MEMO

TO: Technical Work Group

FROM: Bill Persons, Experimental Flows Ad-hoc group

DATE: July 6, 1999

RE: Ad-hoc report

We were tasked by the TWG:

> "To convene an ad-hoc group to develop an array of flow experiments and draft proposed actions for future water years using a programmatic approach."

My understanding of the task was:

Develop an array of flow experiments (BHBFs, load-following, SASF, other) for future water years so that a programmatic compliance approach can proceed. Pursue environmental compliance and be ready to run load following experiment or other experimental flows in future water years.

After a brainstorming session (March 17, 1999) and a meeting to clarify criteria and proposed actions (April 20, 1999) a sample "ballot" was sent to ad-hoc group members on April 27 as an attempt to rank and further reduce the list of 33 proposed experiments. Nine responses were received. (The criteria suggested for ranking the experimental flows are presented in Table 2).

The attached table presents a summary of the mean scores (1-5) for each selected criteria and experimental flow submitted by the nine respondents (Table 1). The "total" column represents the mean for the experiment, not the sum of the means for each criteria. A score of 1 indicated that the proposed action does not meet the criteria as specified, a score of 5 indicated that the action meets the criteria. A score of 3 was neutral for the given criteria. Ballots were compiled and summarized in an attempt to identify the top choices for further discussion at the TWG in June, with the intent to forward a list of 8-10 experiments for environmental compliance to the compliance committee. The top ten experiments, based on the sample ballot, are included with a single page per experiment. I would like to further refine this list with the full TWG in July and forward a short list to the compliance group.

BP:bp

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GLENDALE CA 91203-1035

Bill Persons

From:	Bill Persons
Sent:	Tuesday, July 06, 1999 10:45 AM
To:	Andre Potochnik; Barry Gold; Bill Davis; Chris Harris; Clayton Palmer; Cliff Barrett; Dave Cohen; Don Metz; John W. Shields (E-mail); Kurt Dongoske; Matt Kaplinski; Mindy Schlimgen-Wilson; Nancy Hornewer; Norm Henderson; Randy Peterson; Randy Seaholm; Rick Johnson; Wayne Cook
Cc:	Barb Ralston; Bill Vernieu; ChristineKaras; Debra Bills; egweeks; Gary Burton WAPA; Pam Hyde; Ted Melis; Tony Morton
Subject:	Experimental Flows Ad - hoc Reports

MEMO

TO: Technical Work Group
FROM: Bill Persons, Experimental Flows Ad-hoc group
DATE: July 6, 1999
RE: Ad-hoc report

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The attached document [TWGAH1.doc] (MS Word) presents a summary of the mean scores (1-5) for each selected criteria and experimental flow submitted by the nine respondents (Table 1). The "total" column represents the mean for the experiment, not the sum of the means for each criteria. A score of 1 indicated that the proposed action does not meet the criteria as specified, a score of 5 indicated that the action meets the criteria. A score of 3 was neutral for the given criteria. Ballots were compiled and summarized in an attempt to identify the top choices for further discussion at the TWG in June, with the intent to forward a list of 8-10 experiments for environmental compliance to the compliance committee. The top ten experiments, based on the sample ballot, are included with a single page per experiment. I would like to further refine this list with the full TWG in July and forward a short list to the compliance group.


TWGAH1.doc


TWGAH2.doc

The second document (TWGAH2.doc) contains information from the sample ballot on 15 experiments that I would like to have the group refine.

I'll be out of the office July 7 - 12, in briefly on the 12th, then out of the office again until 15 July.

Bill

Bill Persons
Arizona Game and Fish Department
2221 West Greenway Road
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(602) 789-3375

Table 1. Mean scores by criteria for each of proposed experimental flows, Experimental Flows Ad-hoc group sample ballot results, June 1999.

