

**Glen Canyon Dam Adaptive Management Work Group**  
**Agenda Item Information**  
**August 24-25, 2010**

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Agenda Item

Socioeconomic Workshop and Panel Report

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Action Requested

- ✓ Action recommended by TWG: please see the TWG motion below under “Previous Action Taken.”

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Presenters

Shane Capron, Chair, Technical Work Group

Michael Hanemann, Socioeconomic Panel Member, Chancellor’s Professor of Agricultural and Resource Economics University of California, Berkeley, California

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Previous Action Taken

- ✓ Other:  
On December 2-3, 2009, the Grand Canyon Monitoring and Research Center (GCMRC) hosted a Socioeconomic Workshop for the Technical Work Group (TWG) of the Glen Canyon Dam Adaptive Management Program (GCDAMP). See “Background Information” for more information on the workshop and its outcomes.
- ✓ By AMWG: At its February meeting, AMWG was given a presentation about the Socioeconomic Workshop. The panel’s report was not complete at that time, and there were diverse opinions expressed about how to proceed. The Secretary’s Designee said she didn’t feel the program was ready for a policy decision on a particular budget line item for this coming year. She felt the subject needed more refinement in terms of the report from the workshop, evaluation by the TWG for a particular program going forward, and then further discussion by the AMWG.
- ✓ By TWG: At its conference call on July 26, 2010, TWG passed a motion by a vote of 8-7 with 2 abstentions. The complete motion is attached at the end of this document.

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Relevant Science

- ✓ The following describes the relevant research or monitoring on this subject:  
Hamilton, J., Hanemann, M., Loomis, J., and Peters, L., 2010, Final Report of the GCMRC Socioeconomic Research Review Panel: Report of a Workshop held December 2-3, 2009, Phoenix, Arizona. Prepared for the U.S. Geological Survey, Grand Canyon Monitoring and Research Center, February 26, 2010.  
[\[http://www.usbr.gov/uc/rm/amp/twg/mtgs/10mar15/Attach\\_03b.pdf\]](http://www.usbr.gov/uc/rm/amp/twg/mtgs/10mar15/Attach_03b.pdf)
- Harpman, D.A. and Douglas, A.J., 2005, Status and Trends of Hydropower Production at Glen Canyon Dam, *in* Gloss, S.P., Lovich, J.E., and Melis, T.S., eds., The State of the

Colorado River Ecosystem in Grand Canyon: U.S. Geological Survey Circular 1282, 165-176p.

Loomis, J., Douglas, A.J., and Harpman, D.A., 2005, Recreation Use Values and Nonuse Values of Glen and Grand Canyons, *in* Gloss, S.P., Lovich, J.E., and Melis, T.S., eds., The State of the Colorado River Ecosystem in Grand Canyon: U.S. Geological Survey Circular 1282, 153-164p.

National Research Council, 1996, River resource management in Grand Canyon--committee to review the Glen Canyon environmental studies, Commission on Geosciences, Environment, and Resources: Washington, D.C., National Academy Press, p. 226 (see specifically Chapters 7 and 9).

National Research Council, 1999, Downstream--adaptive management of Glen Canyon Dam and the Colorado River ecosystem: Washington D.C., National Academy Press, 230 p. (see specifically pages 109-114 and Appendix F).

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### Background Information

On December 2-3, 2009, the Grand Canyon Monitoring and Research Center (GCMRC) hosted a Socioeconomic Workshop for the Technical Work Group (TWG) of the Glen Canyon Dam Adaptive Management Program (GCDAMP). The purpose of the workshop was to review recently completed and ongoing socioeconomic studies that are directly relevant to assessing effects and trade-offs of Glen Canyon Dam operations and, with this information as a starting point, have a facilitated discussion among GCDAMP stakeholders to assist GCMRC in identifying and prioritizing socioeconomic questions and topics that would be useful to inform future GCDAMP decision making, both within the next 3-5 years (Phase I) and farther out in time (Phase II).

Members of the GCDAMP Technical Work Group (TWG) and Adaptive Management Work Group (AMWG), representing 19 of the 24 agencies, tribes and organizations in the GCDAMP, participated in the workshop, along with seven invited presenters, four members of an expert independent panel, and four other interested parties. TWG members were asked for input on the scope and objectives of future economic studies, and to identify and prioritize information needs for Phase I and Phase II work. The members of the independent panel were asked to give GCMRC general guidance on scoping and refining the prioritization of Phase II work, as well as specific guidance to include in a future RFP for Phase I studies.

