

DRAFT PROSPECTUS FOR EVALUATING GCMRC MONITORING PROTOCOLS FOR THE COLORADO RIVER ECOSYSTEM

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Part I. Proposed Strategy and Time Line for GCMRC Protocols Evaluation Program (PEP)

Following four planning meetings between the GCMRC's Chief, Physical Scientist, Information Technologies Director, Lead Surveyor/Hydrographer, and other staff, the following prospectus for the GCMRC protocols evaluation program (PEP), was drafted. The proposed strategy for implementation of the PEP is a staggered, multi-stage effort that investigates new technologies, as well as existing and past protocols used to monitor Colorado River Ecosystem (CRE). The geographical scope of the CRE covers a distance of 291 river miles (-15 to 276) between the forebay of Lake Powell and the western-most boundary of Grand Canyon National Park.

The monitoring protocols evaluated will include: (1) those related to physical resources, including tributary and mainstem sediment input, storage and transport; (2) streamflow and water quality below GCD to river mile 276; water quality in Lake Powell; biological resources, both aquatic and terrestrial; cultural resources in all categories; and a variety of remote sensing technologies (ground-based, airborne and hydrographic) appropriate for addressing stakeholder information needs in all of the above-mentioned areas.

The main goal of the PEP is to identify an optimal design for an efficient and effective long-term monitoring program for the CRE, to be implemented by the GCMRC. A highly effective long-term monitoring program is required to provide Glen Canyon Dam Adaptive Management Work Group (and Technical Work Group) members (stakeholders) with information needed to make recommendations to the Secretary of the Interior (or Designee) on management-action decisions and impacts of GCD operations under the existing Record of Decision (ROD)-imposed dam operations, initiated in December 1996. Although the PEP strategy will be generally followed regardless of individual protocol differences, the process will likely be tailored to meet program objectives of each resource area.

Individual resource-area PEP objectives will be accomplished through a multi-step process over two to three years in which systematic articulation, scoping, review and testing/evaluation efforts will identify the most effective and feasible methods of measuring CRE resource attributes and their long-term responses to GCD operations under the ROD. Following these steps, the most effective monitoring approaches will be identified and PEP results will be reported to the stakeholders. After final consultation with the Science Advisors (SA) and the Technical Work Group, GCMRC program managers and the Chief will implement changes to the long-term monitoring program as indicated by need, and allowed by cost and other considerations.

The proposed time line over which these evaluations will take place and be implemented in the GCMRC monitoring program is estimated to be Fiscal Year (FY) 1998 through FY02. Following the initial PEP, additional evaluations may need to occur as new information needs arise, new knowledge is gained, and as new techniques/technologies become available for monitoring riverine ecosystems. The PEP planning team also believes that a periodic review of the overall GCMRC monitoring program

should be reviewed and evaluated at about five-year intervals to identify areas where improvements or small changes in focus are needed. Finally, the need for consistency in monitoring data sets for purposes of comparability is recognized as important as decisions to alter protocols are made by the GCMRC. The systematic nature of the PEP process will guarantee that paired tests leading up to changes in long-term monitoring are conducted in such a way as to ensure that data from past studies are comparable to future efforts.

PART II. Key Components of the PEP

In drafting this prospectus for the PEP, the GCMRC planning team considered the following issues to be important:

A. Articulate Management Objectives/Information Needs, and Current Protocols - Just as it is critical to identify details of new and existing monitoring protocols, it is also critical for PEP participants (external and internal) to have a clear and detailed understanding of present stakeholder-derived management objectives and information needs. Originally drafted in 1995 by the Glen Canyon Transition Work Group, CRE management objectives were reviewed and revised by a sub-group of the Technical Work Group, and the GCMRC Chief and his staff during a series of five scoping meetings in spring 1998. Information needs were originally stepped down from the draft objectives during summer 1996, and were reviewed and modified as needed in 1998. Information needs derived from the management objectives are the basis for procurement of CRE science activities by the GCMRC through its competitive RFP process.

In addition to describing information needs and objectives, past and presently used monitoring protocols need to be clearly articulated on the basis of existing literature and discussions with present/former project chiefs and PIs who conducted monitoring and research during phases I and II of the Glen Canyon Environmental Studies (GCES, 1983 through 1996). Information on existing protocols, including methods sections of reports and articles that describe various uses in the CRE or other rivers, must be reviewed and made available to external review panels and scoping workshop participants in advance of all PEP workshops/meetings. This information will be collected, compiled and distributed by program managers during the scoping phase of the PEP as they lead each of the individual protocol evaluations. Although the PEP will eventually address monitoring needs in all program areas, initial workshops held during the FY98 phase of the PEP will focus on the effectiveness of ground-based and airborne remote-technology sensing (GARST), and previously used protocols associated with physical resources, such as those used to monitor sediment transport and sand bar changes.