Experiment	BIO	COS	CUL	LEG	POW	REC	SAN	SCI	WAT	TOT
6.10 Replicate 1996 BHBF without 8K flows before and after	3.6	3.5	3.6	4.5	2.5	3.6	4.0	4.0	3.0	29.1
6.11 Replicate 1996 BHBF.	3.3	3.9	3.4	4.6	2.3	3.9	4.0	3.9	3.0	29.0
6.5 BHBF of 45,000 cfs for 2 days	3.0	3.1	3.5	4.5	2.1	3.9	3.9	4.1	3.0	28.0
2.1 Powerplant capacity coincident with high tributary inflows.	2.8	3.1	3.6	3.8	3.0	2.9	4.9	3.6	2.9	27.4
4.4 – Baseline monitoring flows.	4.0	3.9	3.7	3.9	3.6	3.7	3.9	4.3	3.6	27.2
6.9 - 60,000 cfs for 2-4 days followed by load-following flows up to powerplant capacity	2.6	3.1	3.6	2.9	4.5	2.8	4.4	3.5	3.0	27.2
6.8 BHBF following tributary inflow of sediment.	3.2	2.9	3.8	2.6	1.9	3.5	4.4	3.5	2.9	25.8
6.13 - 45K for 2-4 days followed. by load following flows up to powerplant capacity	2.9	3.4	3.4	4.5	4.3	***2.5***	3.8	3.8	3.0	28.2
1.4 Minimum evening and weekend flows at 8,000 cfs	4.3	2.8	3.4	3.9	***1.6***	4.3	3.5	4.1	3.0	27.9
1.1 Sunday flows : every day's hydrologic pattern is the same	3.9	2.6	3.3	4.1	***1.8***	4.6	3.3	3.6	3.0	27.2
6.4 – 75,000 cfs for 2 days.	3.2	2.0	3.9	2.6	***1.8***	3.5	4.4	3.8	2.8	25.1
5.3 Flows recommended in the May 1997 SWCA SASF Report:	4.1	2.8	2.8	3.6	***1.4***	3.0	2.5	3.8	2.8	24.1
5.1 Low steady flows in the summer and fall with and without a high spring spike.	3.6	2.1	3.4	2.9	***1.1***	2.6	3.0	4.0	2.4	22.7
6.12 The 3-yr Melis prop in response to the Cook-Moody prop.	3.3	***2.0***	3.2	2.7	3.0	3.2	4.3	4.3	3.0	19.7
1.2 Load foll. up to powerplant capacity during high flow months	2.3	4.0	3.3	3.8	5.0	1.9	3.8	3.8	2.9	27.4
6.6 Fall BHBF.	2.6	3.1	3.5	2.1	2.1	3.5	4.0	4.3	3.0	25.3
1.3 Increase daily fluctuations.	1.9	4.0	2.4	3.3	4.9	1.6	2.6	3.9	3.3	24.9
1.5 Transfer peaking power to Hoover Dam.	4.0	1.6	3.4	2.3	1.3	4.4	3.0	2.6	3.4	23.4
2.2 Lower flows when tributary releases sediment. Gage tribu	3.0	2.3	3.5	2.9	1.6	2.5	4.6	2.9	2.5	23.2
6.2 - 125,000 cfs for 2 days.	3.0	1.6	3.8	1.5	1.6	2.8	4.1	2.8	2.6	21.4
5.2 Assess flows which provide max nearshore HBC habitat	3.9	2.1	2.6	2.8	1.6	2.9	2.4	2.6	2.5	21.2
6.7 Back to back BHBF's. Ann. or more test spill, 2 in a row	2.4	2.1	2.9	2.9	1.5	2.9	2.8	2.8	2.6	20.6
4.1 - 20,000 cfs steady flow."	3.4	1.9	2.6	1.9	1.3	3.4	2.5	2.6	2.4	19.6
6.0 Maximum releases for 2 days. (>200,000 cfs).	2.6	1.5	3.4	1.5	1.6	2.5	3.9	2.4	2.1	19.3
3.1 - 20,000 cfs maximum release	2.6	1.9	2.6	2.6	1.4	3.1	2.8	2.3	2.4	18.9
3.2 Replicate 1986 - 1990 Operations. e.g. No Action.	1.9	3.3	2.1	2.9	4.7	1.6	2.1	1.9	3.0	18.7
5.4 High spring experimental flows: 42K May through Jun	2.6	2.0	2.8	2.1	1.3	1.5	2.9	2.9	2.1	18.1
7.1 Bill Persons Secry of Interior Option	4.7	3.4	3.4	2.6	2.6	5.0	3.4	2.6	2.8	17.4
1.6 Transfer 50% of ACE to other CRSP facilities.	3.0	1.7	2.4	2.9	1.4	2.9	2.4	2.9	2.6	17.2
4.2 - 15,000 cfs steady.	3.8	1.4	2.4	1.6	1.1	3.3	2.6	3.1	2.0	17.0
4.3 - 8,000 constant release for 6 months	2.7	1.5	2.6	1.6	1.0	2.0	2.8	2.8	1.6	16.8
3.3 Inflow = outflow in 1 out of 10 years	2.8	1.9	2.7	1.9	1.9	2.3	3.0	2.1	1.9	16.1
6.3 Replicate 1983-87.	2.6	1.3	2.4	1.1	1.3	2.1	3.0	1.6	1.9	13.8
5.5 Assess Qs that can optimize conditions for HBC recruitm	3.0	2.0	2.3	2.0	1.8	2.5	2.0	2.0	2.3	13.7

BIO: biological resources; COS = cost; CUL=cultural resources;LEG=legal; POW=power resources; REC=recreation recources; SAN=sand/physical resources; SCI=scientific design; WAT=water resources; TOT=total.

