Update on GCMRC's FY 2007-11 Strategic Science Planning (SSP)

Update on 4 – Planning Elements

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Element #1: STRATEGIC SCIENCE PLAN (SSP) Progress Report – Ted Melis (SSP co-leader)

- Provisional Research and Experimental Projects Recommended for FY 2006 (see GCMRC workplan and budget)
- SSP Outline Development Completed (July) and Expanded Sentence Outline (Aug 2005)
- Knowledge Assessment Outcomes used as Basis for Development of Strategic Science Questions
- Proposed Completion of Draft Strategic Plan (Nov 2005)
- Outcomes will be used from the planning process to populate FY 2007-08 workplan & budgets (Research & Monitoring)

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Element #2 - Experimental Design Planning Process: Embracing the "Hybrid" Approach

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Milestones – Points along the Path of the GCDAMP – Pausing to Assess the State of Knowledge on Experimental Treatments

Knowledge About

- Certainties/uncertainties related to:
  - Flow Treatments [MLFF, LSSF, BHBF, HMF, ExpFF, plus prior Glen Canyon Dam operations since 1963, where abundant historical data are available for evaluation….
  - External Flow Treatments [Implemented operationally at other facilities where learning may be transferred to GCDAMP]
  - Non-Flow Treatments [Mechanical Removal, HBC translocation in the LCR, etc.]

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Questions – How do we Evaluate when are we done with Experimental Research?

- **Are there Experimental Treatments** - for which there is sufficient cause/effect certainty to move the activity from Experimentation to ongoing management action to achieve resource objectives?

- **Experimental Design** - Can we resolve the next logical steps in resolving treatments that are still so **uncertain** that experimentation is needed for effective and efficient "Learning" to identify options for management?

- **Laboratory Experiments** – What is the role of highly controlled experiments conducted in the laboratory?

- **Modeling** – What is the role/utility of modeling in the evaluation & planning process [what is our predictive skill currently & how can we build on our existing Conceptual Model (GCM)]?

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EXP Design Planning
SCHEDULE: Summer 2005 – Winter 2006

- **Knowledge Assessment Workshops I & II** – May 18-19 & July 5-8, 2005, **GETTING A HANDLE ON WHERE WE ARE EXPERIMENTALLY!**
- **Draft EXP Design** by Aug. 2005 for review and comment by TWG at fall 2005 meeting(s)
- **Peer Review and Information Transfer** – Science & Manager interactions about the proposed EXP design (GCMRC Science Symposium Day #2, Oct. 26, 2005)
- **Approval/Recommendation** – GCD AMP approval (Jan 2006)
- **GCMRC Strategic Science Plan** – Experimental actions implemented in WY/FY2007 & beyond… (Phase V, see next)

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Phased Development & Progress since Final GCD-EIS (Mar 1995)

NPS + GCES I (together constitute a Phase I), GCES II & EIS (Phase II)
First Era of "Active" Adaptive Management begins June 1990 ("TEST FLOWS")

Milestone Toward Phase III

- 1995 – August – GCES holds "Fern Mountain" Integration Meeting to ID future Science Needs
- 1995 – November – GCMRC is formed and begins drafting Strategic Science Plan I
- 1996 – First Test of the BHBF Concept – Results are assessed as "Mixed" at 1997 meeting
- 1997 – September – First AMWG meeting convened at Phoenix, AZ (FACA era begins)
- 1997 - Phase I duration: Dec. 97 - Mar. 99 – Initial GCM completed

Milestone Toward Phase IV

- 2000 - GCMRC Releases Solicitations (Terrestrial and Sediment Research toward Monitoring)
- 2000 – LSSF (single flow treatment aimed at HBC recruitment)
- 2001 - GCMRC releases Solicitation (Sediment Modeling Research for predicting fate of sand)
- 2001-2004 - Phase II 2000-2002: Emphasis on Coarse Sediment & Lees Ferry Rainbow Trout

Second Era of "Active" Adaptive Management

- 2002 – GCD-AMP ID's ongoing sand loss and fish decline – requests experimental design
- 2002 – GCMRC drafts experimental design with "Blocks" for Sand and Fish treatments
- 2002-2005 – Flow and Non-flow EXP-treatments by GCMRC and science cooperators
- 2005 – New solicitation released for Aquatic food web dynamics & linkages
- 2005 – Knowledge Assessment Milestone – discussions of next phase of research

- 2005-2006 – Strategic Science Planning Process for 2006-2010 era of research and monitoring

Milestone Toward Phase V – Third Era of "Active" Adaptive Management?

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Next Steps in Preparation for Phase V Efforts?

2005-2006 – Strategic Science Planning Process for 2006-2010 era of research and monitoring

Milestone toward Phase V – Third era of "Active" Adaptive Management?

Assess Level of Understanding through review of Knowledge and Briefings on the 2003-2005 Experimental Results (summer 2005)

Identify the Key Uncertainties that Persist Relative to Management Options for Critical Resources (Uncertainty Matrix Exercises)

Formulate Critical Questions that Should be Answered Relative to Stated Management Objectives and Goals (Strategic Plan from GCD-AMP)

Discuss and Identify Options for Limiting Management Uncertainty and Improving Knowledge through Various Science Activities (including, but not exclusive to Experiments)

Draft Strategic Science Planning Documents that Map Course of Action in Next Phase

Identify Next Logical Timing for Future Milestone Assessments (Annual Meetings and 5-Year)?

