

Plight of the American River

By Dennis P. Lee

For thousands of years, steelhead annually returned to the cold waters of Sierra Nevada rivers to spawn. The progeny of those fish would spend one or two years in freshwater, feeding and growing, before migrating to the Pacific Ocean. Once reaching the fertile ocean waters, the juvenile fish would continue to feed and grow but at a much faster rate than in the freshwater environment. After one to three years in the ocean, evolutionary clues would direct the adult fish to return to their natal river to mature and reproduce, completing the life cycle of the steelhead. It has been estimated their numbers may have been in the hundreds of thousands in the Sacramento-San Joaquin river system at one time.



Winter steelhead caught from the American River.

The American River originates in the Sierra Nevada Mountains west of Lake Tahoe and flows westward to enter the Sacramento River near the City of Sacramento. During the 1820s, Jedediah Smith led an expedition to the American River with the goal of finding a safe route across the Sierra Nevada. In Smith's honor the Spanish settlers and Native Americans named the river "*Rio de los Americanos*", or in English, American River.

The plight of American River steelhead began early in California's recorded history. Before

gold was discovered, California was considered "*virgin*" land. As described by S.T. Harding in his 1960 book "*Water in California*," there were no substantial settlements, only missions and ranches along the coast with a few early pioneers like John Sutter. The streams ran uncontrolled, and during the wet seasons, large areas became wetlands filled with thousands of waterfowl and other wildlife. Salmon and steelhead were still abundant and migrated up most Central Valley rivers. However, the discovery of gold in 1849 by James W. Marshall in the tailrace of Sutter's sawmill along the south fork of the American River lured immigrants, dubbed the Forty-niners, from all over the world to the area.

Gold mining activities severely impacted the natural watercourse of the American River. Hydraulic mining began in 1854 at several locations in the drainage and washed tons of sediment into the river affecting the river ecology. Many reaches of the American River looked more like a war zone rather than a river. The California Debris Commission, a federal commission created by Congress in 1893, halted hydraulic mining in an attempt to regulate mining and reduce the sediment that devastated the river and its fish populations.

Efforts were made to restore fish runs and help improved fishing opportunities. In a 1915 article titled, *An Effort to rehabilitate the American River*, in California Fish and Game, Volume 1 (pages 232-233), G. Neal reported over 360,000 steelhead fry were transferred from the Sisson Fish Hatchery (later renamed the Mount Shasta Hatchery) for release in the American River upstream from the town of Folsom. It is likely these fish were from eggs collected at one of several egg taking stations operated by the Fish Commission on the upper Klamath River and transported to the Mt. Sisson Hatchery for hatching and distribution throughout the state.

The following years, an article in the Sacramento Union newspaper dated September 26, 1916 reported –

"One of the first official acts of Frank M. Newbert, president of the state fish and game commission, after his appointment in 1911, in stocking the American

river above Folsom with 200,000 steelhead trout, is now bearing fruit. The steelhead or "sea run" Trout are now numerous in the American and Sacramento rivers, after having been driven from these waters by hydraulic mining operations. In pioneer days the American river literally teemed with the "sea run" trout. Hydraulic mining eventually deposited such large quantities of debris and muddy solution that the trout were driven to other waters. Since hydraulic mining has been stopped and American is clear again at the season of the annual run of these fish, they are again on the increase. According to Newbert, the Sacramento river below the mouth of the American and the American river are now populated with large numbers of these fish. They are so numerous that they are being caught in the fishermen's nets in the Sacramento river. Large numbers are being caught by anglers who are fishing for other varieties of fish. The steelhead trout range from one to 12 pounds in size. Newbert is of the opinion that some of the smaller sized fish are of the last planting, which was made July 19 when 600,000 were planted in the American river near Mormon Island.



Fingerling trout being unloaded at Folsom in 1914 for release in the American River.

