# United States Department of the Interior

BUREAU OF RECLAMATION
Upper Colorado Region
Glen Canyon Environmental Studies
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Flagstaff, Arizona 86002-2459

IN REPLY REFER TO:

D-8290
ENV-1.00

MAR 06 1995

MEMORANDUM

To: Transition Monitoring Work Group
Glen Canyon Environmental Studies

From: David L. Wegner, Acting Manager
Technical Service Center, Environmental Resources Services
Glen Canyon Environmental Studies Group

Subject: Notes and Background Material - Glen Canyon Environmental Studies (GCES) - Transition Monitoring Work Group Meeting - February 22, 1995

The background materials and flip chart notes from the February 22, 1995, Transition Monitoring Work Group meeting held at Arizona State University are attached. These notes are not verbatim but represent the primary areas of discussion.

From this point, the following activities will be followed:

1. Review of meeting notes. Identify any discrepancies or misrepresentations by March 10, 1995.

2. Identification of primary responsibilities for development of study plans. This will occur through coordination between this office and Duncan Patten. Official requests for development of study plans for the transition monitoring will occur by March 20, 1995.

3. Presentation of the process for the development of the Transition Monitoring Program will be made to the Transition Work Group on March 23, 1995.

4. Development of budget estimates will be made from the proposals.

5. The DRAFT study plan will be distributed to the Transition Monitoring Work Group and the National Research Council for review and information. Followup meetings will be scheduled and held to discuss process, reporting requirements, and linkage to the data bases.

6. Coordination with the Upper Colorado Region and Western will follow the budget and study plans for the 1-year transition period.

7. A separate process will cover the development of the specific programs for the Biological Opinion and Programmatic Agreement.

8. New contracts and agreements will be established by September 30, 1995, to ensure no downtime on the monitoring efforts.

We appreciate your participation and support in the development of the Transition Monitoring Program. Please call if you have any questions or suggestions.

David L. Wegner

Attachments: List of Recipients
Meeting Notes
Agenda
Groundrules and Goals
Original Outline

cc: Ms. Sheila David, Staff Officer
National Research Council
2101 Constitution Avenue
Washington DC 20418
(w/attachments)

D-8200, UC-200, UC-230, UC770 (w/attachments to ea)

**NOTES FROM THE 22 FEBRUARY 1995**
**TRANSITION (FY96, OPTIONAL FY97) MONITORING PROGRAM MEETING**
**ASU CENTER FOR ENVIRONMENTAL STUDIES, TEMPE AZ**

Agenda: Enclosure 1
Groundrules and Goals: Enclosure 2
Original Outline: Enclosure 3

Attendance: B. Cluer, W. Davis, D. Haskell, M. Kearsley, R. Marzolf, C. Minckley, D. Patten, W. Persons, J. Schmidt, L. Stevens, D. Wegner, Tony Morton, Norm Henderson, Clay Bravo, Chris Karas, Mark Anderson

I. Initial Discussion

A. Overview and Ground Rules

1. Dave Wegner discussed the funding process for Transition Monitoring. Biological Opinion and spike flow studies will be separately funded.

2. Duncan Patten discussed the need to look at this with no special interest hats. Need to address ecosystem concerns and integration.

3. Dave Wegner discussed the integration process which is planned for fiscal year 1996.

4. Dick Marzolf requested that we add a category regarding contingency planning.

5. Discussed the need to modify the broad headings in the original document (enclosure 3). Revised headings are as follows:

| | Physical system | Biological system | Socio/econ/cult | Data Management |
|---|---|---|---|---|
| A. | Hydrology | Aquatic | Cultural | GIS |
| | 1.mainstem Q | | | |
| | 2.trib. Q | Wetland | Recreation | Data bases |
| B. | Water Quality (chem/phy/biol) | | Economic | |
| | 1. Forebay | | | |
| | 2. Mainstem | | | |
| | 3. Tribs | | | |
| C. | Sediment | | | |
| | 1. Inputs | | | |
| | 2. Transport | | | |
| | 3. Storage | | | |
| | * Beach surveys | | | |

* Cross-sections
* Airphoto analysis
* Time lapse photography

6. Questions to be asked for each program
   * "Is there long-term data sets available?"

   * "Where should we measure?"