The members of the independent panel were as follows:

Joel Hamilton  
Professor Emeritus of Agricultural Economics and Statistics  
University of Idaho, Moscow, Idaho

Michael Hanemann  
Chancellor's Professor of Agricultural and Resource Economics  
University of California, Berkeley, California

John Loomis  
Professor of Agricultural and Resource Economics

## Socioeconomic Workshop and Panel Report, continued

Colorado State University, Fort Collins, Colorado

Lon Peters

Northwest Economic Research, Inc., Portland, Oregon

Discussion was stimulated by a series of presentations by technical experts with research experience on Grand Canyon issues, as follows:

Dr. John Duffield, University of Montana, Missoula, [Economic Values for National Park System Resources within the Colorado River Basin](#)

Dr. David Harpman, Bureau of Reclamation, Denver, [Integrative Recreation Economics Tool](#)

Dr. Yeon-Su Kim, Northern Arizona University, Flagstaff, [Assessing Impacts of the LSSF Experiment on Regional Recreation Economics](#)

Mr. David Marcus, independent consultant, Berkeley, [Glen Canyon Dam Releases – Economic Considerations](#)

Mr. Clayton Palmer, Western Area Power Administration, Salt Lake City, [The Alchemy of Power Economics: Converting Watts to Dollars](#)

Dr. Thomas Veselka, Argonne National Laboratories, Chicago, [Estimating Colorado River Storage Project Power Economics with the GTMax Model](#)

Dr. Michael Welsh, Christensen and Associates, Madison, [GCES Nonuse Value Study](#)

Each presentation was followed by vigorous discussion among all workshop attendees. At the conclusion of the presentations, the workshop participants were assembled into four small groups to brainstorm about the socioeconomic information needs of the GCAMP. These brainstorming results were compiled into a list, and participants were asked to rate the importance of each item, and to specify whether they should be addressed in phase I or phase II of a research program. Because very little socioeconomic research has been previously undertaken by the GCDAMP, and because most of the TWG participants are in the early stages of learning the subject, their opinions as expressed during the workshop can be best understood as brainstorming results.

The expert panel presented a draft report the following day, which was discussed by the workshop group. The panel finalized its report on February 26, 2010. A copy of the panel's full report can be found at [http://www.usbr.gov/uc/rm/amp/twg/mtgs/10mar15/Attach\\_03b.pdf](http://www.usbr.gov/uc/rm/amp/twg/mtgs/10mar15/Attach_03b.pdf). The final report contains a number of recommendations for studies to be undertaken in the next several fiscal years. The panel recommended that the GCDAMP start to make progress on multiple socioeconomic fronts simultaneously. Specifically, the report included the following recommendations:

### **Fiscal Year 2010**

- Initiate Requests for Quotes (RFQs) for power models (consultants, perhaps NAU or other qualified entity). No additional budget will be required if this is done by existing staff. However, it might be worthwhile for GCMRC to consider enlisting some additional socioeconomic expertise when developing the RFQs, in which case additional funding may be required to support this activity in FY10.

### **Fiscal Year 2011**

- Initiate recreation surveys of Glen Canyon anglers and day-use rafters (\$50,000 - \$100,000).
- Identify tribes for specific surveys of preferences and attitudes (\$5,000).

## Socioeconomic Workshop and Panel Report, continued

- Offer “Nonuse Values 101” to educate staff on topic (\$15,000, plus participation of David Harpman).
- Power modeling (cost depends on whether there is a non-proprietary model of WECC and, if not, the cost of access to a proprietary model).

### **Fiscal Year 2012**

- Conduct power flow studies that show the financial and economic consequences of Glen Canyon management alternatives on WAPA, WAPA customers, and the Upper Basin Fund (\$50,000).
- Recreation surveys continue, now covering whitewater users including Diamond Creek to Mead rafters (\$100,000 - \$150,000).
- Prepare surveys of tribal preferences and attitudes (\$20,000).
- Conduct focus groups and piloting of Nonuse Value survey, and initiate OMB clearance (\$200,000).
- Power modeling (cost to be determined).

