PROJECT WORKPLAN
Recirculation Feasibility Study

OBJECTIVE

This study will evaluate the feasibility of recirculation of water pumped from the Delta by the CVP and SWP to help meet San Joaquin River flow and water quality objectives while minimizing impacts to fish and wildlife resources and existing water users in the basin. The study will identify the merits and impacts of recirculation and will determine if any recirculation measures are compatible with other south Delta bundle objectives and CALFED's Ecosystem Restoration Program Plan.

BACKGROUND

Previous recirculation studies consisted of discharging DMC water to the San Joaquin River, via the wasteways that connect the DMC to the river, to meet the April 15 - May 15 pulse flow mandated by the Bay Delta 1994 Accord ~~accords~~. This discharge would reduce demands on the New Melones reservoir during the spring pulse flow period. New Melones would then be able to provide more water to meet water quality standards at Vernalis during the summer months. In the proposed study, recirculation will be analyzed throughout the year to help meet water quality objectives at Vernalis and in south Delta channels.

This study will include all necessary scientific and engineering studies required to evaluate whether or not ~~ensure~~ that recirculation can be implemented in a manner that meets applicable laws and regulations, is consistent with CALFED's Ecosystem Restoration Program Plan, avoids jeopardizing listed aquatic resources, and is acceptable to Reclamation, the California Department of Water Resources (DWR), local, state, and federal agencies and stakeholders participating in the CALFED ~~CalFed~~ Bay-Delta Program, and the state and federal water contractors. If determined to be feasible, the ~~The~~ potential implementation of a recirculation program will be covered in a later phase ~~of~~ and will ~~is~~ not be discussed in detail in this study. This second phase of work would include all activities necessary to move DMC water into the San Joaquin River, including the environmental documentation, consultation pursuant to the state and federal endangered species acts, permits, negotiation and execution of agreements, and a petition to the State Board for any necessary enabling decisions.

The tasks covered in this workplan are expected to take 18 to 24 months to complete. The total cost of this proposal is $320,000 ~~$300,000~~. Costs are broken down as follows:

DWRSIM Modeling for Alternatives Formulation:	$35,000 (Task 1a)
~~DWRSIM~~ DWRDSM2 Modeling for Alternatives Formulation:	$75,000 (Task 1b)
Alternatives Modeling- Water Quality and Power Generation	

~~Model development for DWRDSM2~~:	$40,000 (Task 2)
Impacts assessment and upstream conveyance evaluation: (Tasks 3-8)	$120,000 ~~100,000~~
Feasibility Study Report preparation:	$50,000 (Task 9)

The DMC Recirculation Appraisal study, conducted by Reclamation in late 1995, examined the probable outcome of discharging DMC water into the San Joaquin River upstream of Vernalis to meet the April 15 - May 15 pulse flow requirement. The Appraisal study determined it was physically possible to meet the pulse flows using recirculation water. However, there were many issues associated with required legal and institutional changes that would have to be resolved in order for recirculation to be implemented. In addition, the Appraisal study did not completely address critical water quality and fisheries issues.

Comments on the Appraisal study by several agencies were compiled for purposes of conducting a more detailed study that could lead to implementation of the recirculation proposal. One suggestion was that the study should be included as an alternative in the CVPIA PEIS. However, the changes that would be required in terms of legal and institutional matters in order to implement recirculation were incompatible with the PEIS screening criteria; therefore, it was decided to conduct the DMC Recirculation Special Study outside of the PEIS.

Earlier this year, the CALFED ~~CalFed~~ Bay-Delta Program, an interagency effort of 15 state and federal agencies with management and regulatory responsibilities in the estuary proposed the initiation of a Recirculation Feasibility Study. This workplan, proposed as a Stage 1 action, provides a framework to advance the feasibility study.

TASK DESCRIPTIONS

This study ~~project~~ will consist of nine tasks leading to ~~(1)~~ a decision on whether or not recirculation is acceptable and desirable in terms of the environmental, economic, and institutional framework and ~~(2)~~ a preliminary identification of the terms and conditions for implementing recirculation. If the decision is made to proceed, a future workplan would be developed to focus on ~~, and (3) a workplan for the~~ implementation of recirculation.