7. The majority of the meeting notes were consolidated onto flip charts which are translated below. All items identified as to be evaluated are intended to be worked on during fiscal year 1996 or if possible initiated in fy95.

## II. Flip Chart Notes

### A. Physical Components and Processes

1. Hydrology

a. Mainstream discharge - continuous @ 1 hr intervals
   1) Glen Canyon Dam (BR support $$)
   2) Lees Ferry (USGS $, BR logistics)
   3) Colorado River above Little Colorado River (USGS support $$, and GCES logistics)
   4) Colorado River at Grand Canyon (USGS & BR $)
   5) Colorado River above Diamond Creek (USGS)

* Keep all unit data available for researchers
* Evaluate need for GCD and National cables (should be justified in reports if needed)
* Evaluate changing location of gage above LCR to allow for better data collection.
* Evaluate USGS flow model for long-term monitoring program
* Evaluate the gage above the confluence with the Little Colorado River to determine if a better location is possible

b. Tributary discharge - continuous at hourly intervals
   1) Paria -for sediment
   2) LCR Cameron gage - sediment
   3) Havasu (discharge only)

* Evaluate measurement on LCR near mouth

c. BDR network

* Evaluate cost to maintain versus cost to leave in place and continue to rent. Units should be retrieved from Canyon as they expire

d. Develop contingency plans for flood events

2. Water quality (physical, chemical, biological)
   a. Forebay of Lake Powell
      1) 4 times/yr over a 48 hr interval
      2) Hydrolab 12 times/yr
   * Evaluate sampling design
   * Evaluate need for a full Lake Powell study - Norm Henderson believes that we need to evaluate the full lake for changes related to dam operations.

   b. Mainstream - continuous (hourly, daily or at another interval?)
      1) Lees Ferry - NASQWAN (USGS $)
         a) Major ions, salinity, nutrients, organics, pesticides

      2) Colorado River at Grand Canyon
   * Evaluate continuous temperature at all mainstream gages
   * Complete publication of the USGS synoptic studies project (forebay, mainstream, and tributaries) and evaluate for long-term monitoring
   * Evaluate bacteriology data needs and condition of Honey Draw effluent

   c. Tributaries
      1) Paria - temperature
      2) LCR - temperature
      3) Kanab Cr. - temperature
      4) Havasu - temperature
   * Evaluate temperature and other WQ needs in all major tributaries

   d. Develop contingency plans for high flow events

3. Sediment

   a. Inputs - major tributaries, suspended sediment loads, measured according to USGS protocol
      1) Paria River
      2) LCR
   * Priorities: tributary suspended sediment loads, then mainstream flow, then mainstream sediment loads
   * Evaluate consistency of Paria River rating curve

   b. Mainstream suspended sediment transport
      1) LCR
      2) Grand Canyon
   * Evaluate value of gage above LCR
   * Evaluate usefulness of Diamond Creek for LT Monitoring

   c. Sediment storage
      1) Elevated sand storage
         a) Sandbar surveys - one spring trip

1) 33 sites, within geomorphic reaches
2) Include full bathymetry

* Evaluate alternative methods for long-term monitoring

b) Aerial photography
1) Annual during Memorial Day weekend @ constant 8,000 cfs

* Complete time lapse photography research and then evaluate for long-term monitoring