### **Fiscal Year 2013**

- Expand power flow studies to include the financial and economic consequences of Glen Canyon Dam operations
- Recreation surveys continue, repeating the coverage of Glen Canyon and day-use \$150,000
- Add tribal surveys. \$60,000
- Conduct full nonuse value survey. \$500,000

### **Fiscal Year 2014**

- Develop “real-time decision-making spreadsheet” (\$50,000 - \$100,000)
- Recreation surveys continue, repeating coverage of white water users \$150,000

In the FY2011-2012 work plan, GCMRC proposes to conduct an evaluation of WAPA’s GTMax model to assess its suitability for conducting future power flow studies, as recommended by the panel. The FY2011-2012 work plan also includes a project to collect some basic recreation-related survey data in conjunction with the creel survey work being done by Arizona Game and Fish Department at Lees Ferry. However, the current work plan does not contain projects or funding for conducting additional power modeling in FY2011, or for implementing the panel’s FY2012 recommendations.

### **TWG Report**

A TWG ad hoc reviewed the final report and made recommendations for TWG consideration. Given the sideboards provided by the AMWG, TWG tried to make a recommendation that incorporated the needs of the program while avoiding specifically incorporating those recommendations in the FY 2011-12 budget and workplan. However, one project (evaluation of the GTMax model, HYD 10. R2.11-12, with a follow-up base-case analysis) was incorporated into the TWG recommendation and was generally approved by AMWG at its May 2010 budget webinar meeting. GCRMC has also included a recreation survey (REC 9.R4.11; \$25,000 in FY 2011 and 2012). TWG considered a motion to remove this from the workplan but it failed 7 to 10. The TWG was aware however, that the ad hoc committee was still reviewing the panel’s report and would have additional recommendations regarding economic studies.

In general, the TWG recommended implementing the market component of the panel recommendations over the next couple of years and proposed initiating some elements of the non-market plan as timing and funding allows. The goal was to provide a recommendation to AMWG that could be implemented in the FY 2011 and 2012 workplan and budget, however not all of the potential costs of these activities could be accounted for by TWG without reprioritizing the budget. Given the direction by AMWG, TWG felt that this was as far as we could develop the recommendation without further policy guidance from AMWG. For example, although some items proposed for possible implementation in FY 2011 are at least partially funded (e.g., base case analysis), work in 2012 and beyond (e.g., change case analysis, recreation expenditure analysis, non-market studies) would need additional funds. TWG could work further, and is asking for AMWG guidance to do so, to develop a more detailed plan for 2012 and beyond which could be considered during potential revisions to the second-year budget (2012) next spring.

The TWG felt it was important to implement the power economics work and recreation expenditure analyses first and make progress on these two fronts before moving forward on the non-market studies. The TWG ad hoc recommended a phased approach in which the “low hanging fruit” -- the market-based economics studies--would be accomplished first. The TWG also recommends an “economics 101” course to be made available to the GCDAMP family, ideally before the end of 2010. While the power economics work is being completed, GCMRC would work on developing a study plan for non-market studies and build TWG support for those specific studies over the next year or so. Thus, we would potentially be able to begin work on the non-market portion of the recommendation in 2012 if AMWG wanted to pursue this approach and timeline. Beyond these recommendations, TWG would like additional time to consider the workshop report more fully as well as the other non-market and non-use recommendations.

Below is the full motion passed by the TWG by a vote of 8 yes, 7 no, 2 abstaining during the July 27, 2010 conference call:

The TWG has received the report entitled "Final Report of the GCMRC Socioeconomic Research Review Panel" dated February 26, 2010. The TWG has discussed the workshop recommendations related to electrical power production and recreation surveys. The TWG intends to more fully consider the workshop report and all the recommendations after the August AMWG meeting, but acknowledges the need to make immediate recommendations now for the FY 2011 and 2012 BWPH. The TWG acknowledges that we have not fully considered the budgetary implications of implementing this plan. If AMWG approves implementing this plan, addition funds would be needed in 2011 and 2012, this may require re-prioritization of current funds.

In general, the TWG supports a phased approach as described below:

- a) In FY 2011 and 2012 implement the most expedient action items including the Base Case, and Change Case for electrical power, and Recreation Expenditure analyses. These have been identified as the most expedient items, can likely be implemented without substantial costs to the program in these years, and represents “low hanging” fruit to get the process moving.
- b) In FY 2011 and 2012, begin the work of educating the program about market and non-market recreation economics, and utilize experts as needed to scope out the appropriate non-market (e.g., willingness to pay) economic work to be done and how specifically to

do that in order to implement the workshop recommendations while tailoring those to the needs of the GCDAMP. This would include the “economics 101” course for TWG and AMWG, as well as GCMRC working with other appropriate experts to develop a non-market economics study plan for the program.

- c) In FY 2012, or as soon as the non-market recreation planning is completed and satisfactory to the GCDAMP, begin implementation of the non-market recreational portion of these recommendations.