Unfortunately, halting hydraulic mining did not end the quest for gold. Gold dredges were constructed as an alternative and operated in and along the lower American River. A primitive grab-dredger was first used in 1894 and bucket-line dredging began at Folsom in 1898. Dredging soon became a major industry. In 1916, the Natomas Company was operating 11 active dredges on and along the lower river. From 1927 to 1952, several other operators joined the Natomas Company in dredging the river and adjacent areas. Dredging operations were generally curtailed during World War II but were resumed on a major scale shortly

afterward. However, increasing costs, the depletion of dredging ground, and changing land values caused the dredging operations to be gradually curtailed. By 1960, only one active dredge was operating and it was shut down two years later. Like hydraulic mining, the early dredging was devastating to the river ecology and salmon and steelhead runs. Today, the results of dredging can still be seen all along the river in the form of dredge piles of round river rock.

When early gold mining became less productive, many Californians turned to farming and began devising systems to move water and irrigate crops. In the late 1800's, it was concluded a dam was needed to regulate the erratic flows and develop the waters of the American River. Subsequently, the U.S. Army Corps of Engineers included such a recommendation in a survey of western watersheds under the direction of then President Ulysses S. Grant. The recommendation was received, but no action was taken.

During the early part of the 19th century, various private power companies, municipalities, farm groups, and State agencies reviewed the Corps' old survey. The State envisioned a giant multipurpose water project and purchased a potential dam site on the Middle Fork of the American River just east of the City of Auburn. Subsequently, the Great Depression of the late 1920's forced a halt to further planning. The U.S. Bureau of Reclamation continued to conduct studies in the American River Basin in connection with a comprehensive plan for moving water in California's Central Valley.

Eventually the studies evolved into the State's Central Valley Project a long- term plan for the use of the water of the Sacramento River basin for the benefit of the Sacramento and San Francisco Bay areas, the farmlands of the San Joaquin Valley, and areas south of the Tehachapi Mountains. After repeated attempts

by State officials to obtain grants or loans to aid in financing the Project, the Federal Government was asked to undertake the construction of a portion of the Project. The first authorization of the Project was by the Rivers and Harbors Act of 1935. The Project's priorities were flood control, improvement of navigation on Central Valley rivers, development of hydroelectric power, irrigation, and municipal and industrial water supply, protection of the Sacramento-San Joaquin River Delta from seawater encroachment, and the protection and enhancement of fish and wildlife.

In 1949, the American River Basin Development Act created the American River Division of the Central Valley Project that consists of the Folsom and Auburn-Folsom South Units. Nimbus Dam and Powerplant, located 23 miles upstream from the confluence with the Sacramento River, were completed in July 1955 while Folsom Dam and Powerplant were completed the following year. Nimbus Dam regulates water released from Folsom Dam and diverts water into the Folsom South Canal. Construction of Folsom and Nimbus dams eliminated salmon and steelhead access to historical upstream habitat and no provision for access over the dams was considered.

Prior to construction of Folsom and Nimbus dams, the US Fish and Wildlife Service had the responsibility of *“preparing a plan of action for the conservation of salmon and steelhead affected by the construction of Nimbus Dam on the American River”*. The plan concluded *“The need for a hatchery to mitigate for the construction of Folsom and Nimbus dams has been recognized for a long time”*

At that time, it was concluded construction of Nimbus Dam would block 72% of the Chinook salmon and 100% of the steelhead spawning habitat in the American River. Estimates of the number of Chinook salmon in the American River for the period 1944 through 1952 were reported by the U.S. Fish and Wildlife Service and California

Department of Fish and Game (renamed Fish and Wildlife). During the 7 years when estimates were made, the average annual in-river run was estimated to be 26,144 fall-run Chinook salmon.

No estimates of the historical steelhead population in the American River are available. However, prior to construction of Folsom and Nimbus dams, counts of adult steelhead were made at the Old Folsom Dam, located on the American River near Folsom Prison, from 1943 to 1952. Although the number of fish counted was small, the majority (81%) of steelhead were counted during the months of May and June. Later, the California Department of Fish and Game in their 1990 Central Valley Salmon and Steelhead Restoration and Enhancement Plan reported *“American River spring-run steelhead was extirpated and the fall-run steelhead, which provided a fishery beginning in September in the American River, was severely decimated by Nimbus Dam”*.