Outside experts, identified through GCMRC scoping activities, will also be invited to participate in review-oriented workshops. The GCMRC will solicit participation from experts qualified to provide external critical review of the PEP process, as well as those who may offer information and demonstrations on new technologies and methods from both private and public sectors.

B. Define the Range of Optional Alternatives Under Existing Technologies - Alternatives to existing protocols will be identified by in-depth GCMRC scoping of monitoring techniques that are presently used in other long-term programs for river ecosystems. Methodologies will also be considered that are presently used in monitoring of other ecosystems (i.e., near coastal marine settings, forests, etc.) where the protocols might be adapted to a large river, or technologies/methods that are still in developmental stages, but intended for large rivers.

The PEP scoping process is intended to be wide-ranging, and will glean information from multiple sources such as, reports, journal articles, professional presentations, displays at professional

meetings. Attending national meetings frequented by ecosystem-monitoring experts, and conferences that attract technological innovators by GCMRC staff is encouraged as a means of conducting pre-workshop scoping activities. To increase the effectiveness of the PEP, the limitations and capabilities of new technologies of interest must be screened against information needs by the GCMRC/PEP planning team in advance of the first workshop. New technologies that hold great promise, but are mis-matched with stakeholder/GCMRC information needs should be easily identified. In cases where innovation has led to new approaches not been recognized by stakeholders, the PEP can act to update managers on areas where new information could be easily obtained. This will hopefully eliminate consideration of inappropriate new protocols early in the process. Agencies and private-sector firms identified through the scoping process will be invited to the workshop(s) for demonstration and discussions of new methods and technologies.

Regardless of the diversity of monitoring approaches considered, other topics such as replication, sampling interval and spatial distribution for a long-term monitoring program also need to be evaluated by CRE-resource category. For instance, during FY98, external review panels will also assist the GCMRC-PEP in reviewing and identifying ideal sampling strategies for existing efforts such as channel-storage changes, monitoring channel-bed grain-size evolution and bed coverage through time (SEDS), Lake Powell water quality monitoring (WETS), and for GARST. Information from recent high-flow experiments suggests that monitoring data on grain-size evolution of channel-stored sediment may significantly influence management decision making, but has not previously been a component of physical-resource monitoring.

The PEP process also recognizes that new information gained from experiments, such as controlled high releases from GCD, as well as evolving information needs, will likely drive additional new needs for monitoring methods of the CRE through time. Therefore, although the PEP may have formal start and end dates, the GCMRC mission will require program managers, stakeholders and the SA to revisit the long-term monitoring strategy (including individual protocols) on a periodic basis; perhaps as a five-year review.

C. Evaluation/Selection of Protocols to be Implemented - The PEP aims to identify which of the past, currently used or new, but untested protocols best meet the objectives of what a long-term monitoring program should accomplish for any ecosystem management program. Second, the program aims to design a river-monitoring program with protocols capable of assessing long-term ecosystem trends, as well as be able to document the impacts of discreet events, such as high-flows from GCD. Protocols must also be able to provide information to stakeholders in a timely manner useful for supporting the adaptive management process (recommendations to the Secretary of Interior). The selected protocols also must work within the unique settings of the CRE, be minimally intrusive to the environment, demonstrate cost effectiveness, stand as scientifically defensible, provide suitable accuracy/precision (depending on level of information need), and be highly repeatable and reproducible regardless of changes in contractors over time. Most importantly, the selected approaches must directly address the management objective-derived stakeholder information needs.

Where existing data occur in the databases of the GCMRC or its former/present cooperators, initial evaluations will be undertaken internally by staff members and scientists already involved in monitoring under existing agreements (Phase I). However, existing data sets that may foster comparative assessment will only be analyzed after the articulation and scoping steps have been accomplished. In cases such as the FY98 evaluation of the SEDS, WETS and GARST, existing interagency and cooperative agreements will be modified during FY98-99 to enlist help in conducting paired test evaluations with collaborating scientists.

