

Figure 8 — Annual fall-run escapement to Sacramento River and major tributaries.

- The estimate includes spawning in the mainstem Sacramento as well as the American, Feather, and Yuba rivers and Battle Creek.
- Total estimated escapement was the third highest since 1970 and more than met the PFM goal of 122,000-180,000 spawners in the Central Valley.

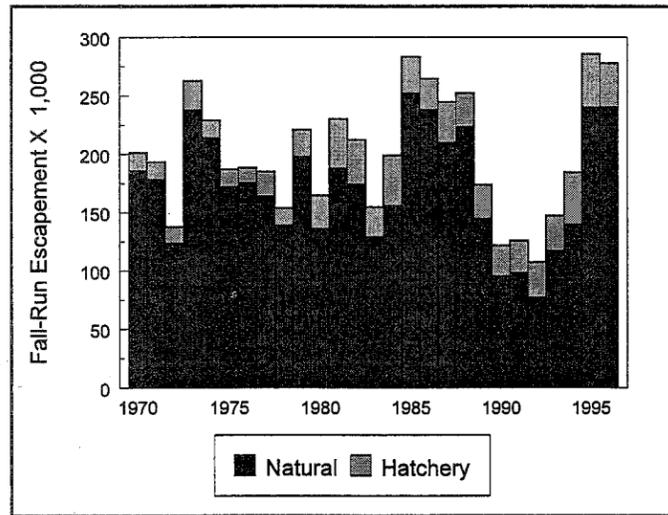


Figure 8  
ANNUAL FALL-RUN ESCAPEMENT TO THE SACRAMENTO RIVER AND MAJOR TRIBUTARIES, NATURAL AND HATCHERY CONTRIBUTIONS  
Preliminary DFG Data

Figure 9 — Annual fall chinook escapement to the San Joaquin River system.

- These data include the Mokelumne, Stanislaus, Tuolumne, and Merced rivers. There are hatcheries on the Mokelumne and Merced rivers.
- There are presently only fall chinook in the San Joaquin system.
- Although San Joaquin system escapement was by far the best since 1990, it did not approach some of the high runs seen in the mid-1980s.

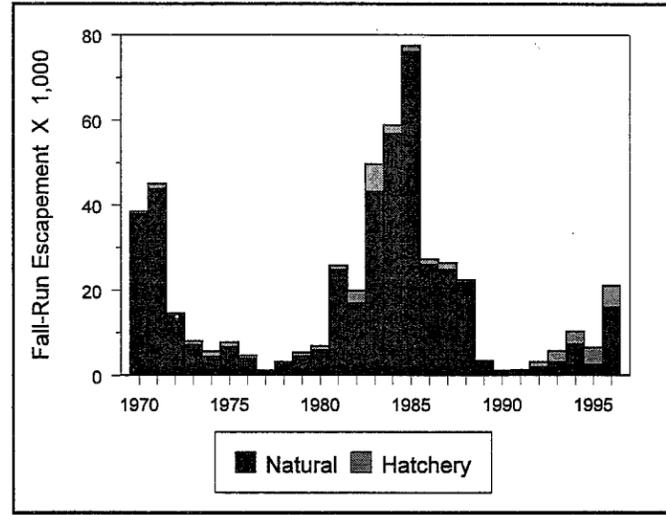


Figure 9  
ANNUAL FALL-RUN ESCAPEMENT TO THE SAN JOAQUIN RIVER SYSTEM, NATURAL AND HATCHERY CONTRIBUTION  
Preliminary DFG Data

## American Shad

Jane D. Arnold and Lee W. Miller, DFG

The abundance of young striped bass and other species has declined in the fall midwater trawl in recent years, but abundance of American shad has been increasing. The American shad mean abundance index was 1,653 for 1967-1976 and 2,750 for 1977-1996, a 40% increase (Figure 1). A record high index of 6,859 was recorded for American shad in 1995; in 1996, the index was 4,312, the fifth highest of record. The five highest indices for American shad have all been since 1982 — the same period in which the lowest striped bass indices were measured.

In the 1996 survey, American shad were found from San Pablo Bay and throughout the delta during September-December. However, by December fewer fish were caught in the delta as most of the fish moved out of the estuary (Figure 2).

To find out more about the fall midwater trawl survey and American shad results, look on the Internet at [www.delta.dfg.ca.gov/mwt96/](http://www.delta.dfg.ca.gov/mwt96/).

