History of the Long-term Experimental Plan

- Jan 2002; GCMRC delivers 16-yr factorial design to AMWG; two years accepted
- May 2004 GCMRC delivers revised long-term factorial design to TWG; LTEP TWG ad hoc formed
- LTEP ad hoc meets 6-9/04
- Hybrid design developed; TWG (9/04) and AMWG (10/04) adopt design with management action and treatment definitions
- GCMRC takes lead for LTEP development
- Knowledge assessment conducted (5/05 and 7/05)
- LTEP proposals analyzed by GCMRC; discussed by SPG 2/06

The Hybrid Design

- Contains management actions and/or treatments
- Determination of management actions and treatments arises out of knowledge assessment workshop and interpretation of results
- Management actions are fixed for duration of experiment
- Treatments implemented in blocked, forward titration or reverse titration design

I. Define Management Actions and Treatments

Both are purposeful manipulations of the system. The former category is considered to have known, positive effects and therefore is implemented and maintained; the latter category has unknown effects and is purposefully turned on and off, or implemented in different states, to determine those effects. (TWG 9/04 & AMWG 10/04)

Adaptive Management Continuum

Learning By Doing

Potential Outcomes of Management Action and Treatment Comparison

- All actions are management actions; no longer an experimental design
- All actions are treatments; treatments applied in block or titration design
- Some actions are management actions and some are treatments; the hybrid design with treatments in block or titration
- All experimental designs are determined prior to the onset of the experiment

Potential Designs

All Management Actions

	MA1	MA2	MA3	MA4
P1	X	X	X	X
P2	X	X	X	X
P3	X	X	X	X
P4	X	X	X	X

Potential Design
All Treatment Factorial

	T1	T2
P1	X	
P2		X
P3	X	X
P4	X	
P5		X
P6	X	X

Potential Design
All Treatment Forward Titration

	T1	T2	T3	T4
P1	X			
P2	X	X		
P3	X	X	X	
P4	X	X	X	X

Potential Design
All Treatment Reverse Titration

	T1	T2	T3	T4
P1	X	X	X	X
P2	X	X	X	
P3	X	X		
P4	X			

Potential Hybrid Designs

Management Action/Factorial

	MA1	T1	T2
P1	X	X	
P2	X		X
P3	X	X	X
P4	X	X	
P5	X		X
P6	X	X	X

Management Action/Titration

	MA1	T1	T2	T3
Forward Titration				
P1	X	X		
P2	X	X	X	
P3	X	X	X	X
Reverse Titration				
P1	X	X	X	X
P2	X	X	X	
P3	X	X		

Criteria for Assessment of “Known Effects” and “Unknown Effects”

- Quality of Information (expert opinion, agency reports, peer-reviewed journal; need to establish hierarchy of acceptance for sources of information)
- Quantity of information (has experiment been done more than once; same results if so?)
- Level of risk to resource; if risk is high, consider carefully; opportunity cost
- Cost of implementing action (short-term and long-term; relate to risk)
- Evidence exists for Grand Canyon vs. evidence exists for other comparable systems
- Has a knowledge assessment been done for this interaction (cause and effect relationship)

Today's Assignment

- Use knowledge assessment findings and proposals for LTEP to identify management actions and treatments
- Identify the specific actions in the proposals
- Identify the design for each of the proposals
- Include other information as appropriate

Process

- Obtain agreement on proposed actions
- Obtain agreement on proposed designs
- Assign management action or treatment to proposed actions (pre-survey)
- Review summary of knowledge assessment findings and discuss
- Assign management action or treatment to proposed actions (post-survey)

Proposed Actions?

Action	General Agreement	Complete Agreement
Alternative Fluctuations	1, 2, 3	None
Stable Flows	2, 4	None
BHBF	All	None
Ramping Rate	1, 2, 3	None
Warmwater Non-native Fish Control	All	All?; specific treatments not identified
Selective Withdrawal	All	All?; operational scenarios missing

Proposed Actions?

Action	General Agreement	Complete Agreement
HBC Translocation	All	1, 2
HBC Refuge	All	1, 2, 3
HBC Augmentation (Stocking?)	1, 2, 4	1, 2, 4
Coldwater Non-native Fish Control	All	All?;
Mini-experiments	All	1, 2, 3 dam ops; 4 in lab
Experimental Design	1, 2, 4 (titration to factorial)	No