Clearly Identify the GCD-AMP's Future Vision with Respect to Science Support Needs?

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What Is An Uncertainty Matrix Anyway?

Resource Attribute Goal #10 Load-Following Capacity & Replacement Costs	Warmer Releases From Glen Canyon Dam	Higher Up Ramp Rate (for a Given Daily Range	Higher Down Ramp Rate (for a Given Daily Range)	Higher Daily Peak (up to 25 kcfs)	Higher Daily Range (up to 25 kcfs)	Lower Daily Min. (for a Given Daily Range)	Change In Historic Annual Monthly Pattern (Toward Flatter Pattern)	BHBF 41,000 to 45,000 cfs for ~2 days (after Sediment inputs)	BHBF 41,000 to 45,000 cfs for ~2 days (after Sediment inputs)	HMF 31,500 for 2-4 days (after Sediment Inputs)	HMF 31,500 for 2-4 days (after Sediment Inputs)	Sustained Steady Flow (between 8-25 kcfs) (for a Given Monthly Volume)	Sustained Steady Flow (between 25-31 kcfs for a Given Monthly Volume)	Mech. Remove (cold Species of exotic fishes)	Mech. Remove (warm Species of exotic fishes)
HydroPower Load-Following Capacity(1) (for a given Monthly Volume)	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(o)	N/A	N/A
HydroPower Replacement Costs(2) (for a given Monthly Volume)	(-)	(+)	(+)	(+)	(+)	(+)	(-)	(-)	(-)	(-)	(-)	(-)	(o)	N/A	N/A

Group Discussions with Scientists and Stakeholders that Attempt to Get At the Heart of What Is and Is Not Known About Cause and Effect for Given Resource Areas of Interest vs. Flow and Non-Flow Treatments

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Physical Resources Example (Do We Know Enough Yet?)

Resource Attributes Goals 7 & 8 Fine Sediment & Quality of Water	Warmer Releases From Glen Canyon Dam	Increased Daily Fluctuations					Change In Historic Annual Monthly Pattern (Toward Less Load Following)	BHBF (after Sediment inputs)	BHBF (before Sediment inputs)	HMF (31.5 kcfs For 2-4 Days, after Sediment inputs)	HMF (31.5 kcfs For 2-4 Days, before Sediment inputs)	Sustained Low Steady Flow (for a Given Monthly Volume)	Sustained High Steady Flow (25 – 31 kcfs for extended Number of days assoc. With Larger Monthly volumes)	Mech. Remove (cold Species of exotic fishes)	Mech. Remove (warm Species of exotic fishes)
		Higher Up Ramp Rate (for a Given Daily Range)	Higher Down Ramp Rate (for a Given Daily Range)	Higher Daily Peak (up to 25 kcfs)	Higher Daily Range (up to 25 kcfs)	Lower Daily Min. (for a Given Daily Range)									
Fine-Sediment above 25 kcfs	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(+)	(o/+)	(o)	(o)	(+)	(-)	N/A	N/A
Fine-Sediment between 8 and 25 kcfs	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(o/+)	(-)	(+)	(-)	N/A	N/A
Fine-Sediment below 8 kcfs	(+)	(-)	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(-)	(-)	(+)	(-)	N/A	N/A
Mainstem Temps.	(+)	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(-)	(-)	(-)	(+)	(-)	N/A	N/A
Nearshore Temps.	(+)	(-)	(-)	(-)	(-)	(+)	(+)	(-)	(-)	(-)	(-)	(+)	(-)	N/A	N/A

Refinement of a Downstream Temperature Model is Obviously Still Needed
And the Issue of Sustainable Sand Bar Restoration Still Must Be Resolved?

In Some Areas, Basic Research is Need, In Others Experiments…

What Science Questions Must Be Addressed Experimentally? What Design?

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Provisional Experimental Phase (2006)
Recommendations for Completion of Work

- **Provisional Treatments Recommended for FY 2006 (see GCMRC workplan and budget)**
- **Maintain Continuity with the 2003-2005 era of treatments**
- **Use Knowledge Gained in 2003-2005, to ID Next Options (i.e. results from Korman et al. 2005 final report)**
- **Focus on the Concept of "Learning" that Benefits Resources**
- **Consider Full Range of Experimental (Logical) Options, including "Mini-Experiments" and Laboratory Designs**

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Element #3: CORE MONITORING PLAN (CMP) Update – Helen Fairley (SPG co-leader)

- **Provisional Plan Recommended for FY 2006 (see GCMRC workplan and budget)**
- **Outline Development Completed (basis for writing Expanded Sentence Outline in fall 2005)**
- **Criteria have been agreed to that will be used in the process of evaluating information (methods and data), to be included in core-monitoring projects**
- **Outcomes will be used from the process to populate FY 2007-08 workplan & budgets**

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Element #4: FY 2007-08 Draft Workplan Proposed Timeline – Ted Melis (Acting Chief)

- Budget Templates Developed by GCMRC & BAHG in September 2005
- Two-Year Coupled Budget Strategy (as originally desired by AMWG)
- Assemble Plan & Projects as Recommended by SPG, BAHG and TWG
- 1st Draft of Work Plan by December 2005 (TWG meeting requested)
- 2nd Draft for winter 2006 TWG meeting (comments solicited)
- Revisions on Basis of TWG Comments Toward Final Draft (3rd)
- TWG Recommendation to AMWG for Approval – Spring '06

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