1. Allow higher or lower export rates and changes to export-to-inflow ratios other than those prescribed by Water Quality Control Plan. Shift pumping rates seasonally and on a real-time basis such as reducing pumping when inflow is low or fish are present in large numbers, or increasing pumping when outflow is high or few fish are present in the south Delta. Greater flexibility, both seasonally and in real-time ~~may~~ appears to be possible ~~through identification of water to be committed to an environmental water account which could be accommodated through appropriate increases in export rates~~ and has good potential to provide greater environmental protection. Descriptions of how ~~such~~ an environmental water account ~~m~~might function are described in David Fullerton's memo to the NoName Group of September 17. The export rates ~~w~~could be altered for the following purposes:

   i. Reduce entrainment (Programmatic Action: C).
   ii. Improve foodweb productivity (Programmatic Action: B).
   iii Protect fish migrating through the Delta (Programmatic Action E).

   This action also has some potential negative effects:

   - Impacts may shift to other species or life stages.
   - May locally impact water quality.

The export rates ~~w~~could be managed in the following ways:

Seasonally:
- More restrictive at times, ~~for environment~~ providing greater environmental protection.
- Less restrictive at times, ~~for environment~~ providing water for environmental benefit at later more critical periods.
- Shift high pumping to seasons of high flows, especially high San Joaquin flows
- Shift high pumping to seasons of low fish sensitivity

  Current requirements in the WQCP and Biological Opinions require seasonal adjustments in operations, modified by hydrological patterns. Further protection to allow recovery may need to expand on these tools. Seasonal shifts in operation ~~are~~ may be most appropriate for conditions that occur predictably or where the times of sensitivity overlap for several species. Examples of such seasonal responses that the DEFT team has considered include: increasing the period of the Vernalis Adaptive Management Program from 31 to 60 days and relaxation of the Export/Inflow ratio to 75% in August and September

Real-Time Flexibility-Monitoring Response:
- More restrictive at times, ~~for environment~~ providing greater environmental protection.
- for environment.
- Less restrictive at times, ~~for environment~~ providing greater environmental protection.
- Shift high pumping to periods of high flows, especially high San Joaquin flows
- Shift high pumping to periods of low fish sensitivity

Flexible Operations

Examination of patterns of fish salvage at the CVP and SWP fish facilities demonstrates the sometimes episodic nature of entrainment losses. The intermittent occurrence of high losses suggests it may be possible to reduce entrainment impacts through relatively brief, but substantial reductions in export pumping. Conversely, there appear to be periods in which increases in export pumping would not increase entrainment. Unlike habitat or water quality actions, the impacts of entrainment are often quite species-specific.

Fish salvage and other fish distribution data from the Interagency Ecological Program's Real Time Monitoring may be used more extensively than in the past to reduce entrainment problems by reducing exports on a daily or weekly basis in relation to monthly standards when the selected species are perceived to be at short -term risk, and increasing exports when entrainment risks are low. Such operations will require reliable short-term monitoring data (such as has been provided by IEP in the last three years), a rapid response mechanism for adjusting the CVP/SWP export operations, and agreement on a reasonable limitation on the size, frequency and duration of export alterations. This process could occur without change to the 1995 Water Quality Control Plan by taking advantage of the little-used option to change daily export rates above and below the required longer-term targets.

Salvage data have been used to explore the potential for this approach. Other real-time data would be appropriate to use in conjunction with salvage data to anticipate peak salvage events and detect when risk is likely to decrease.

Modeling this approach to operations will be difficult in part because the frequency of loss events that would instigate a rapid short-term operations adjustment is predicted based on historic salvage information. Particle tracking and DSM outputs will allow some estimation of the protective value to fish of short-term export restrictions but cannot account for fish behavior. Water supply effects of such changes in operations cannot be addressed by most of the current modeling tools. Daily models such as Jones & Stokes's Delta SOS Model ~~will probably~~ may be useful to estimate water supply impacts but are not comparable to DWRSIM runs of total system operations. Developing ways to make all relevant types of models more realistic and comparable with each other will require substantial effort.

As an example of the way this tool might develop,

1.*the historic salvage data may identify a number of days in each month when each species is* typically at risk under different hydrologic patterns
2. the average number of times when salvage impacts overlap across species can be calculated to weight the number of days for each species

3. hydrodynamic modeling might show the duration, degree and frequency of decreases in exports required to achieve a given level of protection under different flow conditions for each species.
4. the regulatory agencies might then be able to call for export restrictions, consistent with those findings, in order to avoid entrainment rather than having to wait for take limits to be exceeded.
5. On the other days of the month export rates could be relaxed to minimize impacts on deliveries, as long as all other multi-species protection measures are met.