

Upstream migration... Continued

- b. Develop and implement measures that provide adequate water temperature within the designated spawning areas by mid-October each year.

It is the position of the fishery management agencies that optimum spawning and incubation temperature where no salmon egg mortality occurs (due to temperature alone) is between 42-56°F. While there is agreement that salmon do have certain temperature tolerances and that the egg stage is probably the most sensitive a few parties continue to express reservations with (1) the basis for this recommendations, (2) whether these recommendations will become hard goals or just objectives to strive for, and (3) whether reservoir releases for temperature protection purposes would be subject to some test of reasonableness. All of these concerns are issues to be determined through more formal administrative and sometimes legal processes and are beyond the scope of this Plan. The Regional Water Quality Control Board or the State Water Resources Control Board may provide appropriate forums for resolution.

In the interim a temperature objective of 42-56°F should be used as a target throughout the designated spawning reach on each tributary. Special water operations using this objective were implemented on the Stanislaus River in 1991 and 1992 with the cooperation of the U.S. Bureau of Reclamation, Oakdale and South San Joaquin Irrigation Districts and the Tri-Dam Project. Responsible parties should explore and accelerate options for structural, operational, and other actions (e.g., riparian vegetation restoration to increase shading) to make water temperature improvements in the spawning, nursery, and migration reaches in the drainage.

- c. Install the upper Old River Barrier each fall to improve guidance flows and water quality for fish migrating upstream through the San Joaquin Delta.

The installation of this barrier in the fall by the Department of Water Resource has been used to improve habitat conditions for upstream migrants when necessary. Rip-rap is placed in the head of Old River to increase the proportion flow that continues down the San Joaquin River to the Stockton Turning Basin area. Low dissolved oxygen has persisted there in dryer years despite reductions in cannery wastes and tertiary treatment of Stockton waste water. This fall barrier at Old River continues to be the primary measure used to alleviate the

Upstream migration... Continued

dissolved oxygen "sag" which can block adult salmon migrations at concentrations less than 5.0 parts per million. Stockton is proceeding with water quality and wastewater reclamation studies which may eventually result in eliminating a portion of their discharge to the San Joaquin River. Dissolved oxygen levels of 2.0 parts per million or less were recorded near Stockton in October, 1992 during the normal salmon migration period. An interim solution is sorely needed.

The Central Valley Regional Water Quality Control Board feels that ammonia levels in the Stockton area are a potential problem. Further study is needed to determine whether there are any negative impacts on salmon migrations.

With improved Delta modelling capabilities and detailed water quality information it is possible that a model could be built, validated and calibrated to assist in selection of better management options to avoid or mitigate this problem. The combination of a complete barrier at Old River, operation of the aeration device at Rough and Ready Island, and additional streamflows (ref. Vernalis) should be evaluated for use in dry or critical years to increase attraction flows and help reduce the dissolved oxygen "sag" near Stockton. Tidal stage and both State and Federal water project operations also influence this area.

All features of the 1969 Four Agency Memorandum of Understanding (MOU) could be implemented to remedy the dissolved oxygen problems in the lower San Joaquin River until such time as the above studies result in a more effective solution, or until the State Water Resources Control Board issues Interim or New Delta standards or objectives that remedy the problem. The 1969 MOU provides for the release of up to 60,000 acre feet additional Federal water supplies upstream of Vernalis to help improve the dissolved oxygen near Stockton if the problem is not resolved by the installation of the upper Old River barrier by Department of Water Resources.

- d. Evaluate and establish conditions on dredging of the Stockton Turning Basin that help avoid dissolved oxygen levels below 6.0 parts per million during salmon migration periods.

Late summer dredging activities in 1992 appear to have exacerbated the dissolved oxygen "sag" in the San

Upstream migration... Continued

Joaquin River near Stockton this fall. There are many other factors which influence oxygen levels in this area of the Delta. Changing the time period of acceptable for dredging may help insure free passage of adult salmon en route to spawning areas.

- e. Create adequate fall attraction flows from each tributary.

Scheduling of existing fishery water supplies and conjunctive use of other supplies should be considered to improve the attraction flows to guide salmon to their natal spawning areas. Typically, upstream migration occurs in October, November, and December.

Inter-basin water use options should be explored to provide better attraction flows without increasing the problem of fish straying into inappropriate areas in the drainage.

- f. Monitor and, if necessary, recommend expansion of the water hyacinth control efforts into other parts of the drainage.

California Department of Boating and Waterways (CDBW) and County Agricultural Commissioner currently cooperate on the control efforts in Merced County. CDBW operates a larger program in the Delta and a minimal program elsewhere in the San Joaquin drainage. If the drought continues and dispersal of this plant becomes a problem it may be beneficial to expand the control effort.

- g. Install and evaluate a temporary electrical or physical migration barrier in combination with greater attraction flows from the Merced River.

For many years guidance flows from the Merced River have been inadequate during October. Many salmon have strayed into agricultural drainage flows returning to the San Joaquin River, primarily from Mud and Salt sloughs. A barrier (electrical and physical) across the San Joaquin River upstream of the Merced River confluence has been installed in 1992 and should be evaluated under various streamflow conditions. The objective is to prevent salmon migration into sloughs where their offspring will be lost, and to help guide them into the Merced River. A substantial budget will be necessary for construction, operation and maintenance if this pilot facility is effective.

Upstream migration... Continued

- h. Trap and spawn adult salmon at various locations in the drainage.

If the drought continues and other measures to improve spawning and recruitment of natural fish fail, more aggressive fish cultural efforts may be warranted. Trapping on the San Joaquin River in 1977 and at Los Banos Wildlife Area from 1988 through 1991 exemplify situations where habitat conditions were poor and no other options to sustain natural production was available. Funding through the Commercial Salmon Stamp Program and Drought Relief funding have supported such emergency programs in the drainage since 1988. Alternative funding may be appropriate.

- i. Evaluate tri-annual amendments to the Regional Water Quality Control Board's Basin 5C Plan for adequate protection of cold water beneficial uses in the San Joaquin drainage.

The current Basin 5C Plan provides very limited protection for the designated cold water beneficial uses. The Regional Board attempted to deal with a very similar situation in the Sacramento River in 1988 through a waste discharge requirement order. The State Water Resources Control Board determined that the issue should be addressed through its water rights authority. The time for this process may exceed the duration of this Plan. However, as a minimum the Regional Board's Plan could be revised to clearly designate the locations and time periods crucial to the reproductive success and rearing of Chinook salmon in Basin 5C.

Studies to more clearly define temperature requirements could be implemented. Different life stages may have different temperatures tolerances depending on the combination of acclimation temperatures, exposure times and the actual temperature, and other factors. It is unlikely that such studies could be completed within the time frame of this Plan. Therefore an interim temperature objective for each life stage may be appropriate (See 2.b. above).

3. Spawning, egg incubation, emergence and juvenile rearing High water temperatures, poor or no screens on water diversions, poor spawning habitat quality, high predation rates, and inadequate instream flows (including channel maintenance flows) are believed to be the primary factors causing mortalities during these life stages. Remote trapping and spawning operations to increase