The TWG has developed the following recommendations. Additional expertise (and funding) may be needed at GCRMC to implement the following tasks:

**Base Case analysis:** Implement the report recommendation to complete base and change case studies for hydroelectric operations in FY 2010. 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 any additional specifications by the TWG/AMWG. This base case study will 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 (i.e., Dave Garrett or other expert) as needed. WAPA will incorporate changes into the report based on comments received from the peer review process.

Include the funding and the need as a line item in the 2011/12 budget, workplan and hydrograph.

**Change Case analysis (power modeling):** will be done by WAPA based on tasks provided by GCMRC, developed by GCMRC with input from WAPA and appropriate experts, based on the description in the Socioeconomic Panel's report and any additional specifications by the TWG/AMWG.

**Recreation Expenditure analysis (market):** We recommend that an analysis of data related to the regional economic effects of GCD experiments and other DOI actions be undertaken. 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 Nevada or Salt Lake City, it would be appropriate to show results using a broader multi-state economic impact area (Report page 16). This project would replace GCMRC Project 9.04.11-12.

**Provide training to AMP stakeholders on use and non-use values:** (implement in FY 2011 or 2012), economics 101 as described in the report. To be organized and hosted by GCRMC with financial support from WAPA.

**Other studies including non-market recreation studies which will be considered further during the ad hoc's review of the report and implemented under the time frame described above:**

- a) Implement non-market recreation surveys of Glen Canyon anglers and day-use rafters
- b) Identify tribes and consider specific surveys of preferences and attitudes
- c) Conduct power flow studies that show the financial and economic consequences of Glen Canyon management alternatives on WAPA, WAPA customers, and the Upper Basin Fund
- d) Conduct focus groups and piloting of non-use value survey (initiate OMB clearance)

# Socioeconomic Workshop & Research Review Panel Report

Michael Hanemann

UC Berkeley & Arizona State University

GCDAMP AMWG Meeting Phoenix, August 24, 2010

# Socioeconomic Research Review Panel

- **Joel Hamilton**  
Professor Emeritus of Agricultural Economics and Statistics  
University of Idaho, Moscow, Idaho
- **Michael Hanemann**  
Chancellor's Professor of Agricultural & Resource Economics and  
Public Policy, University of California, Berkeley, California
- **John Loomis**  
Professor of Agricultural and Resource Economics  
Colorado State University, Fort Collins, Colorado
- **Lon Peters**  
Northwest Economic Research, Inc., Portland, Oregon

# Context

- The socioeconomic analyses being conducted by the Glen Canyon Environmental Studies (GCES) Program, and GCAMP, has been the subject of four major reviews by the National Academy of Science/National research Council (NRC) over the past 24 years.
- These led to four books:

- National Research Council, *River and Dam Management: A Review of BoR's GCES* (1987).
- National Research Council, *Colorado River Ecology and Dam Management* (1991).
- National Research Council, *River Resource Management in the Grand Canyon* (1996).
- National Research Council, *Downstream: Adaptive Management of Glen Canyon Dam and the Colorado River Ecosystem* (1999).
- Also:
- National Research Council, *Analytical Methods and Approaches for Water Resources Project Planning* (2004)
- National Research Council, *Valuing Ecosystem Services: Toward Better Environmental Decision-Making* (2004)

- The NRC reviews of GCES and GCAMP reached essentially similar conclusions:
  - The economic analysis is unduly restricted to hydropower and recreation.
  - The hydropower economic analysis is not a realistic reflection of conditions in the Western power grid, and significantly overstates the economic cost associated with changes in flow regime.
  - The recreation analysis is not well integrated with the operations analysis. It significantly understates the economic benefits associated with changes in flow regimes.
- In December, the Review Panel found that the same conclusions apply to GCAMP today.

# Power Economics

- Glen Canyon is 78% of the total CRSP capacity, but CRSP is a small fraction of the entire Western power grid. Analysis needs to consider GCD as part of the Western grid in which, for periods of time, there is surplus power. (NRC 1987, 1991, 1996)
- WAPA's long-term power contracts should not be taken as exogenous to the analysis. They are subject to periodic renegotiation, and conditions reflecting operational changes can and should be incorporated into the contracts. (NRC 1987, 1991, 1996)

# Recreation

## NRC 1987:

- Effect of some flow regimes on recreational rafting values was assessed, but this was not integrated with the operations analysis.
- Impacts on non-water based recreation in Grand Canyon needs to be assessed.
- Impact on non-use values needs to be assessed.