Any assessments conducted on existing data will be subjected to internal and external review and will be presented and discussed during initial workshop(s) held by GCMRC during spring/summer 1998, and beyond for other resource categories. The PEP external review panel(s) will be invited to attend the scoping workshop(s), and its members will be comprised of experts derived from the GCMRC list of reviewers established by discipline during the scoping phases. Membership will be determined competitively on the basis of expertise (initially, physical and remote sensing technologies), and on willingness and availability to participate in the scheduled time line of the PEP.

Following the articulation/scoping steps (Phase I), committed PEP review panel members (3-5 persons per phase/program area) will be paid a stipend and travel for attending workshop(s), and will be required to provide individual and group reports on protocols evaluated, presentations/reports on assessments of existing data, results of field testing (Phase II), and critical review of trial implementations (Phase III). A key component of each report will consist of recommendations to the GCMRC Chief and the SA on what changes in monitoring protocols are warranted. The results of each PEP evaluation will be reviewed by the SA and comments will be forwarded to the GCMRC Chief for consideration before new or modified monitoring procedures are implemented by program managers through a competitive RFP-driven process.

For any given resource-program area, there will likely be at least three workshops held (minimum of one per year) throughout the PEP process. Although FY98 will be devoted mostly to scoping and evaluation of protocols relating to the GARST, WETS and SEDS, the PEP planning team intends that all protocols in all program areas be evaluated over a staggered schedule lasting 3-4 years (FY98 through FY02), as follows:

Part III. Proposed PEP Schedule

A. General Schedule and Timing for PEP - The GCMRC proposes that the PEP be staggered over three-four years, and fully realizes that the PEP process will and should vary somewhat in approach by individual resource-program areas. The basic approach will remain the same, but individual steps will likely vary based on each program manager's needs, budget constraints, etc. The PEP process begins in FY98 with articulation/scoping for GARST (headed by Ted Melis and Mike Liszewski, GCMRC's Physical Scientist, and Information Technologies Director, respectively), and protocols aimed at long-term monitoring of physical resources (SEDS and WETS, headed by Ted Melis and Barry Gold, GCMRC's Physical Scientist and Chief, respectively).

The time line for preliminary reports on GARST, SEDS and WETS is September 1998 (see attachment 1 for a more detailed work plan and time line). Information gained from the initial phase of the process may be used in two ways: (1) where analyses of existing data have been suitable for comparison, and results/conclusions have been derived, the results will be externally reviewed in detail; (2) where scoping information has led to questions about the appropriateness of one protocol over another, but no existing data are available for analyses, the information will be used to develop RFP(s) intended to have specific protocols field tested and evaluated as competitive research effort(s) in FY99 and beyond.

B. Proposed Tasks and Timing for PEP - By Resource-Program Area –

1. **FY1998-1999:** A combined internal/external definition/scoping period, including initial peer review workshop(s) to evaluate past, present and possible new protocols that are relevant to stakeholder information needs; with the goal of review workshops being to identify one or more appropriate alternate protocols for field testing.

2. FY1999-2000: Field testing of the most effective and promising alternate protocol(s) through internal and external competitive research efforts.
3. FY2000-2001: Trial implementation of the most promising alternative protocol(s), identified from field testing, evaluation and external review, through competitive RFPs.
4. FY2000-2002: External review panel evaluation of monitoring information derived from the protocol(s) deemed most appropriate.
5. FY2001-2002: Final selection of most-appropriate protocol(s) for incorporation into long-term monitoring program.

C. Procedures for Accomplishing Tasks - Scoping workshops and external review panels will be organized through the GCMRC by the PEP planning team and assistance from the GCMRC review coordinator (Dr. Barbara Ralston), beginning in spring/summer 1998. Resource areas and formerly/presently used physical/remote sensing protocols that have generated existing data sets will be compared as outlined above. Preliminary results of internal assessments will be presented at workshops, Technical Work Group meetings, and will be reviewed and discussed at the GCMRC-sponsored workshops (see Attachment 1).

Part IV. Proposed Time Lines for Individual Resource-Program Areas

Physical Resources and Remote Sensing - FY98-99:

- *Scoping* (FY98) and *Field Testing Pilot Studies* (FY99);
- FY2000 and Beyond: Implementation in GCMRC Monitoring Program through competitive RFP process;

Biological and Cultural Resources - FY99-2000:

- *Scoping* (FY99) and *Field Testing Pilot Studies* (FY2000);
- FY2001 and Beyond: Implementation in GCMRC Monitoring Program through competitive RFP process.

