

Alameda 8/92

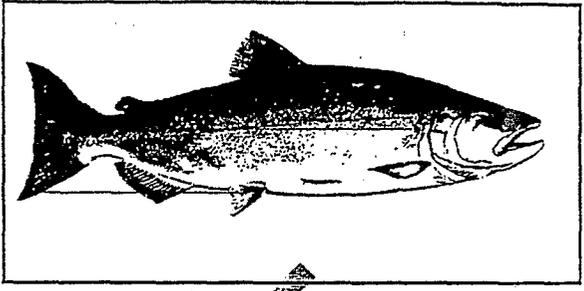
SACRAMENTO RIVER ECOLOGICAL ZONE

INTRODUCTION

The health of the Sacramento-San Joaquin Delta is largely dependent on the rivers and streams that compose its watershed. The Sacramento River is the largest element of the Delta's watershed, providing about 80% of the inflow to the Delta. Water, sediment, and nutrients from the Sacramento River are important factors governing the ecological health of the Bay and Delta. Many estuarine fish species and their foodweb depend on these factors that are input from the Sacramento River.

The Sacramento River is also an essential spawning, rearing, and migratory pathway for many anadromous fish populations of winter-run, fall-run, late-fall-run, and spring-run chinook salmon, steelhead, white sturgeon, green sturgeon, striped bass, and American shad. All of these populations must pass through the Delta and Bay during portions of their life cycle. Although the time spent in the Bay and Delta may be short, it represents an important part of the life cycle. The abundance and health of the anadromous fish in the Sacramento River has been influenced by human activities in the Bay and Delta.

Ecological factors having the greatest influence on the anadromous fish in the Sacramento River include streamflow, natural sediment supply, stream channel dynamics (stream meander corridors), and riparian and riverine aquatic habitat. Stressors including dams, legal and illegal harvest, high water temperature during salmon spawning and egg incubation, toxins from mine drainage, hatchery stocking of anadromous fish, and unscreened or poorly screened irrigation diversions have affected the health of anadromous fish populations.



The vision for the Sacramento River Ecological Zone is to restore healthy populations of anadromous fish throughout the river and provide healthy conditions for populations from tributary streams that use the Sacramento River for feeding and migrating to and from the estuary and ocean. The pathway to this vision is through improving stream flow, spawning gravel recruitment, the river meander belt process, riparian and riverine aquatic habitats, and reducing the extent and influence of stressors. Healthy populations in the Delta will be attained when survival of anadromous fish is no longer threatened by human activity. The vision strongly focuses on restoration of the Sacramento River winter-run chinook salmon, a state-listed and federally listed endangered species, by providing winter-run chinook salmon with improved spawning, rearing, and migrating habitat and by reducing the adverse influences of stressors.

Focus needs to be in restoration and maintenance of habitat (and addressing stressors) this is species-centered restoration.

ECOLOGICAL PROCESSES

Central Valley streamflows - Healthy streamflows are natural seasonal patterns in late winter and spring that include peak flow events that support many ecological processes and functions essential to the health of the anadromous fish populations. The Sacramento River has only a marginally healthy streamflow because storage reservoirs in the upper watershed capture much of the winter-spring flows, in dry and below normal rainfall year-types.

Reduce flood peaks during the winter and spring, releasing the stored water during the summer and fall.



Sacramento River Ecological Zone Vision Ecosystem Restoration Program Plan Workshop April 8, 1997

Improvements in the flow patterns will require supplemental short-term releases from the major storage reservoirs to provide flow events that emulate natural peak flow events.

SPECIES

Natural sediment supply - Gravel recruitment on the Sacramento River is severely impaired by reduced inputs from tributaries and blockage of upstream sources by Shasta Dam, Keswick Dam, Anderson-Cottonwood Irrigation District diversion dam, and Red Bluff Diversion Dam. Spawning habitat of salmon and steelhead is controlled by the amount of gravel in the river.

Point out where this is a problem?

