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**Facilities and Operational Commitments to be Included in the 8500 cfs Operating Plan
in Order to Protect In-channel Water Conditions in the South Delta
by Alex Hildebrand for SDWA**

Introduction

If the 8500 Operating Plan can protect all interests that are dependent on an adequate flow regime, water levels, water depth and compliance with salinity standards in South Delta channels, SDWA would not oppose such export operations. The needed plan is necessarily complex in order to address varying export rates during varying portions of the tidal cycle, varying natural tides, varying local diversion needs, varying fishery conditions, alteration to San Joaquin River flows that result from water management in the watershed, varying watershed water yield in different years, the effect on water quality caused by drainage of imported salt into the river from west side farms and wildlife refuges in the CVP service area, etc.

The South Delta Water Agency (SDWA) can not accept any plan that does not protect and assure South Delta farmers' ability to irrigate crops on an as needed basis. They can not survive if operations by other interests make it impossible or impractical to irrigate whenever needed by their crops. Salinity standards must also be met.

SDWA believes, however, that fishery, agricultural, and boating interests would be compatibly protected by measures proposed in this memo which include (a) dredging and modification of local diversion facilities at selected critical locations upstream of the barriers to enable local diversions to function with somewhat lower water levels than can now be tolerated; (b) maintenance dredging to remove additional sediment that is brought in by the San Joaquin River, thereby stabilizing and maintaining channel depth as is done in the Ship Channel; (c) installing operable, permanent tidal barriers that can be opened or closed on an as needed basis and can also be operated as weirs (or equivalent) which can protect against inadequate water levels under many water conditions with very little alteration of flow direction or flow quantity in Delta channels; (d) pumping across barriers when natural high tides are reduced by export operations to a degree that capture of high tide water by the barriers is insufficient to combine with river inflow to provide for local diversions; (e) dredging and altering diversion facilities downstream of the barriers so that drawdown of water levels by export pumping does not interfere with local diversions; (f) an operable Head of Old River barrier (HORB) to protect salmon while letting enough water through in a controlled manner to protect downstream diverters from being dewatered by the barrier; (g) a coordinated operating plan for the four barriers that protects all interests.

These features are described in greater detail below, including the coordination and the real time management with which they would be operated. The 8500 cfs plan must also address an interim operation with temporary barriers while permanent barriers are designed and installed. This will be discussed later in this memo.

Higher export rates can provide flexibility which can reduce the conflict between exports and protection of fish. However, increased rates exacerbate the problem of protecting local diverters. The problem is also exacerbated by the fact that upstream exports and other upstream water management, primarily by the CVP, first reduced both spring and summer river flow and then restored spring flow by further reducing summer flow. This reduction in summer flow is discussed in an 8/15/02 memo by SDWA. Drainage to the river of salt imported into the watershed by the CVP causes salinity problems that did not exist pre CVP. (Refer to *June 1980 Report on The Effects of the CVP Upon the Southern Delta* by USBR and SDWA). There are ways to restore some summer flow and provide salinity control without loss of water to other interests, but those measures are beyond the scope of this memo. The memo also does not address the problem of complying with the dissolved oxygen standard in the Stockton Ship Channel. However, compliance with that standard may not be feasible during low river flows if the tidal barriers are not in full operation in summer and fall months.

Dredging

The Operating Plan must provide that water levels and depth at each local diversion facility upstream of barriers is adequate for water diversion at all times. The water level required can be lowered somewhat by local dredging at the most restrictive locations; probably one or two dozen. Pumps must also be lowered as necessary to accommodate the lower water level. Before the lower level is allowed in Old River it will also be necessary to pump or otherwise provide for getting water through the local district's tide gates on Tom Paine Slough.

Diverters downstream of the tidal barriers must also be protected by dredging and altered diversion facilities to mitigate the drawdown of level by exports. This must be done as soon as possible and prior to any increase in export rates.

These measures to mitigate the impacts of export pumping should be provided at no cost or risk to local diverters. A maintenance plan to stabilize and maintain channel depth must also be part of the 8500 cfs plan.

Design Criteria for Permanent Barriers.

1. All barriers must be designed to allow unimpeded flow during floods.
2. The Head of Old River barrier (HORB) must be able to let an adequate controlled flow into Old River and have well designed trash control. The barrier must be able to open or close on short notice.
3. The three tidal barriers must be able to open and allow unrestricted water flow and boat and barge passage during flood tides and must provide maximum capture and retention of high tide water for use during ebb and low tides when the barriers are closed.