## NRC 1996:

- “Questions about the effects of dam operations on the total value of the resources downstream from Glen canyon dam are appropriate because federal law requires consideration of the economic implications of alternatives.”
- “Nonuse value seems particularly relevant in the case of the Grand Canyon”
- “The nonuse value results are an important contribution of GCES and deserve full attention as decisions are made regarding dam operations.”
- “Since expenditures made by recreationists reflect the costs of participation, they are not considered benefits from the national point of view and are not included in the calculation of net economic value.”

## NRC 1999:

- “The limited commitment to socioeconomic analysis, the magnitude of its responsibilities under the Cultural Resources Program, and the limited staffing levels of these programs are troubling.”
- “The 1988 Strategic Plan limits consideration of ‘economics’ to recreation and hydropower. Limiting the scope of ‘economics’ to two narrowly defined sources of benefits and costs associated with management decisions is disproportionate with the level of scrutiny of physical and biological effects associated with alternative management strategies.”
- “The effect of changes on the welfare of all stakeholder constituencies is represented only by an incomplete measure of recreational user value and the market costs of hydropower.”
- “This strategy fails to anticipate the types of social scientific knowledge needed for adaptive management.”

# Socioeconomic Review Panel

- Reviewing GCAMP in December 2009, nothing seems to have changed.
- The concerns expressed by the Panel are the same as those expressed by NRC in 1987, 1991, 1996 and 1999.

# No Progress in Economics

- Since 1995, the only economic analysis that has moved forward has been the power analysis. So far, this remains flawed by the same conceptual errors that were noted by NRC in 1987, 1991 and 1996, which significantly overstated the economic impact on power users.
- No progress has been made by GCES/GCAMP since 1995 with regard to economic analysis of the natural, recreational or cultural resources of Grand Canyon National Park and Glen Canyon.

# Regional recreation expenditures

- These are *not* recognized by the Office of Management & Budget, or the federal Principles and Guidelines, or by any other economic authority, as a valid measure of net economic benefit.
- In addition, they have consistently been calculated incorrectly because of the failure to control for economic leakage.
- Even if leakage were accounted for, they would not be a meaningful economic metric. The correct economic metric is net benefit. GCAMP currently seems to have no plan to measure this.

# Adaptive Management

- For adaptive management to be meaningful there needs to be a way to *tie* changes in flows to changes in what recreational and cultural users experience.
- The need for a recreational value model component in adaptive management that makes this connection was demonstrated by Walters et al., *Ecosystem Modeling for Evaluation of Adaptive Management* (2000)

# Recreational value

- A flow change can affect
  - The number of recreational trips
  - The user satisfaction per trip
- For some recreational activities (day-use rafters, white water rafters) the number of trips is regulated and cannot change.
- But the satisfaction per trip can and will change as flows change. This needs to be monitored.
- The information currently available on how recreational user satisfaction might be affected by changes in flows is outdated and not acceptable now.

# Information on link between flow changes and user satisfaction

- Fishing below Glen Canyon Dam
  - Measured in 1985
- Day Use Rafting
  - Measured in 1985
- White Water rafting
  - Measured in 1985 and 1998-99
- Diamond Creek to Lake Mead
  - Not measured

# Non-use including cultural value

- Measured for Glen Canyon in 1995.
- Not incorporated in 1995 EIS. Apparently not included in current GCAMP work-plan.
- “To neglect total values in favor of more narrowly defined use values would be to leave a major gap in the economic studies under GCES. This would be unjustifiable given that nonuse values can be estimated.” (NRC, 1996)
- Endorsed in NRC Reports (2004a, b)
- “Does [OMB] permit or encourage the use of methods of “contingent valuation” when quantifying the benefits and costs of environmental rules? Answer: Yes.” (OMB 2003).

# Tribal social & cultural impacts

- Native Americans account for a significant portion of the total population most directly affected by Glen Canyon (NRC 1996).
- “In terms of cultural and historic traditions and beliefs and practices, the Native American peoples are the population at risk relative to dam operations.” (NRC 1996)
- NRC 1996 finds that Tribes have received inadequate consideration in the GCES studies.
- The Review Panel’s recommendations are an attempt to rectify this.

# Concluding observations

- GCAMP has made more progress in monitoring camping *beaches* than visitor *experience*.
- Review Panel identifies flaws that have been present since 1986.
- Current plan lacks a way to tie changes in flows to recreational and cultural values.
- This is not consistent with any meaningful form of adaptive management.
- This can hardly withstand sustained scrutiny.