Table 2. Clarification of criteria included with instructions on sample ballot of April 27, 1999.

Scientific Design

- **Is it a sound experimental design?**
- **Could the action be evaluated?**
- **Will it NOT confound or affect other experiments?**
- **Does it inform us of post-dam conditions?**
- **Is there sufficient planning time for the experiment?**
- **Will it fill an existing data gap?**
- **Would it provide a baseline for long-term monitoring?**
- **Could the action be repeated?**
- **Is the information to be gained NOT already available from another source?**
- **Does it take a long time to evaluate?**

Legal

- **Does it conform with the Law of the River?**
- **Is it required by the Biological Opinion?**
- **Does it meet the triggering criteria?**
- **Does it fit the guidance document?**

Cost

- **Is it financially reasonable?**
- **Is it (relatively) inexpensive to conduct monitoring and research and pay for logistics to evaluate the flow?**

Resources

- **Is it expected to benefit the following resources, as described in Table II-7 of the EIS, and as characterized by the Grand Canyon Monitoring and Research Center Program?**

  SAND/SEDIMENT
  BIOLOGICAL RESOURCES
  POWER
  CULTURAL
  WATER
  RECREATION

6.10 Replicate 1996 BHBF without 8K flows before and after

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIOLOGICAL		1	3	4	1
COST		1	3	3	1
CULTURAL			4	3	1
LEGAL			1	2	5
POWER	2	2	3		1
RECREATION			4	3	1
SAND			2	4	2
SCIENTIFIC		1	1	3	3
WATER			8		

COMMENTS:

- Assume ROD will be followed
- Lets move on to something other than 45,000 cfs to learn more.
- Assume 8,000 cfs steady flow means normal ROD criteria will be followed before and after

SCIENTIFIC DESIGN

- Difficult to compare results to preflow baseline
- change one thing from 96 BHBF

LEGAL

- Trigger
- Assuming criteria met
- If triggering criteria met

COST

- similar to 96 flood, expensive

SAND/PHYSICAL RESOURCES

- May reduce initial sloughing to some degree

BIOLOGICAL RESOURCES

- Trout +

INDIVIDUAL RANKINGS

Respondent	SC	LE	CO	SA	BI	PO	CU	WA	RE
Bill Persons	5	3	2	4	3	2	4	3	3
Dave Cohen	5	5	3	3	4	2	3	3	4
Wayne Cook	2	5	5	3	4	5	3	3	3
Bill Davis	3	5	3	4	2	1	4	3	4
Andre P	4	4	4	5	4	3	5	3	5
Randy P	5	5	4	5	5	3	4	3	4
Cliff Barrett	4	4	3	4	3	1	3	3	3
Debra Bills	0	0	0	0	3	0	0	0	0
Western	4	5	4	4	4	3	3	3	3

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

6.11 **Replicate 1996 BHBF**

Distribution of scores

Criteria	Rankings from sample ballot				
	1	2	3	4	5
BIO		1	4	4	
COST		1	2	2	3
CULTURAL			5	3	
LEGAL			1	1	6
POWER	2	3	2	1	
RECREATIO			2	5	1
SAND			1	6	1
SCIENTIFIC	1		1	3	3
WATER			8		

COMMENTS:

- Almost all biological resources harmed by BHBF in short term at least.
- Lets more on to something other than 45,000 cfs to learn more.
- We already know what this does
- A straight replicate does not make sense given the limited opportunities to conduct BHBFs.

SCIENTIFIC DESIGN

- "Replicates" are nice, antecedent conditions are different.
- We already know this
- Why forego a BHBF opportunity with an exact repeat?

LEGAL

- Assume trigger criteria will be met

SAND/PHYSICAL RESOURCES

- Conservation of resource
- Beach benefit

POWER RESOURCES

- Reduced flexibility – short term

INDIVIDUAL RANKINGS

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	4	3	2	4	3	2	4	3	4
Dave Cohen	5	5	3	4	4	2	3	3	4
Wayne Cook	1	5	4	3	3	4	3	3	4
Bill Davis	3	5	5	4	2	1	4	3	4
Andre P	5	5	5	5	4	2	4	3	5
Randy P	5	5	4	4	3	3	3	3	4
Cliff Barrett	4	4	5	4	4	1	3	3	3
Debra Bills	0	0	0	0	4	0	0	0	0
Western	4	5	3	4	3	3	3	3	3

