

The new Fish Facility Coordination component will share many of the structural, coordination, and oversight features of the existing Ecological Studies and Monitoring component, except that the Fish Facilities Coordination and Review Team will not directly manage programs, studies, and projects. Instead they will provide coordination, oversight, policy development, and interagency review. Existing interagency fish facility committees, programs, units, and projects will be similar to project work teams under the existing IEP structure but will maintain their autonomy. They will be encouraged to pass information to a member of a new "Fish Facilities Coordination and Review Team" representing their lead agency, so that all agencies can be better coordinated for increased effectiveness with the limited funds available for fish facilities work. The IEP Directors intend that the Fish Facilities Coordination and Review Team function as a clearinghouse for interagency review of new programs and proposals, so that the funding agency can be assured that proposals have received interagency review and, if possible, been revised to gain unanimous interagency support.

Summer Tow-Net Survey

Lee Miller

The 1997 summer tow-net abundance index for striped bass is 1.6, the lowest annual index measured in the bay/delta. The previous low index was 2.1, measured in 1996. This year's index also falls well below the average index of 66.6 for 1959-1976 and below the average index of 17.4 for 1977-1996. Thus, the general trend of low abundance indices since 1977 continues.

The final abundance indices were 0.6 for the Suisun area and 1.0 for the delta area, reflecting a higher concentration of striped bass in the delta, particularly in the lower San Joaquin River. Although 1997 was a wet year, this distribution is typical of a dry year, in which optimal nursery habitat is in the upstream portion of the estuary. The dry year distribution is probably due to the extremely dry February-June period.

The first tow-net survey began June 27, a day later than scheduled due to a cracked oil pan on the *Striper II*. Both surveys were conducted using the *Scrutiny*, a boat borrowed from DWR. Striped bass were large on the first survey, with a mean length of 33.4 mm, suggesting they spawned early or grew fast due to higher-than-average spring temperatures.

Fall Midwater Trawl Survey

Lee Miller

Four monthly surveys are scheduled for the 1997 Fall Midwater Trawl Survey. The September survey was completed on the 18th, with a total of 235 striped bass sampled. The abundance index was 286, the highest September index since 1993, when the index was 506, and was almost four times the record low of 71 set in 1996. Typically, the tow-net and fall midwater trawl abundance indices are correlated, but the summer tow-net index was a record low and the September midwater trawl index was only the 10th lowest of record. However, this year's index is still relatively low considering the highest index was 12,111 in 1967.

Coordinators' Strategy Meeting

Randall Brown

On July 30 and 31, the Interagency Coordinators, Pat Coulston, Leo Winternitz, and Steve Ford met to discuss ways to improve the program as well as future directions. We also reviewed responses to questions about program scope and direction. A key discussion item was the Program's potential role in CALFED. A few action items from the retreat were:

- Enhance the role of the Management Team (see article this issue) and increase effectiveness of the project work teams.
- Make better use of the Scientific and Management advisory groups.
- Enhance communications with those who use IEP data and information.
- Continue discussions with CALFED management of the Interagency Program's role in the bay/delta and the watershed.
- Make strategic (*ie*, long term) planning an integral program component.

The coordinators conceptually agreed that the Interagency Program should not be limited to the bay/delta or to its existing technical components. (A holistic, ecosystem approach may require expansion into the watershed and inclusion of additional technical disciplines.) We also agreed to consider new organizational structures.

The challenge will be to follow through with the action items developed at the meeting. Everyone, from the coordinators to project work team members, is far too busy. Almost without exception, folks working in the Interagency Program are pulled several directions by competing demands for their time. Long-term improvement will require more staff dedicated to the program and more time from existing staff and management.