Task I - Alternatives Formulation ($110,000)

This task consists of defining the characteristics and assumptions of the No-Action Base Case and the various alternatives. The purpose of the alternatives is to explore the impacts of recirculation under a variety of conditions at the 1995 level of development. The alternatives

formulation was driven by: (1) the comments that Reclamation has received on the Appraisal study, (2) possible outcomes of the process to provide additional environmental and fisheries water under CVP1A, (3) possible outcomes of implementation decisions for Bay Delta Water Quality Control Plan 95-1WR, and (4) testimony from the 1998 Bay-Delta water rights hearings.

Table 1 outlines the various DWRSIM and DWRDSM2 alternatives being proposed for analysis in this Feasibility Study. In all, eight ~~six~~ DWRSIM and ten ~~seven~~ DWRDSM2 studies are being proposed for this study. However, it may be necessary to run two or three iterations of the DWRDSM2 studies to account for changes in water quality due to variations in the blending of water reaching Vernalis. For the DWRDSM2 studies, 16 years of hydrology will be studied (1976-1991). The alternatives explore using various "tools" to provide protection for both aquatic species and water quality. The tools include:

- Delta operations criteria
- Upstream operation criteria/objectives
- Conveyance criteria
- Storage components (operations objectives), and
- South Delta Modifications

Delta Operations Criteria

The key variation this tool provides to vary E/I ratios in the south Delta. Varying E/I restrictions could maximize the benefits of recirculation, while simulating adaptive management of critical Delta resources. In some analyses, prescriptive Delta actions ~~(EWA for example)~~ - *(EWA is not prescriptive)*- will be modeled.

Upstream Operations Criteria/Objectives

The WQCP flow objectives at Vernalis and salinity objective for the San Joaquin and the Stanislaus ~~R~~ rivers are used as targets in the modeling analysis. The criteria are modeled together and then without the salinity objective (see Table 1).

Conveyance Criteria

Conveyance tools include the use of the full Joint Point of Diversion, recirculation to the San Joaquin River via the Newman wasteway, and recirculation to the San Joaquin River via Mud and Salt ~~S~~ sloughs.

Storage Components (Operation Objectives)

This group studies the use of various reservoirs to help accomplish the recirculation goals. Don Pedro and Exchecquer are modeled to operate and provide additional flows at Vernalis while New Melones Reservoir is optimized to meet salinity flow objectives. San Luis reservoir is operated to utilize available storage for recirculation.

South Delta Flow Control Structures and Project Intake Facilities

South Delta improvements are studied to compare the benefits of the proposed SDIP flow control structures (Middle River, Old River at Tracy only) against the SDIP flow control structures with a Grant Line Canal flow control structure. This comparison will evaluate the potential water quality benefits of a Grant Line Canal flow control structure. All DWRDSM2 modeling studies will be run with flow control structures in place in accordance with times and operations modeled by DWR for the SDIP ~~South Delta Improvements Program~~ and in the SDIP flow control structures with a June 1 through September 30 Grant Line Canal flow control structure operation. In addition, both dual ~~duel~~ intakes for SWP /CVP diversions and a combined SWP/CVP single point of diversion intake structure are studied.

Modeling Assumptions

Assumptions common to all alternatives include that there will be no new construction of storage or conveyance facilities as a result of recirculation except for the fish and flow structures in the south Delta. However, repairs to existing structures, and removal of sediment, vegetation, and debris blocking the wasteways, can be assumed. Analysis of which wasteways should be used for recirculation will be incorporated into other tasks. Another assumption is that a water rights limitation will be imposed along the San Joaquin River, so that the DMC recirculated water is allowed to return to the Delta, rather than becoming an additional source of water for the San Joaquin River diverters.

The alternatives will include assumptions and methodologies associated with the CVPIA PEIS, except where these conflict with operational and legal changes required for DMC recirculation. Specifically, the alternatives should include dedicated water, instream fish flows, refuge water supplies, and the priority of uses.