4. The Old River and Grantline barriers must have boat locks adequate for houseboats.
5. The Grantline barrier must be able to operate either as a tidal barrier or as a weir (or an equivalent method of maintaining a minimum water level while allowing downstream flow). This could be done by having a radial gate in two sections so that when only the upper section is raised the lower section acts as a weir.
6. The Grantline barrier should have provision for a low lift, fish-friendly pump to augment the capture of high tide water when necessary to maintain an adequate water level on the upstream side of the barrier.
7. The Grantline barrier should be near the west end of Grantline. The other barriers should be at or near the temporary barrier sites.
8. All barriers may be provided with fish ladders or other means of passage for upstream migration as appropriate.

Operation of Permanent Barriers

1. During flood conditions the barriers will all be opened and must not cause any increase in flood stages.
2. The tidal barriers will also almost always be open during flood tides.
3. When controlled flows at Vernalis are sufficient to maintain adequate water levels in all South Delta channels, the barriers will all be open unless the HOR barrier is operated for protection of salmon smolts. If the HORB is operated the Old River and Middle River barriers will be operated. The Grantline barrier will then be operated as a weir to maintain adequate water levels upstream of the weir. Sufficient water will be let through the HORB to maintain a downstream flow over the weir. When this is not possible because of low water level in the San Joaquin River, the HORB will be opened or water pumped to augment flow through that barrier.
4. When Vernalis flow is substantial but less than adequate for continuous level control, and the HORB is not operated, the Old and Middle River barriers will be tidally operated and the Grantline barrier operated as a weir. This will maintain almost the same downstream flow in Grantline that would occur without the weir. The proposed dredging will reduce the needed weir height and further decrease the effect on downstream flow.
5. When Vernalis flows are too low to continuously supply local diversions, the tidal barriers must be operated as needed to capture enough high tide water to combine with river inflow to meet diversion needs. The extent to which barriers must be operated during ebb tides to retain high tide water will depend on the deficiency of river flow, the height of natural tides, the drawdown of high tides by export operations, and the local diversion needs which are highest

in June, July, and August. Under these conditions there won't be a net downstream flow through Grantline, and in extreme situations it will be necessary to restore the water capture that would occur with natural tides by low head pumping through the Grantline barrier.

6. There must be a net unidirectional flow through each channel reach enough of the time to comply with salinity standards and disperse urban waste discharges.

7. During hydraulic situations that are sensitive to fishery and/or local diverters the hydraulics will be modeled in advance to determine the minimum period and modes of barrier operation which can protect the water levels still needed after the above dredging. A committee of agency and South Delta representatives would then meet as needed to determine by agreement of all parties what combination of export operation and barrier operation can best protect fish and maintain local diversion capability, while also maintaining unidirectional flow in each channel sufficient to comply with salinity standards and disperse urban wastewater.

Sensitive periods for diverters include:

A. Late November through early January when asparagus farmers must fill the deep root zones before the harvest season. There has often been insufficient flow to maintain depth at this time. The proposed dredging will reduce this problem.

B. March and April prior to export reduction and provision of pulsed flow in years with dry winters.

C. May after the pulsed flow if exports are ramped up. The HORB must then be opened unless barrier operation and other measures can be devised to maintain both water levels and adequate circulation.

D. June, July, and August when Vernalis flows are inadequate to meet local diversions. Tidal barriers must then be operated to capture enough high tide water and even augment capture by pumping when needed. The HORB will have to be open during these months.

Temporary Barriers

Temporary barriers can not fully provide compatible protection for all interests. In order to minimize the insufficiency, the operation of temporary barriers should be more flexible than is permitted by existing permits.

1. The temporary barriers can not be installed in the spring until the risk of high uncontrolled flows is over. This is a serious inadequacy in some years.

2. When flood risks permit, and export rates are high, and Vernalis flows are not sufficient to maintain adequate water levels, the barriers should be installed as early as mid-

March. However, the Grantline barrier and perhaps the other barriers should be installed with a reduced barrier elevation so that they operate as weirs and have little effect on the downstream flow of water.

3. The barrier elevations would be left low to operate as weirs until after the pulsed flow period.

4. When export rates are increased after the pulsed flow, the barrier height will be raised to increase water capture as needed. However, the culvert gates should be designed for easy operation so that they can be closed only when needed for level control.

5. The HORB will be removed before June 1 or earlier when its impact on adequate downstream water levels can not be mitigated.

6. In so far as possible the protection provided by temporary barriers should include the same features as permanent barriers. This includes determination of needed weir height, pumping over the Grantline barrier, protection of Tom Paine Slough, forecasting of needed operating plan, etc.

7. There must be a clear commitment that replacement of temporary barriers with permanent operable barriers will be expedited.