cost: $20,000			
	FY2014			

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
15	[Contingent on scoping results FY 2012] Conduct tribal surveys for preferences and social values potentially affected by GCD operations. Cost: $100,000 Time: FY 2014-2015		O, L, R, B, T	A socioeconomic research program for GCMRC needs to recognize not only the socioeconomic impacts but also the social impacts on the Tribes that result from changes in dam operations.
16	Conduct focus groups and piloting of Non-Use Value survey, and initiate OMB clearance for full survey implementation. Cost: $200,000		T, Q, G, C, N	The panel recommended that GCMRC start to plan for a future non-use value study to be ready for actual implementation. These FY2014 tasks are part of the preparatory phase preceding implementation of the actual survey.
17	Develop "real-time decision-making spreadsheet" for power impacts and benefits. Cost: $50,000 - $100,000			To the extent that repeated analyses of power market impacts are required as part of the future decision-making it may well be possible to ease the calculations by developing a simplified response-surface model, embodied in a spreadsheet, linking changes within the CRSP service area to impacts on prices and capacity requirements within WECC. The GTMax Lite model may be applicable to develop this, but only after adequate testing is done in tasks above.
	FY2015			

ROW #	Proposed Study/Activity	AMP Info Needs	TWG Questions to be addressed	Proposed Use by AMP (SEAGH Perspective)
18	Conduct full non-use value survey. Cost: $500,000 Time: FY 2015-2016		T, Q, G, C, N	By 2015, it will have been 20 years since the Welsh et al. (1995) study was conducted. Much has changed including the management scenarios in the Grand Canyon and the demographics of the U.S. population, especially in the Four Corners Region. As recommended by the National Research Council in its report "Downstream", these nonuse values are quite important to understanding the public benefits of alternative management strategies in the Grand Canyon. By tying flow-related changes to the environment to the non-use value survey, the incremental or marginal nonuse values can be estimated that are most useful for evaluating potential management actions in the Grand Canyon.
19	Implement Core Monitoring Plan for Socioeconomics. Cost: TBD		B, W, A, O, L, G, C, R	The panel recommends that socioeconomic surveys be repeated every 2-3 years as a monitoring tool to assess how changes in GCD operations affect recreational values. This should be integrated into the Core Monitoring Plan. A placeholder for socioeconomics should be kept in the initial General Core Monitoring Plan.

APPENDIX B
SIAHG ACTIVITIES AND FINDINGS AND RECREATION INFORMATION NEEDS

APPENDIX B

SIAHG ACTIVITIES AND FINDINGS: NPS RECOMMENDATIONS ON RECREATION INs

R 1. What is the current total annual market value of the Lees Ferry trout fishery to the regional community, what are its components, hotel and restaurant, guides, retail purchases ,etc. and what are its non-use values?

R 2. What is the current total annual market value of Lees Ferry recreational boating industry, and what are its non-use values?

R 3. How have total annual use and market values for the Lees Ferry trout fishery and recreational boating changed in the pre and post-rod periods?

R 4. Do Lees Ferry recreational boaters and sports fishers express a significant difference in willingness to pay under differing flow conditions?

R 5. How has demand for Lees Ferry and Grand Canyon recreational boating (including rafting to Lake Mead) and Lees Ferry sport fishing changed over the pre and post-rod periods?

R 6. How has crowding, camp size, multiple campsites in an area, etc. affected the Grand Canyon experience and expressed values?

R 7. How has Native American use of the Lees Ferry trout fishery changed from the period pre and post-rod?

R 8. How does the social benefit of the Lees Ferry trout fishery differ for walk-in only and boating anglers?

R 9. Should case scenarios for contingent valuation more closely approximate expected real variance in operations?

R 10. Regarding the Grand Canyon rafting experience, can questions be added to capture more clearly why people take this special trip, isolating specifically trip attributes like unique wilderness experience, solitude, scenic beauty, etc?

R 11. Collect data on fishing alternatives for users, focusing on anglers three favorite fishing locations in the southwest.

R 12. Consider additional survey information from regional fishing groups such as fly fishing groups, or licensed anglers, to assess opportunity value foregone.

R 13. The survey should reach and qualify anglers that visit walk-in areas only, boat upriver for angling only, and those that do both.

APPENDIX C
SEAHG ACTIVITIES AND FINDINGS AND HYDRO POWER INFORMATION NEEDS

APPENDIX C:

SEAHG COMMITTEE FINDINGS ON HYDROPOWER INFORMATION NEEDS; 8/30/2011

H 1. What are the use and non-use values of the CRE?

H 2. Segregate and evaluate impacts of differing proposed dam operation experiments on power users, i.e., ramping, daily and monthly fluctuations, high and low flows, steady flows, base cases, etc.

H 3. Develop rapid response capability to evaluate impacts of alternative scenarios on various aspects of power production and related economic implications.

H 4. Develop total economic impact on upper basin water users from alternative dam operations.

H 5. How do market and non-market value change in response to experiments, unanticipated events or other management actions?

H 6. What are the non-use values for different resources?

H 7. What are the socioeconomic benefits and costs of Glen Canyon Dam operations and experiments to tribal communities?

H 8. Can multiple cases be used including Pre-Rod and MLFF for change case analysis?

H 9. What is the base case for power generation that should be used for change case analysis?

H 10. What are the market impacts of differing Glen Canyon flow regimes on customers relative to Pre-Rod?

H 11. What are the non-market impacts of differing Glen Canyon flow regimes on customers relative to Pre-Rod?