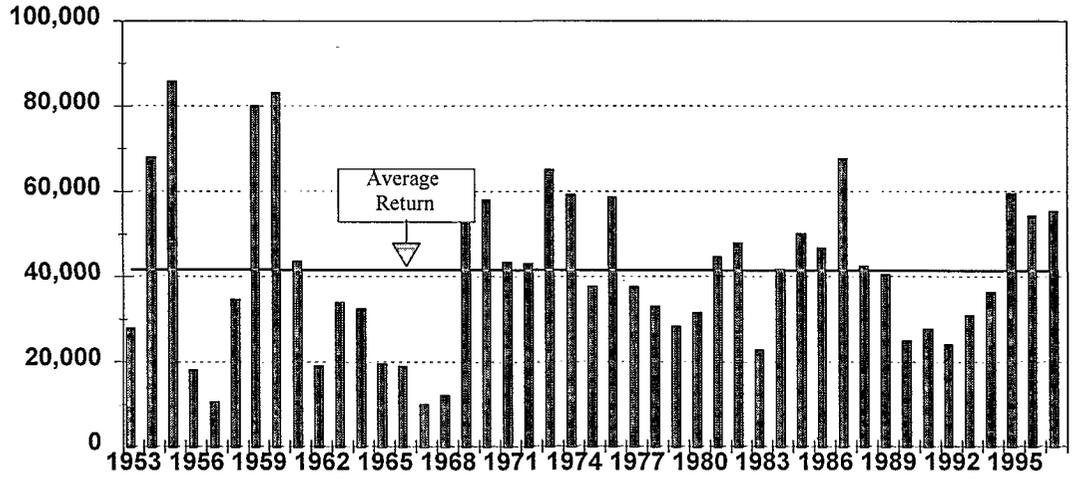


Assessment of Restoration Actions in the Feather River

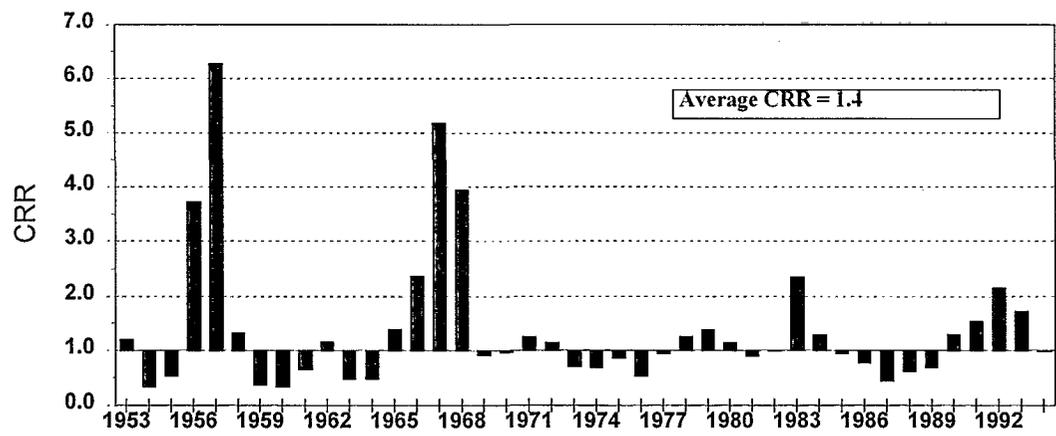
The estimates of Feather River naturally spawning fall-run chinook salmon during 1953 through 1997 have ranged from 10,100 in 1967 to 86,000 in 1955. The average return during this period was 41,600 fish including jacks and adults.

Feather River Naturally Spawning Fall-run Chinook



Cohort replacement rates (CRR) during this period have ranged from a low of 0.36 in 1960 to a high of 6.27 in 1957. The average CRR during this period has been 1.4 but has been 1.1 during 1985 to 1994. Both the number of naturally spawning chinook salmon and the calculated CRR's are influenced by the production and return of fish to Feather River Hatchery. Operation of the hatchery may be partly responsible for maintaining relatively abundant spawning populations and maintaining an average CRR above 1.0.

Feather River Fall-run Cohort Replacement Rate



Proposed CALFED Stage I Implementation Actions

Actions proposed by CALFED for implementation during the first 7 years include:

- Evaluating the feasibility of revegetating levees along the Sacramento River from Verona to Sacramento (Collinsville)
- Screening all diversions of 100 cfs or less (assumes that the CVPIA Anadromous Fish Screen Program will be screening diversions greater than 100 cfs)
- Screening of the Sunset Pumps on the Feather River.