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

6.5 BHBF of 45,000 cfs for 2 days

Distribution of scores

	Rankings from Sample Ballot				
Criteria	1	2	3	4	5
BIO		2	5	2	
COST	1	1	2	4	
CULTURAL			4	4	
LEGAL			1	2	5
POWER	2	3	3		
RECREATIO			2	5	1
SAND		1		5	2
SCIENTIFIC	1			3	4
WATER			8		

COMMENTS

SCIENTIFIC DESIGN:
- Similar to 1996, shorter duration

LEGAL
- Assuming criteria met
- KAS compliance issues

COST
- Expensive to evaluate

SAND/PHYSICAL RESOURCES
- Expected to benefit beaches
- Beach experiment

RECREATION RESOURCES
- Beaches

INDIVIDUAL RANKINGS

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	4	3	2	4	3	2	4	3	4
Dave Cohen	5	5	3	4	4	2	3	3	3
Wayne Cook	1	5	1	2	2	3	3	3	4
Bill Davis	4	5	4	4	2	1	4	3	4
Andre P	5	4	4	5	4	3	4	3	5
Randy P	5	5	4	4	3	2	4	3	4
Cliff Barrett	4	5	4	4	3	1	3	3	4
Debra Bills	0	0	0	0	3	0	0	0	0
Western	5	4	3	4	3	3	3	3	3

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2.1 Powerplant capacity coincident with high tributary inflows.

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO	1	3	3	1	1
COST	1	1	3	2	1
CULTURAL			4	3	1
LEGAL	1		2	2	3
POWER		1	6	1	
RECREATIO	1	2	3	1	1
SAND				1	7
SCIENTIFIC		2	1	3	2
WATER		1	7		

COMMENTS:

- fluctuating or steady?
- sediment conservation flow
- Isn't this a habitat maintenance flow?
- Very desirable, but perhaps problematic for the Chub
- Assume these are Habitat maintenance flow

SCIENTIFIC DESIGN:

- difficult due to lead/response time
- Planning time and study conflicts are concerns

LEGAL

- appears legal
- Outside specified spring time frame

COST

- Requires contingency $ not already budgeted

SAND/PHYSICAL RESOURCES

- Should store sediment when available

BIOLOGICAL RESOURCES

- Potential conflicts with brown trout spawning

POWER RESOURCES

- depends on timing

WATER RESOURCES

- Unscheduled release volumes

RECREATION RESOURCES

- Potential to impact fall rafting and trout fishing
- need to have lead time to notify trout anglers

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Cliff Barrett	4	4	3	5	3	3	4	3	3
Andre P	3	3	4	5	5	4	5	3	5
Bill Persons	2	4	3	5	3	3	4	3	3
Dave Cohen	5	5	3	5	4	3	3	3	2
Wayne Cook	4	5	1	5	3	2	3	3	1
Bill Davis	2	3	4	4	2	3	4	3	3
Randy P	5	5	5	5	2	3	3	3	4
Debra Bills	0	0	0	0	1	0	0	0	0
Western	4	1	2	5	2	3	3	2	2

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4.4 Baseline Monitoring Flows

(Operate under the Record of Decision)

Distribution of scores

	Rankings from sample ballot				
	1	2	3	4	5
BIO			4		4
COST			3	2	2
CULTURAL			4	1	2
LEGAL			3	2	2
POWER			5		2
RECREATIO			4	1	2
SAND			4		3
SCIENTIFIC			2	1	4
WATER			5		2

COMMENTS:

- Make no changes until current science on ROD is in. Some we know (minimums important in foodbase), others we need more data to ensure a baseline and NEED A MONITORING PLAN!!!
- In my demented state this needs further explanation. If this refers to flows like the 8,000 cfs protocols. If it suggests specific flows to gather data that are not so intrusive I would lean favorably.
- What is this?
- Assuming ROD criteria, this is what we should be doing.
- Essential for TCD evaluation, but very vague-what does baseline monitoring mean?
- What flow criteria? I assume the ROD criteria. My vote indicates a real need to gather baseline data on what ROD produces.
- What is this flow? Strict adherence to ROD flows?

SCIENTIFIC DESIGN:

- sounds good

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Andre P	4	4	4	3	3	3	3	3	3
Bill Persons	5	4	4	3	3	3	3	3	3
Dave Cohen	3	3	3	3	3	3	3	3	3
Wayne Cook	0	0	0	0	0	0	0	0	0
Bill Davis	5	5	5	5	5	5	5	5	5
Randy P	5	3	3	5	5	3	4	3	4
Cliff Barrett	5	5	5	5	5	5	5	5	5
Debra Bills	0	0	0	0	5	0	0	0	0
Western	3	3	3	3	3	3	3	3	3

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

6.9: 60,000 cfs for 2-4 days followed by load following flows up to powerplant capacity.