Delta Smelt Concerns Result in Changes in SWP/CVP Operations

Zachary Hymanson and Dale Sweetnam

State and federal export facility operations were modified in late May and early June in response to concerns over the distribution and high take of delta smelt. Since we have no direct measure of delta smelt losses at these facilities, we use salvage of delta smelt as surrogate for "take". Despite 1997 being an above-normal water year, this spring was the driest on record for central California (Figure 1). Consequently, the distribution of young-of-the-year delta smelt was more typical of dry year hydrology, with a greater proportion of the population remaining in the delta through spring and summer. This year was also unique due to a greater proportion of delta smelt spawning in the central delta than has been observed over the last several years. Delta smelt spawn in areas of fresh water under tidal influence. In dryer years, they generally spawn in the Cache Slough area; in wetter years spawning is widespread and can occur as far west as the Napa River. Therefore, this year's scenario of a large portion of the delta smelt population spawning directly in front of the export facilities and the lack of outflow to move delta smelt westward toward Suisun Bay elevated concerns to a high level.

The FWS biological opinion dealing with the effects of SWP/CVP operations

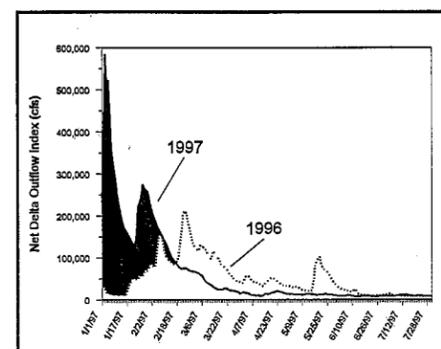


Figure 1
NET DELTA OUTFLOW INDEX,
JANUARY-JULY 1996 AND 1997

on delta smelt uses various levels of combined SWP/CVP delta smelt salvage as triggers to initiate actions to reduce water project impacts on delta smelt. These thresholds include:

- The 14-day running average of combined delta smelt salvage, commonly referred to as the yellow-light level; and
- The cumulative total of combined salvage for each month, commonly referred to as the red-light level.

The red-light level is based on historical salvage data and varies among months and among water year types. For example, in an above-normal water year (like 1997) the red-light level ranges from 733 fish in December to 11,990 fish in October. Monthly red-light levels for below-normal water years are generally higher than for above-normal water years.

In 1997, the combined CVP/SWP delta smelt salvage increased dramatically during May as young-of-the-

year delta smelt grew large enough to be salvaged. Only delta smelt longer than 20 millimeters are considered to be "take" in the salvage operations. The yellow-light level was exceeded by May 12, and the red-light level (9,769 delta smelt) was exceeded by May 16 (Figure 2). Combined salvage remained high throughout the month, and by the end of May total monthly salvage (31,686 delta smelt) exceeded the red-light level more than threefold.

Several actions were proposed and implemented as a result of discussions within the CALFED Operations Group, the No-Name Group, and the Delta Smelt Work Group. These actions included:

- Holding project exports at 2,250 cfs and delaying export ramp-up until the end of May;
- Early removal of the temporary barrier at the head of Old River; and
- Opening the Delta Cross Channel gates.