Proposed CALFED Long-term Implementation Actions

The following programmatic actions will be further evaluated and refined for implementation during the full 30-year CALFED implementation program.

- More closely emulate the seasonal streamflow pattern in the Feather River by providing March flow events of 4,000 to 6,000 cfs in dry years, 6,000 to 8,000 cfs in below-normal years, and 8,000 to 10,000 cfs in above-normal years. Provide or maintain flows that mobilize and transport sediments, allow upstream and downstream fish passage, create point bars, and contribute to stream-channel meander and riparian vegetation succession. In addition, provide minimum flows recommended by DFG (1993). Flows will be provided only if they are less than or equal to Oroville Reservoir inflow
 - Develop a cooperative program to evaluate the benefits of supplemental Feather River flows to ecological processes and riparian and riverine aquatic habitats.
- Maintain existing erosion and gravel recruitment levels in tributaries that sustain an adequate level of gravel recruitment, or restore desirable levels by directly manipulating and augmenting gravel supplies where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.
 - Evaluate spawning gravel quality in areas used by chinook salmon in the Feather River. If indicated, renovate or supplement gravel supplies to enhance substrate quality by importing 4,000 to 8,000 tons of additional gravel below the hatchery as conditions require.
- Preserve and expand the stream-meander belts in the Feather, Yuba, and Bear Rivers

by adding a cumulative total of 1,000 acres of riparian lands to the meander zones.

- Acquire riparian and meander-zone lands by purchasing them directly or acquiring easements from willing sellers, or provide incentives for voluntary efforts to preserve and manage riparian areas on private land.
- Build local support for maintaining active meander zones by establishing a mechanism whereby property owners would be reimbursed for lands lost to natural meander processes.
- Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other structures that impair stream meander.
- Restore and improve opportunities for rivers to seasonally flood their floodplain
 - Conduct a feasibility study to construct setback levees in the Feather, Yuba, and Bear lower river floodplains.
 - Restore, as needed, stream channel and overflow basin configurations within the floodplain.
 - Minimize effects of permanent structures, such as bridges and diversion dams, on floodplain processes
 - Develop a floodplain management plan for the Feather River.
- Improve water quality conditions in the Feather, Yuba, and Bear Rivers to benefit anadromous fish.
 - Develop and use a temperature model as a tool for managing the Feather River.
 - Develop a cooperative program to identify and remove physical and water quality barriers in the Feather River that impede access for white and green sturgeon to spawning habitat, or facilitate passage around these barriers.
 - Develop a cooperative program to maintain mean daily water temperatures below 65°F for at least 1 month from April 1 to June 30 for American shad spawning in the Feather River. This is consistent with actions to protect chinook salmon and steelhead and, when hydrologic conditions are adequate, to minimize adverse effects on water-supply operations.
- Provide conditions for riparian vegetation growth along river sections in the Feather

River/Sutter Basin Ecological Zone.

- Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Feather River.
- Improve the survival of juvenile anadromous fish in the Feather River by installing, upgrading, or replacing fish screens.
- Develop a cooperative program to evaluate and screen diversions in the Feather River to protect all anadromous fish life stages.

Cumulative Benefit Evaluation

Feather River fall-run chinook salmon will continue to be one of the more abundant naturally spawning population in the Sacramento Valley. This reflects the high spawner abundance from 1953 through the present and the operation of Feather River Hatchery. In view of the relatively high returns throughout the period of record, it is probably unnecessary to attempt to greatly increase returns, although an increase in abundance is likely. The proposed short-term and long-term actions will contribute to maintaining a healthy and robust naturally spawning population.

There will be a need to further balance the production level of hatchery fish with naturally produced fish. Presently, the majority of fall-run hatchery production is trucked to the western Delta for release. We should anticipate that as instream conditions improve in the Feather River and in the mainstem Sacramento River between Verona and Sacramento, the need to truck smolts to release sites downstream to increase their survival and return will greatly diminish.

The fall-run chinook abundance trend in the Feather River, when coupled with the proposed restoration actions, suggests that an increase in abundance is likely and that there is a high likelihood that restoration and recovery goals for this system will contribute to the overall basin-wide goal for fall-run chinook salmon.

Scoring

The cumulative benefits of proposed actions in the Feather River will likely provide an increase in naturally spawning fall-run chinook abundance and is scored at +5.

The overall system-wide benefits of actions in the Feather River and in other important streams which support naturally spawning fall-run indicate a high likelihood that the goals

of restoration and recovery of fall-run chinook may be achieved and is scored at +7.