Retention of agricultural drainage through improved drainage storage will also be studied.

Specific assumptions are:

Base Assumptions - 1995-level hydrology and demands are assumed. South of Delta SWP demands vary between 3.5 MAF in drier years down to 2.6 MAF in wetter years. Annual

south of Delta CVP demands are 3.4 MAF. CVP and SWP facilities are operated to meet the SWRCB May 1995 Water Quality Control Plan for the Bay-Delta (WQCP); the facilities are also operated to meet the CVPIA (b) (2) Delta Actions. Trinity River minimum flows below Lewiston Dam are maintained at 340 TAF in all years.

1. *Maximized System Re-Operation* assumes New Melones, Don Pedro, and Lake McClure reservoirs are operated for WCQP salinity flow objective improvements. Banks pumping capacity is assumed to be 10,300 cfs with full Joint Point of Diversion.

2. *Maximized Recirculation* assumes full use of available CVP/SWP conveyance and San Luis Reservoir facilities targeted for improved WQCP flows at Vernalis. Recirculation operations are not included in the E/I ratio.

3. *Minimized System Re-Operation* assumes New Melones, Don Pedro and Lake McClure reservoirs are operated for WCQP salinity flow objective improvements. Banks pumping capacity is assumed to be 10,300 cfs with full Joint Point of Diversion. CVP and SWP facilities are operated to meet additional prescriptive Delta actions above the Baseline Operation Criteria.

4. *Minimized Recirculation* assumes full use of available CVP/SWP conveyance and San Luis Reservoir facilities targeted for improved WQCP flows at Vernalis. Recirculation operations are included in the E/I ratio.

Task 2 - Alternatives Modeling including Water Quality and Power Generation Analysis ($40,000)

DWRSIM is to be used in conjunction with DWRDSM2 to conduct the mathematical model runs to assess the impact of different alternatives for this study. DSM2 will need to be extended to include the study area along SJR. A full sequence of model runs for each alternative would include a DWRSIM run, DWRDSM2 run, statistical water quality analysis, and a power generation analysis. It is likely that some alternatives will not require the full sequence of model runs.

DWRSIM will provide flow quantity, reservoir storage, contractor delivery quantities, and part of the power analysis. DWRDSM2 will provide water quality predictions at the Delta pumping plants (Tracy and Banks), at various locations within the Delta, and along SJR upstream from Vernalis, and at Vernalis.

All model runs will attempt to meet applicable laws and standards in terms of flow quantity and water quality, unless otherwise noted. For example, the models may be run without Export/Inflow ratio ~~n~~ restrictions (and only limited by the physical capacity of the pumping

plants) to determine if adaptive management by the CALFED ~~CalFed~~ Ops group, at times, might provide additional benefits to water supply and water quality without impacting aquatic resources. Impacts will be recorded in terms of contractor delivery deficiencies, reservoir storage, power generation changes, aquatic impacts, and any failure to meet applicable water quality standards.

To perform the TDS water quality analysis in the San Joaquin River at Vernalis for each alternative, historic San Joaquin River water quality data (upstream of the confluence of the Stanislaus River if possible), water quality estimated for Grasslands Bypass releases into the San Joaquin River, the water volumes and flows obtained from the hydrology modeling (DWRSIM) runs for each alternative, the tide and other hydrology (e.g. rim flows, export pumping, channel depletions, Ag. Returns, and etc.) and water quality data used in DWRDSM2, and flow and water quality data from the maximum expected Grasslands Bypass release into the river will be used. Water quality from each source will have a range of values, allowing a statistical analysis of the probability of exceedance of the Vernalis standards.

The TDS water quality analysis should be done separately for the different water year types. A methodology for achieving this will be chosen as part of this task.

An additional TDS water quality analysis that may be desirable, for any alternatives that do not include south delta channel barriers, is the use of historic DMC water quality (measured at Vernalis) rather than DSM2 modeled water quality to determine the probability of exceedance of the TDS standards at Vernalis.