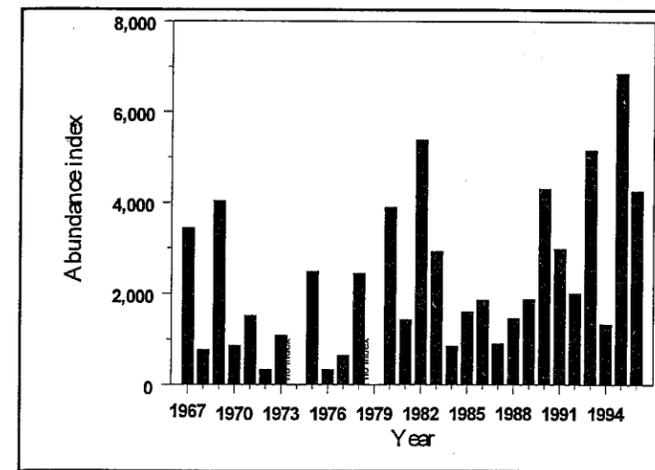


Figure 1  
ABUNDANCE INDICES FOR AMERICAN SHAD BASED ON SEPTEMBER-DECEMBER FALL MIDWATER TRAWL SURVEYS  
No survey in 1974 and 1979.

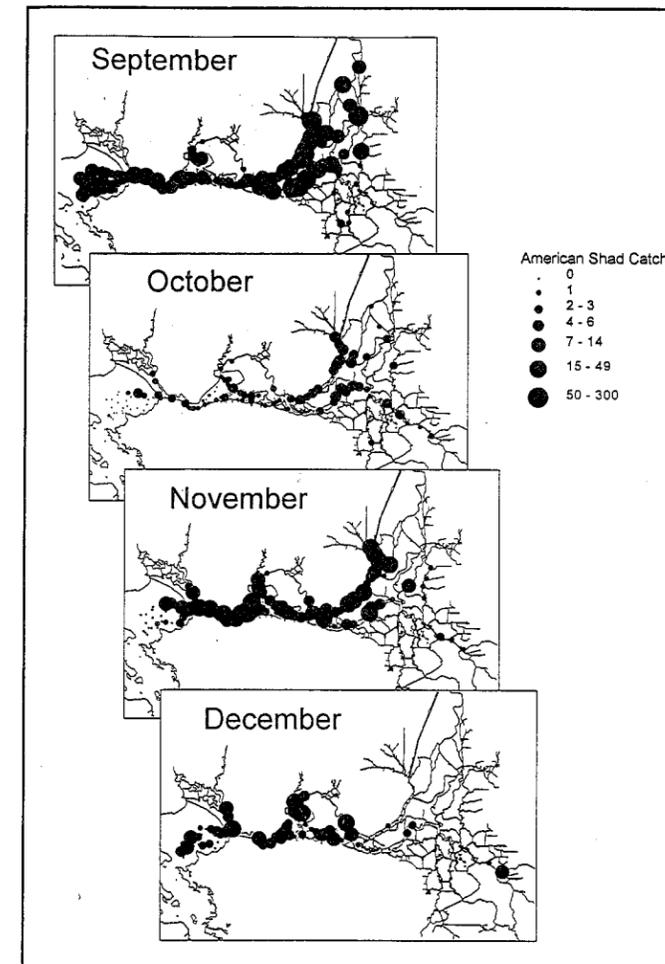


Figure 2  
DISTRIBUTION OF AMERICAN SHAD IN THE 1996 FALL MIDWATER TRAWL SURVEY

## Young Striped Bass

Jane D. Arnold, Stephen F. Foss, and Lee W. Miller

The summer tow-net survey measures an index of striped bass abundance when the population mean size is 38mm. In 1996, the index was 2.1, the lowest since 1959, when the survey began (Figure 1). The 1996 index was lower than expected, based on the high mean April-July delta outflow. Possible causes of the lower index were discussed in "Low Striped Bass Index for 1996" in the Autumn 1996 *Newsletter*. Results from 1996 were similar to those of 1995, when we reported a similar unusually low young bass index for the water year type (discussed in the Summer 1996 *Newsletter*).

The fall midwater trawl survey measures abundance of young striped bass and other species of interest. The survey has been conducted annually since 1967 except in 1974 and 1979, with a total of 28 years surveyed. The fall midwater trawl abundance index is the sum of monthly indices for September-December.

The 1996 fall midwater trawl abundance index for young striped bass was 388, the lowest index of record; the 1995 index of 479 was the third lowest of record (Figure 2), continuing the trend since 1977. For 1977-1996, the index has averaged 2,571 — 65% lower than the average of 7,350 for 1967-1976.

High mean April-July outflow usually produces larger striped bass year classes than low flow, but despite high flows in 1995 and 1996, the fall midwater trawl abundance indices for those years were very low. However, these low fall abundance indices corroborate the low striped bass abundance as measured by the summer tow-net survey. Fall striped bass abundance usually reflects the summer abundance, because the two sets of indices are strongly correlated ( $r=0.85$ ,  $p=0.0001$ ).

Young striped bass were found in Suisun Bay and the delta from September through November. In December, striped bass distribution expanded into San Pablo Bay (Figure 3). Abundance also increased markedly in December following winter storms that increased outflow and turbidity. Such events apparently affect the vulnerability or availability of striped bass to the trawl. Striped bass abundance indices have often been much higher after storms than we would have expected based on the surveys preceding such events.

More information about the fall midwater trawl and striped bass results can be viewed on the Internet at [www.delta.dfg.ca.gov/mwt96/](http://www.delta.dfg.ca.gov/mwt96/).