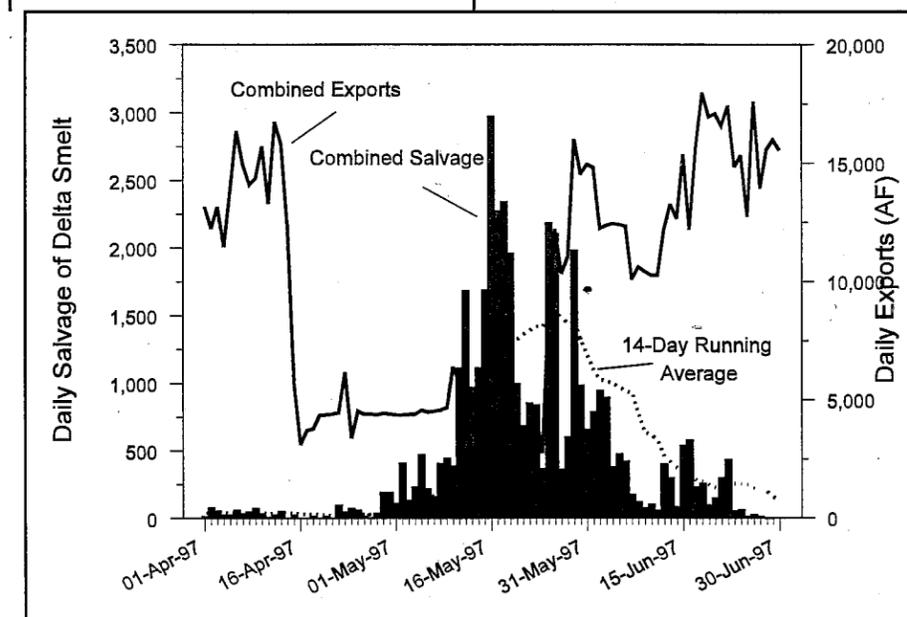


Figure 2
CVP/SWP DELTA SMELT SALVAGE, APRIL-JUNE 1997
Bars represent combined daily salvage of delta smelt.
Solid line represents combined daily exports, in acre-feet.
Dashed line represents the 14-day running average of delta smelt.

As required by the opinion, USBR reinitiated formal consultation with FWS. As a result, FWS identified four actions for immediate implementation:

- Continue to hold the Delta Cross Channel gates open;
- Maintain combined CVP/SWP exports at 2,250 cfs until June 8, 1997;
- Maintain upstream water releases in the American and Sacramento rivers; and
- Maintain an export/inflow ratio of 35 percent.

All but the second item were implemented.

Although these limited actions were taken to reduce delta smelt take at the facilities in late May and early June; combined salvage remained high through early June. In response to con-

tinuing concerns, the flap-gates on the south delta temporary barriers were held open through much of June, and the SWP reduced exports by 1,000 cfs from June 7 through June 11. As part of this reduction in exports, the CALFED Management Team agreed (with concurrence from the SWRCB executive director) to allow an increase in the export/inflow ratio from 35 to 40 percent through the remainder of June as long as delta smelt salvage declined and the center of delta smelt distribution did not move eastward into the delta.

Daily review of delta smelt distribution from the 20-mm and real-time monitoring surveys and the number of delta smelt salvaged per acre-foot at the facilities were used to evaluate whether increased exports would move the center of delta smelt distri-

bution toward the export facilities (Figure 3). However, delta smelt salvage began declining in mid-June, and the center of distribution did not move back into the central delta. In fact, combined salvage moved below the yellow-light level by month's end.

The SWP and CVP were able to maintain an export/inflow ratio of 40 percent throughout the latter part of June, and the south delta temporary barriers became fully operational on June 24. Current accounting estimates of CVP/SWP operations show the actions taken for delta smelt this spring reduced combined exports by 24,000 acre-feet (14,000 in May and 10,000 in June) from base-case operations. However, an additional 48,000 acre-feet was recovered by relaxation of the export/inflow ratio from 35 to 40 percent in June.

El Niños and the Decline of Striped Bass

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Liz Howard, USBR

Factors causing the decline in the striped bass population after 1976 continue to challenge biologists and restoration efforts (Miller and Foss 1996). Recently, we have been exploring the hypothesis that the decline was initiated by a shift in global climate in 1976-1977 that stimulated migration by older adult striped bass from the estuary to the warmer ocean (Bennett and Moyle 1996). In Atlantic estuaries, oceanic migrations by native striped bass populations are stimulated by seasonally warmer ocean temperatures (Coultant 1985). Our findings provide an additional explanation for previous results, which indicate higher adult mortality, loss of adult egg supply, and poor recruitment have affected the population since 1976 (Stevens *et al* 1985; DFG 1987; Miller and Foss 1996).