ATTACHMENT 1. - GENERALIZED STEPS FOR PEP: A PILOT STUDY

**Evaluating Present and Alternative Airborne Remote-Sensing Technologies (GARST)
[Photography and Videography]**

INTRODUCTION

The GCMRC presently uses standard aerial photography/photogrammetry and color video for river corridor overflights. The following is a draft outline of tasks, responsibilities, deadlines, and budget information associated with the PEP pilot study; a process for ground-based and aerial photography/videography, termed here as Ground-Based and Airborne Remote-Sensing Technology (GARST), data collection protocols during FY98-99. This effort is intended to: (1) evaluate current aerial photography and videography protocols; (2) evaluate alternative airborne remote-sensing technologies; (3) propose an appropriate comparison of any new protocol with the existing protocols to evaluate the old vs. the new, and to ensure there is no discontinuity in the data set as a result of changing protocols, and 4) test the protocol evaluation process discussed above.

PLANNING PHASE:

Task I. Describe Current GARST Protocols Used by GCMRC to Monitor the Colorado River Ecosystem

Task I.a. (Mike Liszewski) - Define the former and present remote-sensing protocols in terms of timing, scale, format, constant low-stage, method of deployment, etc.

Task I.b. (Program Managers and Staff) - Describe and define the types of data required and desired to address the present monitoring information needs set down by stakeholders (R. Lambert for cultural, B. Gold, L. Stevens, B. Ralston and -M. Yard for biological, T. Melis for physical, D. Garrett, W. Vernieu and S. Hueftle for Lake Powell, M. Liszewski for information technologies). A few examples of general needs might include: sandbar and sediment-related features, terrestrial vegetation (including chlorophyll-A), cultural site erosional/depositional changes. In describing the data requirements, the program managers and staff must address scale/resolution, as well as acceptable levels of error (precision/accuracy) associated with remote-sensed data.

Task I.c. (Program Managers and Staff) - Provide Mike L. with detailed information on: (1) how past airborne-collected data have or are presently being used? (2) What is being done with the data presently to achieve information needs defined by stakeholders? (3) Do the present protocols effectively provide data needed to answer information needs?

Due Date for Tasks I.a-c: March 6, 1998 - ACHIEVED

(NOTE: Several potentially interesting conferences happen to coincide with the initial phase of the PEP with respect to physical/remote sensing topics, such as the ASCE Wetlands Conference in late March 1998 [Denver, CO]; a national meeting sponsored by the USGS-WRD to present new technologies for measuring sediment in rivers in February in St. Petersburg, FL will also provide information on new technologies. Another conference on new technologies and developments in remote-sensing will be convened in late March, 1998 [Tampa, FL] that may also potentially provide new information and contacts on CRE resource monitoring approaches.)

Task II. Identify Expert Review Panel and Alternative Protocols to be Evaluated

Task II.a. (Program Managers) - Develop list of names of potential expert review panel members, review list and identify individuals to be invited to sit on the expert review panel (plus alternates), and invite individuals to join the expert review panel.

Task II.b. (Mike L. and Ted M.) - Identify alternative GARST protocols that may be evaluated by the expert review panel and subsequently recommended for evaluation through potential paired comparisons (e.g., field testing during the anticipated 1998 Labor Day overflight) or other means.

The following are approaches that the GCMRC (headed by Mike L. and Ted M.) will utilize to scope appropriate expertise and alternative technologies: 1) telephone and face-to-face interviews with program managers and research-group leaders from major agencies that work with remote sensing technologies and databases; especially those who focus on river, lake or near coastal ecosystems; 2) literature review, 3) attendance of the national remote-sensing conference set for Tampa, FL in late March; 4) internal scoping and discussions with survey personnel (Gonzales and others) who have already identified interesting new remote-sensing technologies.

Due Date for Tasks II.a-b: April 10, 1998 - ACHEIVED

(NOTE: In future PEP efforts, the GCMRC would involve the Science Advisory Board (SA) in the scoping process, as well as in external review panel meetings and workshops to the greatest extent possible. At the very least, the SA should be involved in the scoping process and asked to review the decisions to conduct paired field tests, as well as final decisions on changes in protocols for implementation in the long-term monitoring program.)