Meandering river system
~~Stream meander corridors~~ - *A natural stream meandering river process of the Sacramento River will* provide much of the habitat required by anadromous fish populations that depend on the river for spawning, rearing, and migration. The meander belt of the upper portion of the river above Chico Landing is reasonably healthy and functioning, while the meander belt of the lower reaches of the river has been greatly limited by channelization of the river, by a network of confining levees, and associated development in the river floodplain.

Solution

Splittail - Improvements in the riparian and stream meander corridors along the Sacramento River will improve spawning and early rearing habitat of splittail. Late-winter and early-spring streamflow improvements will provide attraction flows for spawning adults and increased spawning habitat.

White sturgeon and green sturgeon - Improved peak flows in late winter and early spring will benefit sturgeon spawning. Improved stream meander corridors should also benefit sturgeon.

Chinook salmon - All four races of chinook salmon should benefit from improved streamflows, gravel recruitment, water temperatures, riparian and riverine aquatic habitat, and stream meander corridors.

Steelhead trout - Steelhead will benefit from improved streamflows and gravel recruitment in the upper river and improved water temperature and riverine habitat in the upper, middle, and lower reaches of the river.

Central Valley stream temperatures - High summer and fall water temperatures continue to threaten the health of anadromous fish populations in the river. Although actions have been taken to reduce high water temperatures, low flows, and the release of warm water from reservoirs in drought years remain a very serious threat to the anadromous fish populations of the Sacramento River.

American shad - Improvements in late-winter and spring streamflows and stream meander corridors will benefit American shad spawning and rearing in the Sacramento River.

Swainson's hawk - Riparian woodland improvements along the Sacramento River will assist in the recovery of the Swainson's hawk.

Western yellow-billed cuckoo - Improvements in riparian habitat will benefit the western yellow-billed cuckoo.

HABITATS

Riparian and riverine aquatic habitats - Habitats important to anadromous fish production in the river are impaired not only by development along the river but by development in the healthy meander belt of the upper river. Improvements are needed in the upper meander belt section in addition to the leveed lower reach.

Sensen i Platts refer to as:

'riverine - riparian ecosystem'

Bank swallow - Protecting and isolating the stream meander corridor will benefit bank swallows.



Glenn, Colusa, and Yolo Counties. Much of the water conveyed through the drain is recaptured and reused before being discharged into the Sacramento River at Knights Landing near RM 90. The combined volume of the water delivered by the two districts can exceed 5,000 cfs during the peak of the irrigation season.

Water temperature is also affected by overhanging vegetation, which shades and cools the water. This shaded riverine aquatic (SRA) habitat has been significantly altered by bank protection and flood control projects. Reestablishing this edge vegetation would improve water temperatures and significantly improve SRA habitat, woody debris, and other riparian habitat along the Sacramento River, which, in turn, should improve production and survival of salmon and steelhead.

RIPARIAN AND RIVERINE AQUATIC HABITATS

Historically, the riparian forest corridor along the river averaged 4-5 miles wide and encompassed a significantly large area, today only 5% of the forests remain. One-third of the river length has natural banks and floodplain terraces, the other two-thirds have been modified and confined by levees, riprap, and flood control projects. These structures limit the dynamic forces that promote natural habitat succession and regeneration along the river. Channelization and bank protection between Red Bluff and the Delta eliminate and degrade many habitats by increasing the depth and velocity of flow and reducing the hydraulic and substrate diversity associated with more natural or undeveloped river systems. Bank protection also reduces the amount of fresh gravel and shaded riverine aquatic habitat normally available to the river through bank erosion.

Colusa
Between Chico Landing and Red Bluff, natural riparian vegetation associated with the existing stream meander corridor plays a part in the natural floodplain process. In turn, the diversity of streamside vegetation and its overall condition are dependent on these same dynamic river processes.