Insightful statistical models developed by DFG during the 1960s-1970s (Turner and Chadwick 1972; Stevens 1977) implicated low outflows and water exports (Chadwick *et al* 1977) as the primary problem regulating striped bass year-class success and the population. After 1977, however, year-class success and adult abundance declined more than predicted by these models, directing research on other factors associated with low freshwater outflows affecting primarily young fish in the estuary, including food limitation, predation, and toxic chemicals (Stevens *et al* 1985; Bennett and Moyle 1996). Water exports remain the primary explanation for poor recruitment, long-term loss of adult egg supply, and decline of the population, while the factors contributing to higher adult mortality are unclear (Stevens *et al* 1985; DFG 1987).

Concurrent with the striped bass decline, a shift in global climate in 1976-1977 produced conditions similar to frequent and prolonged El Niño Southern Oscillations (ENSO). This resulted in warmer ocean temperatures (Figure 1), frequent periods of extreme weather (droughts and floods), and substantial changes in the populations of various marine organisms (Peterson 1995; Hayward 1997). The influence of ocean temperature on movements of California's striped bass had been recognized early on by Radovich (1963) during the 1957-1959 ENSO. However, normal (cool) ocean temperatures in the 1960s and the apparent environmental effects associated with exporting higher proportions of fresh water in the 1970s and 1980s drew attention from potential oceanic effects on striped bass (Chadwick 1967; Coultant 1985; Stevens *et al* 1985).

Analyses

We used adult striped bass and egg abundance estimates developed by the DFG mark/recapture program and compiled records from the Commercial Passenger Fishing Vessel (charter boat) survey administered by DFG (Marine Resources Division).

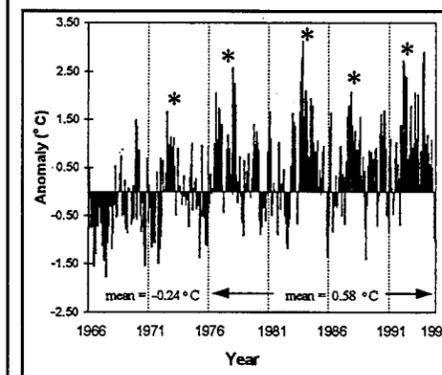


Figure 1
OCEAN TEMPERATURE AT FORT POINT, SAN FRANCISCO (deviations from normal), AND EL NIÑO EVENTS (asterisks)

From the abundance estimates, we calculated cohort decline rates (*ie*, mortality rates) by taking the logarithm of the ratio of age-5 to age-3 and age-7 to age-5 abundance estimates of individual cohorts. We also determined the proportion of total tags returned from the ocean within 3 years after release (analogous to DFG annual harvest rate estimates, Stevens *et al* 1985). From the charter boat survey, we calculated ocean catch per angler effort from two 10-minute latitude-longitude blocks extending from the Marin coastline to Half Moon Bay. Sea surface temperature records were obtained from USGS and the NEMO Oceanographic Data Server from shoreline stations at Bodega Bay, Pacific Grove, and Fort Point/San Francisco administered by NOAA. From these we calculated monthly deviations from long-term monthly averages (anomalies) and annual mean temperatures from May to May so the temperature series would correspond with the striped bass tagging schedule.

We then correlated time series of striped bass population characteristics with ocean temperatures from the three shoreline locations (Table 1). First, we detrended the log-transformed 6-7 and >7 year old abundance estimates (Figure 2a) and temperature time series by computing the difference between successive years. Then the detrended series were cross-correlated at lags of ± 5 time periods. This was done because the appropriate lag in years between when an increase in ocean temperature may be reflected in the abundance estimates is unclear, because the abundance estimates for each year are modified using returns from subsequent years, and some ENSO's