FIRST MILESTONE REVIEW

CALFED ~~CalFed~~ management will review the modeling output from Tasks 1 and 2 to determine if recirculation of water pumped from the Delta by the CVP and SWP can help meet San Joaquin River flow and water quality objectives. If the study results from Tasks 1 and 2 show potential of meeting the study objectives and recirculation is compatible with other south Delta bundle objectives, the study will continue. Management will also make recommendations on additional DWRSIM and DWRDSM2 studies.

If recirculation does not appear to help meet San Joaquin River flow and water quality objectives, the study will end and staff will document the study findings (Task 9).

Management will also review the merits and impacts of recirculation and will determine if any recirculation measures are compatible with other south Delta bundle objectives. If recirculation is determined to be incompatible with south Delta bundle objectives, then the study will end and staff will document the study findings (Task 9).

~~If the study results from Tasks 1 and 2 show potential of meeting the study objectives, the study will continue. Management will also make recommendations on additional DWRSIM and DWRDSM2 studies.~~

Task 3 - Fish & Wildlife Evaluation on Fisheries, Wetlands, and Contaminants (~~$20,000~~ $40,000)

The U.S. Fish and Wildlife Service (FWS), the National Marine Fishery Service (NMFS), and the California Department of Fish and Game (DFG) will ~~be asked to~~ evaluate the impacts of recirculation on, but not limited to: (1) DMC water impact on salmon smolt imprinting, delta smelt in the central and southern Delta, and other fisheries issues, (2) impacts of recirculation on wetlands, and (3) potential bio-toxicity of the wasteway contaminants. The fish and wildlife agencies will also evaluate whether or not recirculation is consistent with CALFED's Ecosystem Restoration Program Plan. The extent of these analyses will play a key role in determining whether recirculation should be pursued and, if so, defining measures to avoid and mitigate ~~for~~ program impacts. These analyses will also help in ~~, and~~ determining if the program alternatives would cause jeopardy to threatened or endangered species. This task will begin early in the study, and will use ~~work with~~ modeling output ~~data~~ regarding flows, velocities, stages, and water quality.

SECOND MILESTONE REVIEW

CALFED ~~CalFed~~ management will review the technical data from Task 3 in light of the results of Tasks 1 and 2 ~~Tasks 1, 2, and 3~~ to determine if recirculation of water pumped from the Delta by the CVP and SWP can occur without conflicting with CALFED's Ecosystem Restoration Program Plan ~~help meet San Joaquin River flow and water quality objectives~~ and while minimizing impacts to ~~water users or~~ fish and wildlife resources in the basin. If recirculation ~~does not help meet San Joaquin River flow and water quality objectives, or if recirculation~~ creates unavoidable significant impacts to ~~water users or~~ fish and wildlife resources in the basin or conflicts with CALFED's Ecosystem Restoration Program Plan, the study will end and staff will document the study findings (Task 9).

~~Management will also review the merits and impacts of recirculation and will determine if any recirculation measures are compatible with other south Delta bundle objectives. If recirculation is determined to be incompatible with south Delta bundle objectives, then the study will end and staff will document the study findings (Task 9).~~

If the study results and conclusions from Task 3 ~~Tasks 1, 2, and 3~~ show potential of meeting the study objectives while avoiding significant impacts to fish and wildlife resources in the basin or conflicts with CALFED's Ecosystem Restoration Program Plan, the study will continue.

No comments on tasks 4 through 8

Task 9 - Preparation of Study Report and Workplan for Implementation ($50,000)

The purpose of this task is to prepare a feasibility report summarizing the study findings that will provide CALFED ~~CalFed~~ policy makers with adequate information to make ~~(1)~~ a decision on whether or not recirculation is acceptable and desirable in terms of the environmental, economic, and institutional framework. If the recommendation is to proceed with recirculation the report will also provide a preliminary ~~(2)~~ identification of the terms and conditions for its implementation ~~implementing recirculation. , and (3) a workplan for the implementation of recirculation.~~