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO	2	1	5	1	
COST	2		2	3	1
CULTURAL			5	1	2
LEGAL	2	1	2	2	1
POWER			1	2	5
RECREATIO	1		7		
SAND			1	3	4
SCIENTIFIC		1	4	1	2
WATER			8		

COMMENTS:

- Assume meets triggering criteria and 8.23 MAF
- Assume this is a BHBF experiment followed by load following experiment. Same as 1.2 (?)

SCIENTIFIC DESIGN:

- difficult, confounding

LEGAL

- Need Trigger, outside ROD?
- Assuming Criteria Met
- if triggering criteria met
- BO compliance

COST

- expensive to evaluate

SAND/PHYSICAL RESOURCES

- expect benefit beaches
- Stabilization by load following flows

BIOLOGICAL

- unk.
- Benefits to natives, impacts to trout (2&4)=3

POWER

- benefit

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	2	2	1	4	3	5	3	3	3
Dave Cohen	3	1	1	3	1	4	3	3	1
Wayne Cook	5	5	4	5	3	5	3	3	3
Bill Davis	3	3	4	5	2	4	5	3	3
Andre P	3	3	3	4	4	5	3	3	3
Randy P	4	4	4	5	3	5	4	3	3
Cliff Barrett	3	4	5	5	3	5	5	3	3
Debra Bills	0	0	0	0	1	0	0	0	0
Western	5	1	3	4	3	3	3	3	3

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

6.8 BHBF following tributary inflow of sediment

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO		1	2	3	3
COST	1	2	3	1	1
CULTURAL			4	2	2
LEGAL	2	2	2	1	1
POWER	4	1	3		2
RECREATIO		1	4	1	2
SAND				5	3
SCIENTIFIC		2	2	2	2
WATER		1	7		

COMMENTS

- above powerplant capacity. Fast Action Response.
- I have serious doubts that we can mobilize a significant, credible test and monitoring effort on short notice. It would seem to be a good idea. I don't know how you factor in "doubts".
- This experimental flow more correctly belongs as 2.3 in Section 2 - Sediment Conservation Flows.

SCIENTIFIC DESIGN:

- depends on inflow timing
- Difficult to anticipate timing, study conflicts

LEGAL

- Trigger needed?
- No trigger
- triggering criteria

COST

- Would require contingency funding

POWER

- Unscheduled generation and bypass

WATER

- Unscheduled releases

RECREATION

- Unanticipated impacts to rafting and fishing

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	3	3	2	4	3	3	4	3	3
Dave Cohen	5	5	3	4	3	1	3	3	3
Wayne Cook	2	1	1	4	3	1	3	3	3
Bill Davis	3	3	3	4	2	1	4	3	4
Andre P	4	4	4	5	4	3	5	3	5
Randy P	5	2	5	5	5	3	5	3	5
Cliff Barrett	4	2	3	4	3	1	3	3	3
Debra Bills	0	0	0	0	3	0	0	0	0
Western	2	1	2	5	3	2	3	2	2

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

6.13: 45,000 cfs for 2-4 days followed by load following flows up to powerplant capacity

Distribution of scores

Criteria	Rankings from sample ballot				
	1	2	3	4	5
BIO		3	4	2	
COST		2	2	3	1
CULTURAL			5	3	
LEGAL			1	2	5
POWER		1		3	4
RECREATIO	1	2	5	1	
SAND			3	4	1
SCIENTIFIC		2	1	2	3
WATER			8		

COMMENTS:

- complex. Do in concert with another similar but different test to separate effects of BHBF and Load Following.
- This linked proposal deserves investigation- I don't buy the 2 treatment concerns

SCIENTIFIC DESIGN:

- complex, may confound

LEGAL

- Trigger met
- assume trigger criteria is met

COST

- expensive to evaluate

POWER

- Allows generation flexibility

SAND/PHYSICAL RESOURCES

- Resource conservation

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	2	3	2	3	3	2	3	3	3
Dave Cohen	2	5	2	3	3	4	3	3	3
Wayne Cook	3	5	4	3	3	4	3	3	3
Bill Davis	4	5	3	4	2	4	4	3	2
Andre P	5	4	4	5	4	5	4	3	3
Randy P	4	4	4	4	2	5	3	3	2
Debra Bills	0	0	0	0	2	0	0	0	0
Western	5	5	5	4	3	5	3	3	3
Cliff Barrett	5	5	3	4	4	5	4	3	1

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

1.4 Minimum evening and weekend flows at 8,000 cfs

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO		1	2	3	3
COST	3	1	1	2	1
CULTURAL	1	1	3	1	2
LEGAL			2	3	3
POWER	5	1	1	1	
RECREATIO				3	5
SAND	2		2	2	2
SCIENTIFIC		2	1	3	2
WATER		2	5		1

COMMENTS:

- Actually WAPA is doing this now.
- Still waiting for WAPA to tell us what this would cost.
- Assume same as WAPA doing now.
- Significant problems in low release months, too much optimizing of Lee Ferry reach.