FIRST REVIEW PHASE:

Task III. Convene GARST Expert Review Panel for Critical Evaluation of Existing and Potentially Useful Protocols - COMPLETED

Task III.a. (Mike L. and Ted M.) - The external review panel for GARST will be convened May 26-28, 1998. Mike L. and Ted M. will organize the meeting in Flagstaff, AZ at the USGS, Building 3 conference room. Expert review panel members will be supplied with information developed from Task I (above), and any alternative protocols identified from Task II (above).

Reviewers will have at least three weeks to prepare for the meeting (their ability to work within this time window will be one additional requirement for their selection).

Due Date for Task III.a: COMPLETED

Task III.b. (Mike L. and Ted M.) - At the review panel meeting, the panel will be introduced to the PEP process in general (Ted M. and Barry G.). This will be followed by a brief presentation on the existing protocols and data requirements. Discussions as to the appropriateness of the former/existing protocols for meeting presently defined information needs, as well as evaluation of alternatives identified by the GCMRC will be held. In addition, the reviewers will be asked to provide their own recommendations on other alternatives that may not have been identified through the GCMRC scoping process. Hopefully, through this combined process, the GCMRC will identify all of the appropriate GARST options for consideration and possible testing.

Due Date for Task III.b: May 28, 1998 - COMPLETED

Task III.c. (Expert Review Panel) - The expert review panel will be asked to provide the GCMRC with individual summary reports, and a group report on their evaluations of the protocols discussed during the meeting, and their recommendation(s), if any, on other GARST protocols should be considered for paired field testing during the Labor Day 1998 aerial overflight. On the basis of their report(s), the GCMRC (Mike L.) will implement the annual overflight and possibly a paired test, pending available funding ability to procure any alternatives that might be identified for a test comparison.

Due Date for Task III.c: COMPLETED

(NOTE: Whatever evaluation approach is recommended, the selection and implementation of a new protocol for airborne remote sensing must be implemented in such a manner as not to yield a discontinuity in data collection.)

PROCUREMENT PHASE:

Task IV. Labor Day 1998 Overflight (with Possible Paired or Triple Field Testing)

Task IV.a. (Mike L.) - The GCMRC Information Technologies Director will have all of summer 1998 to procure the standard overflight for Labor Day still photography and videography, and any additional protocols that were identified through the scoping and review panel process for paired field testing. The present contractual agreement for aerial photography may be used to procure additional protocols for testing during the overflight, depending on the contractor's willingness and ability to provide them directly or subcontract for them through another party within the designated time frame. Standard videography may be conducted by the Bureau of Reclamation with permitted helicopter deployment, and additional videography formats may also be used for testing purposes using existing cooperative and interagency agreements.

Due Date for Task IV.a: August 31, 1998

Task IV.b. (Mike L. and GCMRC's Contractor(s)) - Over the Labor Day weekend airborne remotely sensed data will be collected. The processed data will be delivered to the GCMRC Information Technologies Director no later than mid-October 1998.

Due Date for Task IV.b: October 15, 1998

EVALUATION PHASE:

Task V. Paired-Test Evaluation by GCMRC, Cooperator(s), and Expert Review Panel

Contingency Task V.a. (Cooperator/Contractor procured through competitive RFP process) - In the event that comparative testing is recommended by the expert review panel (May meeting), and that alternative data sets are obtained from protocols other than standard aerial photography over Labor Day '98 overflight, then the GCMRC Information Technologies Director may decide to procure assessment(s) of the data from outside sources. If the RFP was released in summer 1998, then it is assumed that the performance period of the assessment would be at least one year, beginning October 1, 1998. Under this schedule, the draft report on the assessment would likely be due on August 15, 1999 and the final report would be completed on or before September 30, 1999.

Draft Report Due on August 15, 1999

SECOND REVIEW PHASE:

Task V.b. (Expert Review Panel and GCMRC) - The results of the paired test (databases) would be evaluated by the reviewers and the GCMRC staff at a second review panel meeting held in the fall of 1999 (date is dependent on how soon the data and evaluation are available). On the basis of this second review, the GCMRC would prepare a draft report on the PEP process, results of testing, and review results for distribution and comment by the Technical Work Group in late summer 1999.

Due Date for Task V.b: October 1, 1999

DECISION-MAKING AND IMPLEMENTATION PHASE:

Task V.c. (Barry G.) - On the basis of review and comment by GCMRC staff, the SA and the TWG, a decision would be made by the GCMRC Chief as to whether additional scoping, review and testing is required, or whether a protocol change(s) is warranted for implementation in to the GCMRC long-term monitoring program beginning in FY99 and beyond.