Riparian vegetation effectively creates a buffer to decrease local floodflow velocities. This increases deposits of suspended materials derived from eroding banks. This erosion-deposition process builds the midterrace and eventually the high-terrace lands that support climax forest and agriculture. Overbank flooding is essential for the continued health of the riparian system. As silt and seeds are deposited during these overbank water flow events, the native vegetation is rejuvenated. ~~It~~

The occurrence of the remaining riparian habitat in fragmented blocks greatly diminishes its ability to support viable wildlife populations. In addition, this remaining habitat is being further degraded by human activity and adverse land uses. The combined loss, fragmentation, and deterioration of riparian habitat has caused, or is leading to, the extinction or elimination of several wildlife species. The drastic decline of the Swainson's hawk, once one of California's most abundant raptors, is in part a result of the loss of riparian nesting areas. In 1987, surveys documented such a low number of yellow-billed cuckoos that the species appeared to be in danger of immediate extirpation. The elimination of the bank swallow appears likely if bank protection work continues and if mitigation measures are unsuccessful. Various other animal species and some plant species, including the California hibiscus, have population viability problems as a result of adverse human impacts on riparian habitat.

Reestablishing a viable riparian ecosystem along the upper Sacramento River region will increase the acreage and variety of riparian habitats and reverse the decline in wildlife, fishery, and human use values. The U.S. Fish and Wildlife Service (USFWS), the Wildlife Conservation Board (WCB), the National Audubon Society, The Nature Conservancy (TNC), and other private conservation groups are actively seeking to acquire conservation easements or fee ownership of high-priority riparian lands along the Sacramento River as a means to save these lands in perpetuity.

impacts, and potential effectiveness have not been determined.

RATIONALE: Replenishing gravel supplies to a level sufficient to support target populations of salmon and steelhead will help to improve populations to desirable levels and to maintain such levels once achieved. Replenishing gravels to maintain channel-forming processes and stream meanders in the upper Sacramento River will help to maintain fish and wildlife habitats, aquatic algae and invertebrate production, and streamside vegetation. A predevelopment level of gravel recruitment should be adequate to restore the natural ecological processes supported by gravel recruitment, but may require experimenting, monitoring, and experience to determine the exact amount of gravel supplies necessary to meet the objective.

PROGRAMMATIC ACTION 1B: Purchase easements to offset losses to property owners for land lost to meander process.

RATIONALE: Preserving and improving the stream meander belt below Red Bluff will ensure that this important natural process is maintained in the Sacramento River. This reach is important for spawning and rearing salmon and steelhead. A natural meander process will provide near-optimal habitat for spawning (through gravel recruitment), rearing, channel configuration, cover, and foodweb, and migration. There is limited potential natural channel above Red Bluff. Below Chico Landing, flood control levees limit the potential of restoring the natural meander of that reach.

Colusa

STREAM MEANDER CORRIDOR

NATURAL FLOODPLAIN AND FLOOD PROCESSES

IMPLEMENTATION OBJECTIVE

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Maintain, improve, or restore natural stream meander processes to allow the natural recruitment of sediments and creation of habitats, and promote natural riparian succession processes.

Modify channel and basin configurations to improve floodplain functions along rivers and streams in the Sacramento-San Joaquin River basin.

TARGET 1: Preserve and improve the existing stream meander belt in the Sacramento River between Red Bluff and Chico Landing by purchase in fee or through easements of ~~8,000~~ ^{16,000} ~~2,000~~ ^{24,000} acres of riparian lands in the meander zone.

TARGET 1: Increase and maintain floodplains in conjunction with stream meander corridor restoration.

PROGRAMMATIC ACTION 1A: Remove riprap from banks to the extent possible consistent with flood control requirements and reduce effects of other structures, such as bridges, that inhibit meander process.

PROGRAMMATIC ACTION 1A: Develop a cooperative program, consistent with flood control requirements, to evaluate the feasibility of altering river channel configurations in leveed reaches of the Sacramento River to increase the areal extent of floodplains inundated during high-flow periods.

RATIONALE: Floodplain inundation is a secondary ecosystem process related to water and sediment flow through the Sacramento-San Joaquin River basin in combination with geomorphology. Floodplain inundation is the