SCIENTIFIC DESIGN:

- good design for some resources near Dam

LEGAL

- outside ROD

COST

- Reduced power revenues

SAND/PHYSICAL RESOURCES

- less erosion?

BIOLOGICAL RESOURCES

- benefit foodbase, fish
- Benefits to trout

POWER RESOURCES

- Reduced flexibility
- Costly

RECREATION RESOURCES

- benefit beaches
- This is for the trout
- Increased stability of weekend flows

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	4	2	3	4	4	2	4	3	4
Cliff Barrett	4	5	3	3	3	1	3	3	4
Andre P	4	5	4	4	5	2	4	3	5
Dave Cohen	5	5	3	3	5	2	3	3	5
Wayne Cook	4	2	2	3	4	2	3	3	4
Bill Davis	4	5	2	3	4	1	3	3	4
Randy P	3	2	3	5	5	1	4	3	4
Western	5	5	2	3	4	2	3	3	4
Debra Bills	0	0	0	0	5	0	0	0	0

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

1.1 SUNDAY Flows: Every day's hydrologic pattern is the same.

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO		1	2	3	3
COST	3	1	1	2	1
CULTURAL	1	1	3	1	2
LEGAL			2	3	3
POWER	5	1	1	1	
RECREATIO				3	5
SAND	2		2	2	2
SCIENTIFIC		2	1	3	2
WATER		2	5		1

COMMENTS

- Eliminate Sunday lows, being done now as concession from BoR, not specifically designed for monitoring, but at least trout monitoring should be able to detect response if duration is sufficient. Already know that this will benefit resource.
- Assume this deals with the minimum flows over the weekend, a departure from ROD criteria to maximize trout benefits.
- Good experiment, I highly favor this one.
- Not clear as to what the flow would entail, difficult to rank.
- The intent of this recommendation anticipated minimums not maximums. The highs need not replicate daily patterns.

SCIENTIFIC DESIGN:

- Already know this should help
- What would be the purpose of this flow scenario

LEGAL

- Within ROD "box"

COST

- Within existing monitoring program
- Impacts to power revenue

RECREATION RESOURCES

- Expected to benefit beaches
- Beach experiment

BIOLOGICAL RESOURCES

- Steady-state benefits non-natives

POWER RESOURCES

- Reduced flexibility

WATER RESOURCES

- Neutral

RECREATION RESOURCES

- Trout
- Improved predictability, but limited variety of Qs

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	4	4	4	4	4	2	4	2	4
Cliff Barrett	3	4	1	1	3	1	1	3	5
Andre P	4	4	4	5	4	1	3	3	5
Wayne Cook	4	3	1	3	4	1	2	3	4
Bill Davis	2	5	1	1	3	1	3	3	5
Randy P	5	5	5	5	5	4	5	5	5
Western	2	3	2	3	2	1	3	3	4
Dave Cohen	5	5	3	4	5	3	5	2	5
Debra Bills	0	0	0	0	5	0	0	0	0

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

6.4 - 75,000 cfs for 2 days.

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO		2	5		2
COST	4	1	2	1	
CULTURAL		1	2	2	3
LEGAL	3	1	2		2
POWER	3	4	1		
RECREATIO		1	4	1	2
SAND			2	1	5
SCIENTIFIC	1		1	4	2
WATER	1		7		

COMMENTS

- BHBF similar to 96 experiment only higher magnitude, shorter duration.
- The previous one almost makes this look reasonable.
- A winner.