The following is an outline of the proposed time line, tasks, and estimated budget to conduct the GARST evaluation during FY98-99.

BUDGET AND TIMELINE, PEP-I:

Section VI. GARST - Time Line, Budget, and Assignments

A - Articulation:	2/1/98 through 3/6/98	Mike L. and Staff	COMPLETED
B - Scoping:	3/7/98 through 4/10/98	Mark G. + Ted M.	COMPLETED
C - External Review:	4/15/98 through 5/25/98	Mike L. + Ted M.	COMPLETED
D - First Meeting:	5/26 through 5/28/98	Mike L. + Ted M.	COMPLETED
E - Procurement:	6/16/98 through 9/3/98	Mike L.	COMPLETED
F - L.D. Overflight:	9/5/98 through 9/7/98	Mike L.	COMPLETED
***G - Data Processing:	9/9/98 through 10/15/98	Contractor(s)	TBA

***NOTE ON ITEM G: The period required to process and evaluate the data collected during the Labor Day 1998 overflight will depend on the recommendations of the Expert Review Panel convened at the May 26-28, 1997, meeting in Flagstaff, AZ. The minimum requirement for time and assessment by GCMRC could be 4-6 weeks (conventional photography versus digital imagery). This time period could be extended to as much as a year in the event that completely new GARST protocols are flown that generate significantly new and different data sets from those previously captured. HENCE, THE REMAINDER OF THE TIMELINE ONLY APPLIES TO THE FIRST CASE, NOT THE LATTER.

H - External Review:	6/15/99 through 7/15/99	Mike L. + Ted M.	TBA
I - Second Meeting:	Late July 1999	Mike L. + Ted M.	TBA
J - SA Review:	August 1999	Mike L.	TBA
K - Draft Report:	8/15/99	Mike L.	TBA

***LABOR DAY 1999 AERIAL OVERFLIGHT (At minimum, standard aerial photography will be procured)

L - Draft to TWG:	9/1/99, Discuss at Sept. TWG	Mike L.	TBA
M - Draft to AMWG:	October 1999	Mike L.	TB
N - Present to AMWG	January 2000 Meeting	Barry G. + Mike L.	TBA
O - Chief's Decision:	Spring 2000	Barry G.	TBA
P - Implement Change(s):	Labor Day 2000	Mike L.	TBA

End GARST Component of PEP Assessments

OR,

Continue the PEP process for GARST, Phase II in FY2001 and beyond with additional scoping, field testing and SA and external expert reviews, workshops, etc.

ATTACHMENT 2. - PROPOSED STEPS FOR [SEDS] PEP: A REVIEW PROCESS

**Evaluating Present and Alternative Physical Resources Monitoring Protocols (SEDS)
[System-Wide Monitoring and Modeling - Sediment and Flow]**

INTRODUCTION:

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PLANNING PHASE:

Task I. Describe Current SEDS Protocols Used by GCMRC to Monitor the Colorado River Ecosystem

Task I.a. (Mike Liszewski) - Define the former and present remote-sensing protocols in terms of timing, scale, format, constant low-stage, method of deployment, etc.

Task I.b. (Program Managers and Staff) - Describe and define the types of data required and desired to address the present monitoring information needs set down by stakeholders (R. Lambert for cultural, B. Gold, B. Ralston and -M. Yard for biological, T. Melis for physical, W. Vernieu and S. Hueftle for Lake Powell, M. Liszewski for information technologies). A few examples of general needs might include: sandbar and sediment-related features, terrestrial vegetation (including chlorophyll-A), cultural site erosional/depositional changes. In describing the data requirements, the program managers and staff must address scale/resolution, as well as acceptable levels of error (precision/accuracy) associated with remote-sensed data.

Task I.c. (Program Managers and Staff) - Provide Mike L. with detailed information on: (1) how past airborne-collected data have or are presently being used? (2) What is being done with the data presently to achieve information needs defined by stakeholders? (3) Do the present protocols effectively provide data needed to answer information needs?

Due Date for Tasks I.a-c: March 6, 1998 - ACHIEVED

(NOTE: Several potentially interesting conferences happen to coincide with the initial phase of the PEP with respect to physical/remote sensing topics, such as the ASCE Wetlands Conference in late March 1998 [Denver, CO]; a national meeting sponsored by the USGS-WRD to present new technologies for measuring sediment in rivers in February in St. Petersburg, FL will also provide information on new technologies. Another conference on new technologies and developments in remote-sensing will be convened in late March, 1998 [Tampa, FL] that may also potentially provide new information and contacts on CRE resource monitoring approaches.)