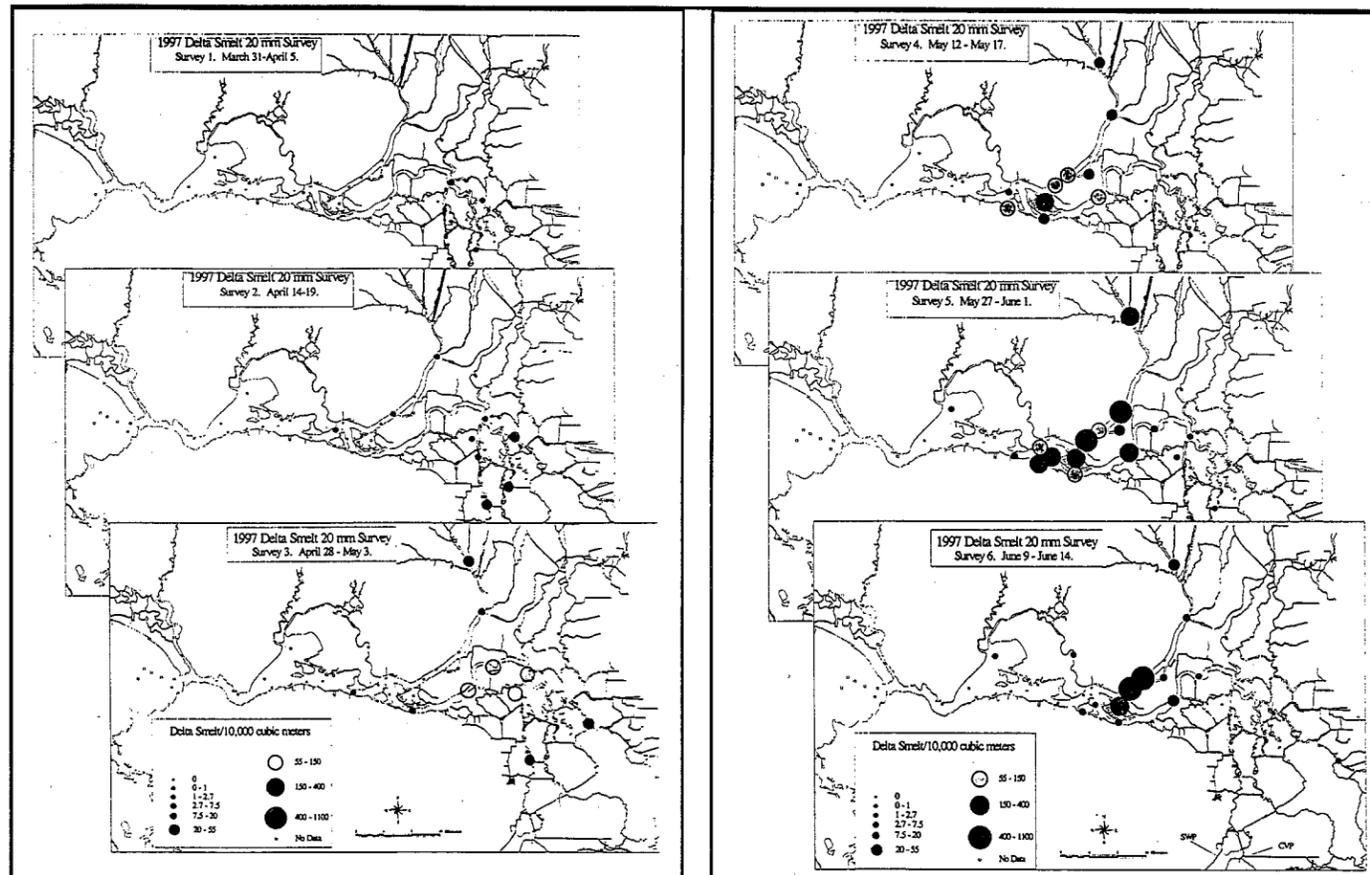


Figure 3
DELTA SMELT DISTRIBUTION AND ABUNDANCE IN THE FIRST SIX 20-MM SURVEYS IN 1997
Circles represent the average density (delta smelt/10,000 m³) at each station sampled three times every 2 weeks.