2) Repeated cross-section measurements
a) Paria to Badger
b) Below LCR

* Evaluate number of times/yr for repeated cross-sections based on water year conditions and number of tributary floods

d. Develop contingency plans for high flow and debris flow opportunities

B. Biological Components, Processes, and Habitats, Including Listed Species

1. Aquatic Domain

**Note: A full endangered fish research program as related to the Biological opinion is being developed independently of the monitoring identified here.**

a. Fish (all species)
1) Mainstream populations
a) Three sampling trips (pre-spawn, post-spawn, prior to 9/15)
b) Monitor condition of 3 age classes (larval, juvenile, adult)
1) Continue to tag fish and monitor tagged fish to determine mortality, survivorship and movement
c) Sample primary tributary mouths (Paria, LCR, Kanab, Havasu)
d) Sample from Glen Canyon Dam to Lake Mead

b. Humpback chub recruitment
1) Spawning run (Spring = April/May, each year in lower LCR, coupled with habitat assessment)
2) Monitor fish health and condition in the mainstem

c. Lees Ferry fishery
1) Sample 4 times/yr

* Evaluate making Lees Ferry effort consistent with Grand Canyon sampling program and combining efforts

d. Aquatic food base
  1) Benthos
    a) Quarterly sampling at Lees Ferry (3-4 sites)
    b) Mainstream in Grand Canyon, 3 times/yr (10-13 sites), including drift
    c) Compare sampling techniques
* Evaluate food base and fish interactions for long-term program
* Evaluate use of aerial photography and videography for long-term program

e. Backwaters - note: these analysis need to be completed for the Biological Opinion work
* Evaluate fy95 analyses, including responses of individual backwaters as well as reach-wide distribution.

f. Develop contingency plans

2. Wetland/Riparian Domain
a. Wetland/riparian vegetation
  1) Use of aerial photography for cover estimates
    a) Limited ground-truthing (1 trip/yr)
  2) Relate marsh monitoring to topographic surveying and sediment transport program

b. Wetland/riparian fauna
  1) Kanab ambersnail
    a) Base population and habitat research on FWS consultation

  2) Avifauna
    a) Southwest willow flycatcher
      1) Nesting and habitat research based on FWS consultation
    b) Waterfowl
      1) Continue monitoring above Lees Ferry
* Evaluate bald eagle population dynamics for LT monitoring
* Evaluate peregrine falcon population dynamics for LT monitoring
* Evaluate other avifaunal population dynamics for LT monitoring
  3) Other terrestrial fauna
* Evaluate data needs for invertebrates, herpetofauna and mammals (small mammals, carnivores, ungulates)

c. Develop contingency plans

C. Socio-economic and Cultural Components and Processes

1. Cultural/historical

a. Programmatic agreement
   1) Incorporate cultural monitoring plan into Transition Monitoring Program and Long-term Monitoring Plan
   2) NPS quarterly monitoring from Glen Canyon Dam to Lake Mead
   3) Complete traditional use areas analysis
* Evaluate integration of topographic surveys into sandbar erosion surveys
b. Develop contingency plans

2. Recreation
   a. Use and satisfaction (AGF)
   b. Creel surveys
   c. Visitation and use levels (NPS)
   d. Hualapai use levels
   e. Campsite availability
   f. Develop contingency plans

3. Economics
   a. Power economics
      1) Quarterly assessment of costs
   * Complete non-use values study and evaluate for long-term monitoring program
   * Evaluate need for recreation economics data for LT Monitoring

   b. Develop contingency plans

D. Synthesis of Information - not directly discussed but important to include

1. Recommend: Executive summaries from each project
2. Recommend: Scientific information management for each project
3. Recommend: Synthesis of system dynamics in physical, biological and cultural/socio-economic arenas
4. Synthesis will assist with spike flow planning and, conversely, the spike flow will help with synthesis
5. Synthesis should help plan thermal modification planning
6. GCES research symposium, Fall 1995 or winter 1996?
7. Recommend: Completion of the long-term monitoring program
8. Codify contingency plans for events such as large tributary floods, debris flows and slope failures, hazardous materials spills
9. Use synthesis to advise for adaptive management and Grand Canyon Protection Act, and to determine what constitutes a satisfactory conditions for the resources under study.

E. Summary Thoughts

1. Administrative costs will be shifted to the agencies with resource management responsibilities to the greatest extent possible after FY95.

2. The Long-term Monitoring Program will address future research needs for this system. We have not discussed those needs, and they should arise from the synthesis process.

3. We presently have little communication between researchers and managers. The synthesis program should help with this problem, but the Long-term Monitoring program should include a component to help improve inter-project and inter-agency communication.