LEGAL

- trigger needed
- Assuming Trigger Met
- KAS and other outstanding compliance issues

SAND/PHYSICAL RESOURCES

- Higher terrace deposition

BIOLOGICAL RESOURCES

- Impacts to nonnatives (+) but also trout (-)

CULTURAL RESOURCES

- Some potential for additional protection

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	4	3	2	5	3	2	4	3	3
Dave Cohen	4	1	1	3	2	1	3	3	2
Wayne Cook	5	5	1	5	3	2	2	3	4
Bill Davis	1	1	1	5	2	1	5	3	3
Andre P	4	3	4	5	5	2	5	3	5
Randy P	5	5	3	5	5	2	5	3	5
Cliff Barrett	3	1	1	3	3	1	3	1	3
Debra Bills	0	0	0	0	3	0	0	0	0
Western	4	2	3	4	3	3	4	3	3

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

5.3 Flows recommended in the May 1997 SWCA SASF Report

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO			3	2	4
COST	2	3		1	2
CULTURAL	1	1	5	1	
LEGAL		3		2	3
POWER	5	3			
RECREATIO	1		5	2	
SAND	3	1	2	1	1
SCIENTIFIC	1		2	2	3
WATER	1		7		

COMMENTS

- Wait for next SWCA report and scientific PLAN.
- This is more like it.
- Risky proposal, lots of sediment transport, only biologic resources possibly win.
- Assume this meets the SASF required by BO.

SCIENTIFIC

- Not ready yet

LEGAL

- B.O.

COST

- Reduced ability to optimize power revenues.

POWER

- Reduced flexibility

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Andre P	4	4	4	5	5	1	4	3	4
Bill Persons	1	4	2	4	5	2	3	3	3
Dave Cohen	4	5	1	3	4	2	3	3	3
Bill Davis	5	2	5	2	3	1	2	3	4
Randy P	3	2	2	1	5	1	3	1	3
Cliff Barrett	5	5	5	1	4	1	1	3	1
Debra Bills	0	0	0	0	5	0	0	0	0
Western	5	5	2	3	3	2	3	3	3
Wayne Cook	3	2	1	1	3	1	3	3	3

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

5.1 Low steady flows in the summer and fall with and without a high spring spike.

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO		1	4	2	2
COST	3	1	4		
CULTURAL		1	5		2
LEGAL	2	1	3		2
POWER	7	1			
RECREATIO		4	3	1	
SAND	1	2	3		2
SCIENTIFIC			2	4	2
WATER	1	3	4		

COMMENTS:

- IF I HAVE TO GUESS WHAT THE PARAMETERS ARE-YOU'RE GOING TO HAVE TO GUESS HOW I VOTED! Since this was FWS preferred alternative, I tend to favor it. However, more definition to "low" and "high" need to be included. Since this is an experiment, those parameters can be identified. If the spring spike is 120,000 cfs or the low steady is 8000 cfs or lower, I have already voted against them.
- Assume it does not meet 8.23 MAF
- A gut wrencher for other resources other than the chub.
- At what level? "3"s here indicate I don't know.

LEGAL

- not "normal", not B.O.

COST

- Reduced power revenues

SAND/PHYSICAL RESOURCES

- Reduced toe slope erosion (+) no replenishment (-)

BIOLOGICAL RESOURCES

- Steady state benefits natives (+) & Nonnatives (-)

POWER RESOURCES

- Reduced flexibility

WATER RESOURCES

- Delivery obligations

RECREATION RESOURCES

- Steady but reduced stage, safety factor?

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Andre P	4	3	3	5	4	1	5	3	4
Bill Persons	3	2	3	3	4	2	3	2	3
Dave Cohen	5	5	1	3	3	1	3	3	2
Wayne Cook	3	1	1	1	3	1	3	3	3
Bill Davis	4	1	3	2	2	1	2	1	2
Randy P	4	3	1	5	5	1	5	2	2
Cliff Barrett	4	3	3	2	3	1	3	3	3
Debra Bills	0	0	0	0	5	0	0	0	0
Western	5	5	2	3	3	1	3	2	2

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

6.12 The 3-yr Mels proposal in response to the Cook-Moody proposal

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO			6		1
COST	3		3		
CULTURAL			5	1	
LEGAL	1		5		
POWER	1	2	1		2
RECREATIO			5	1	
SAND				4	2
SCIENTIFIC			1	2	3
WATER			6		

COMMENTS

- Like three year approach to experimental design.
- Assume 45K and steady flows followed by 45K with fluctuating flows.
- I am not familiar with Melis proposal.
- I still don't understand the "Melis" proposal.