Task II. Identify Expert Review Panel and Alternative Protocols to be Evaluated

Task II.a. (Program Managers) - Develop list of names of potential expert review panel members, review list and identify individuals to be invited to sit on the expert review panel (plus alternates), and invite individuals to join the expert review panel.

Task II.b. (Mike L. and Ted M.) - Identify alternative SEDS protocols that may be evaluated by the expert review panel and subsequently recommended for evaluation through potential paired comparisons (e.g., field testing during the anticipated 1998 Labor Day overflight) or other means.

The following are approaches that the GCMRC (headed by Mike L. and Ted M.) will utilize to scope appropriate expertise and alternative technologies: (1) telephone and face-to-face interviews with program managers and research-group leaders from major agencies that work with remote sensing technologies and databases; especially those who focus on river, lake or near coastal ecosystems; (2) literature review; (3) attendance of the national remote-sensing conference set for Tampa, FL in late March; (4) internal scoping and discussions with survey personnel (Gonzales and others) who have already identified interesting new remote-sensing technologies.

Due Date for Tasks II.a-b: April 10, 1998 - ACHIEVED

(NOTE: In future PEP efforts, the GCMRC would involve the Science Advisory Board (SA) in the scoping process, as well as in external review panel meetings and workshops to the greatest extent possible. At the very least, the SA should be involved in the scoping process and asked to review the decisions to conduct paired field tests, as well as final decisions on changes in protocols for implementation in the long-term monitoring program.)

FIRST REVIEW PHASE:

Task III. Convene SEDS Expert Review Panel for Critical Evaluation of Existing and Potentially Useful Protocols - COMPLETED

Task III.a. (Mike L. and Ted M.) - The external review panel for SEDS will be convened May 26-28, 1998. Mike L. and Ted M. will organize the meeting in Flagstaff, AZ at the USGS, Building 3 conference room. Expert review panel members will be supplied with information developed from Task I (above), and any alternative protocols identified from Task II (above).

Reviewers will have at least three weeks to prepare for the meeting (their ability to work within this time window will be one additional requirement for their selection).

Due Date for Task III.a: COMPLETED

Task III.b. (Mike L. and Ted M.) - At the review panel meeting, the panel will be introduced to the PEP process in general (Ted M. and Barry G.). This will be followed by a brief presentation on the existing protocols and data requirements. Discussions as to the appropriateness of the former/existing protocols for meeting presently defined information needs, as well as evaluation of alternatives identified by the GCMRC will be held. In addition, the reviewers will be asked to provide their own recommendations on other alternatives that may not have been identified through the GCMRC scoping process. Hopefully, through this combined process, the GCMRC will identify all of the appropriate SEDS options for consideration and possible testing.

Due Date for Task III.b: May 28, 1998 - COMPLETED

Task III.c. (Expert Review Panel) - The expert review panel will be asked to provide the GCMRC with individual summary reports, and a group report on their evaluations of the protocols discussed during the meeting, and their recommendation(s), if any, on other SEDS protocols should be considered for paired field testing during the Labor Day 1998 aerial overflight. On the basis of their report(s), the GCMRC (Mike L.) will implement the annual overflight and possibly a paired test, pending available funding ability to procure any alternatives that might be identified for a test comparison.

Due Date for Task III.c: COMPLETED

(NOTE: Whatever evaluation approach is recommended, the selection and implementation of a new protocol for airborne remote sensing must be implemented in such a manner as not to yield a discontinuity in data collection.)

PROCUREMENT PHASE:

Task IV. Labor Day 1998 Overflight (with Possible Paired or Triple Field Testing)

Task IV.a. (Mike L.) - The GCMRC Information Technologies Director will have all of summer 1998 to procure the standard overflight for Labor Day still photography and videography, and any additional protocols that were identified through the scoping and review panel process for paired field testing. The present contractual agreement for aerial photography may be used to procure additional protocols for testing during the overflight, depending on the contractor's willingness and ability to provide them directly or subcontract for them through another party within the designated time frame. Standard videography may be conducted by the Bureau of Reclamation with permitted helicopter deployment, and additional videography formats may also be used for testing purposes using existing cooperative and interagency agreements.