SCIENTIFIC DESIGN:

- Time to completion may extend by years

LEGAL

- Need trigger
- Assuming no trigger (3 yr?)
- triggering criteria problem

COST

- expensive (3 years)

SAND/PHYSICAL RESOURCES

- Resource conservation

POWER RESOURCES

- Short-term, but more frequent reduced flexibility

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	4	3	1	4	3	2	4	3	4
Dave Cohen	5	3	1	4	3	3	3	3	3
Wayne Cook	3	1	1	4	3	1	3	3	3
Bill Davis	5	3	3	5	3	5	3	3	3
Andre P	0	0	0	0	0	0	0	0	0
Randy P	0	0	0	0	0	0	0	0	0
Cliff Barrett	5	3	3	5	3	5	3	3	3
Debra Bills	0	0	0	0	5	0	0	0	0
Western	4	3	3	4	3	2	3	3	3

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

1.2 Load following up to powerplant capacity during high flow months

Distribution of scores

	Rankings from sample ballot				
Criteria	1	2	3	4	5
BIO	2	2	5		
COST		1	2	1	4
CULTURAL	1	1	3	1	2
LEGAL	1	1		3	3
POWER					8
RECREATIO	2	5	1		
SAND		2	1	2	3
SCIENTIFIC		2		4	2
WATER		1	7		

COMMENTS:

- Change from ROD to allow fluctuations above 25,000 to pplant capacity. Benefit power resources, effects on others largely unknown, would require considerable effort to detect response.
- This would be done after a BHBF. The experiment will have to be coordinated with BHBF >45K experiment. Goal is to gain back some of the power value lost in the ROD criteria and to help maintain the sand impacted during high flows.
- What is meant by high flow-power plant capacity or beyond?
- Assume current up-and down ramps
- Another highly desirable experiment.

SCIENTIFIC DESIGN

- design not done yet

LEGAL

- outside ROD box

COST

- more effort than monitoring to detect response
- Incorporated benefits to hydropower revenues

SAND/PHYSICAL RESOURCES

- Unk
- Additional toe slope erosion possible

BIOLOGICAL RESOURCES

- expect harm to natives

POWER RESOURCES

- benefit
- Increases flexibility

CULTURAL RESOURCES

- assume more erosion at high elevation

WATER RESOURCES

- no effect
- neutral

RECREATION

- fewer high elevation beaches for camping

INDIVIDUAL RANKINGS:

Respondent	SC	LE	CO	SA	BI	PO	CO	WA	RE
Bill Persons	4	2	2	3	1	5	2	3	2
Cliff Barrett	4	4	5	5	3	5	5	3	2
Andre P	2	1	3	2	2	5	1	3	1
Dave Cohen	2	4	3	5	2	5	3	2	1
Wayne Cook	4	5	5	5	3	5	3	3	2
Bill Davis	4	5	5	4	3	5	4	3	2
Randy P	5	5	5	4	3	5	5	3	2
Western	5	4	4	2	3	5	3	3	3
Debra Bills	0	0	0	0	1	0	0	0	0

SC = Scientific Design, LE = Legal, CO = Cost, SA = Sand/Physical resources, BI = Biological resources, PO = Power resources, CU = Cultural Resources, WA = Water resources, RE = Recreational resources.

EXPERIMENTAL FLOWS AD HOC GROUP PROGRESS REPORT

Colorado River and Glen Canyon Dam Adaptive Management Program
Adaptive Management Work Group
July 20, 1999

Process:

Meeting 1
February 23, 1999
6:30 p.m. – 7:30 p.m.

- Select chair (Bill Persons).
- Review and clarify task from TWG:
    - *(Convene an ad-hoc group to) Develop an array of flow experiments and draft proposed actions for future water years so that a programmatic compliance approach can proceed.*
- Discuss methods and timetable to achieve task.
    - Brainstorm array of flows.
    - Brainstorm criteria to evaluate flows.
- Scheduled future meeting on March 17
- Homework assignment to develop 2 lists

Meeting 2
March 17, 1999
1 p.m. – 4 p.m.

- Brainstormed lists of flow activities and criteria to evaluate experimental flows
    - 33 possible criteria
    - 41 possible experimental flows
- Notes taken and distributed

Meeting 3
April 20
6 p.m. – 8:45 p.m.

- Clarified criteria and proposed actions
    - Narrowed and clarified criteria to 9 major groups
    - Narrowed experimental flows to 33 possible experiments
- Agreed to mail "ballot" to group members for initial ranking exercise

Mail-out ballot (Email)
April 27, 1999

- Nine responses were received by May 10, 1999
- Results summarized and distributed to full TWG in July

Attempted to meet June 7 with the full TWG
Time did not allow us to meet

Meeting 4
July 20, 1999
4 – 5 p.m.

- Discuss and agree upon process to complete assignment
- Agreed to proceed with the following steps:
    - 1. Screen the 33 experiments based on the guidance document, use conference call to do screening.
        - Send to group by July 30 with responses and comments due back August 13, 1999.
    - 2. Organize possible experiments by High, Medium, Low water years
    - 3. Prioritize 2-3 options for each (High, Medium, Low) water years and clarify to forward to programmatic compliance group

Bill Persons
July 20, 1999