Due Date for Task IV.a: August 31, 1998

Task IV.b. (Mike L. and GCMRC's Contractor(s)) - Over the Labor Day weekend airborne remotely sensed data will be collected. The processed data will be delivered to the GCMRC Information Technologies Director no later than mid-October 1998.

Due Date for Task IV.b: October 15, 1998

EVALUATION PHASE:

Task V. Paired-Test Evaluation by GCMRC, Cooperator(s), and Expert Review Panel

Contingency Task V.a. (Cooperator/Contractor procured through competitive RFP process) - In the event that comparative testing is recommended by the expert review panel (May meeting), and that alternative data sets are obtained from protocols other than standard aerial photography over Labor Day 1998 overflight, then the GCMRC Information Technologies Director may decide to procure assessment(s) of the data from outside sources. If the RFP was released in summer 1998, then it is assumed that the performance period of the assessment would be at least one year, beginning October 1, 1998. Under this schedule, the draft report on the assessment would likely be due on August 15, 1999 and the final report would be completed on or before September 30, 1999.

Draft Report Due on August 15, 1999

SECOND REVIEW PHASE:

Task V.b. (Expert Review Panel and GCMRC) - The results of the paired test (databases) would be evaluated by the reviewers and the GCMRC staff at a second review panel meeting held in the fall of 1999 (date is dependent on how soon the data and evaluation are available). On the basis of this second review, the GCMRC would prepare a draft report on the PEP process, results of testing, and review results for distribution and comment by the Technical Work Group in late summer 1999.

Due Date for Task V.b: October 1, 1999

DECISION-MAKING AND IMPLEMENTATION PHASE:

Task V.c. (Barry G.) - On the basis of review and comment by GCMRC staff, the SA and the TWG, a decision would be made by the GCMRC Chief as to whether additional scoping, review and testing is required, or whether a protocol change(s) is warranted for implementation in to the GCMRC long-term monitoring program beginning in FY99 and beyond.

The following is an outline of the proposed time line, tasks, and estimated budget to conduct the SEDS evaluation during FY98-99.

BUDGET AND TIMELINE, PEP-I:

Section VI. SEDS - Time Line, Budget, and Assignments

A - Articulation:	2/1/98 through 3/6/98	Mike L. and Staff	COMPLETED
B - Scoping:	3/7/98 through 4/10/98	Mark G. + Ted M.	COMPLETED
C - External Review:	4/15/98 through 5/25/98	Mike L. + Ted M.	COMPLETED
D - First Meeting:	5/26 through 5/28/98	Mike L. + Ted M.	COMPLETED
E - Procurement:	6/16/98 through 9/3/98	Mike L.	COMPLETED
F - Overflights:	9/5/98 through 9/7/98	Mike L.	COMPLETED
***G - Data Processing:	9/9/98 through 10/15/98	Contractor(s)	TBA

***NOTE ON ITEM G: The period required to process and evaluate the data collected during the Labor Day '98 overflight will depend on the recommendations of the Expert Review Panel convened at the May 26-28, 1997, meeting in Flagstaff, AZ. The minimum requirement for time and assessment by GCMRC could be 4-6 weeks (conventional photography versus digital imagery. This time period could be extended to as much as a year in the event that completely new SEDS protocols are flown that generate significantly new and different data sets from those previously captured. HENCE, THE REMAINDER OF THE TIMELINE ONLY APPLIES TO THE FIRST CASE, NOT THE LATTER.

H - External Review:	6/15/99 through 7/15/99	Mike L. + Ted M.	TBA
I - Second Meeting:	Late July 1999	Mike L. + Ted M.	TBA
J - SA Review:	August 1999	Mike L.	TBA
K - Draft Report:	8/15/99	Mike L.	TBA

***LABOR DAY 1999 AERIAL OVERFLIGHT [At minimum, standard aerial photography will be procured]

L - Draft to TWG:	9/1/99, Discuss at Sept. TWG	Mike L.	TBA
M - Draft to AMWG:	October 1999	Mike L.	TBA
N - Present to AMWG	January 2000 Meeting	Barry G. + Mike L.	TBA
O - Chief's Decision:	Spring 2000	Barry G.	TBA
P - Implement Change(s):	Labor Day 2000	Mike L.	TBA

End SEDS Component of PEP Assessments

OR,

Continue the PEP process for SEDS, Phase II in FY2001 and beyond with additional scoping, field testing and SA and external expert reviews, workshops, etc.