Federal and state managers envisioned a fish hatchery was needed to replace approximately 19,000 Chinook salmon and an unknown number of steelhead. Use of these fish was not clearly identified but it can be assumed that some of the Chinook salmon produced would contribute to commercial and recreational fisheries. In addition, some would return to the American River to either spawn naturally in the river or be artificially spawned and the resulting juvenile fish reared at the hatchery.

A 1953 contract between the State and Reclamation indicated the hatchery would be built to *“compensate for the loss of said spawning habitat”* and would have a capacity of thirty (30) million eggs, and ultimately, if necessary, fifty (50) million eggs. At that time, steelhead runs in the Sacramento River (excluding the American and Feather rivers) were estimated to range from 14,000 to 26,000 fish annually although no counts were reported for the American River. Based on the US Fish and Wildlife Service recommendations, Nimbus

Fish Hatchery was constructed and placed into operation in 1955.

During the first two seasons of operation in 1955 and 1956, hatchery personnel trapped and artificially spawned steelhead trapped from the American River. These fish were artificially spawned in March and April, several months later than Sacramento River steelhead (now called Central Valley Steelhead) spawned at the Feather River or Coleman National Fish hatcheries. American River steelhead also produced a significantly higher average number of eggs per female fish than the smaller Sacramento River steelhead. The higher number of eggs suggests the native American River steelhead were much larger than Sacramento River steelhead. The progeny of the steelhead spawned at Nimbus Fish Hatchery were reared and released into the American River. However, due to the small number of eggs collected and fish reared, steelhead eggs were transferred in 1958 and 1959 from the Eel River Snow Mountain Egg Collection Station to Nimbus Fish Hatchery to make up for the deficiency. Approximately 2 million juvenile fish from the Eel River steelhead egg transfers were eventually released in the American and Sacramento rivers.

One of the early goals of the Department's American River steelhead management was to *"increase the proportion of the annual steelhead run entering the hatchery during the fall"* thereby enhancing fishing opportunities. As part of this effort, steelhead eggs from Coleman National Fish Hatchery and summer steelhead from the N.F. Washougal River, Washington and were transferred to Nimbus Fish Hatchery from 1970 through 1981. In addition, adult steelhead were trapped in the Sacramento River upstream from the confluence of the American River near the Interstate Highway 80 Bridge in the early 1970's and transported to Nimbus Fish Hatchery. About 1.6 million juvenile fish were subsequently released in the American and Sacramento rivers as part of this effort. The attempt to develop an early steelhead

fishery in the American River was eventually discontinued by the Department due to poor success holding early arriving adult steelhead at the hatchery.

In addition to the summer and fall steelhead egg transfers, winter steelhead eggs from Mad River and Warm Springs hatcheries during the period 1978 to 1991, were transferred to Nimbus Fish Hatchery and the progeny released in the American and Sacramento rivers. Since then, no out-of-basin steelhead eggs or fish have been transferred to the hatchery.

Based on genetic analysis, the Nimbus Fish Hatchery winter steelhead broodstock cluster with samples from northern California populations and are most similar to winter steelhead from the Eel River. Researchers also report naturally spawned juvenile fish in the river are similar to the hatchery stock. Apparently, the Eel River winter steelhead stock has been most successful at adapting to the altered river environment.

Adult steelhead are artificially spawned at Nimbus Fish Hatchery slightly earlier than steelhead that spawn naturally in the river. This is due to artificial spawning practices rather than an actual difference in spawn timing. Earlier spawning results in eggs that hatch earlier and ultimately slightly larger fry that may have higher survival rates than naturally produce juvenile fish.

Steelhead artificially spawned at the hatchery are returned to the river and a small percentage may return as repeat spawners. The annual production goal for the hatchery is to release 430,000 yearling size fish. In the past, juvenile fish have been released in the Sacramento and American rivers although for the past couple of years, all juvenile fish have been released in the American River. Juvenile fish are released in early February due to pond space requirements juvenile Chinook salmon. Many of the hatchery-produced juvenile fish may not

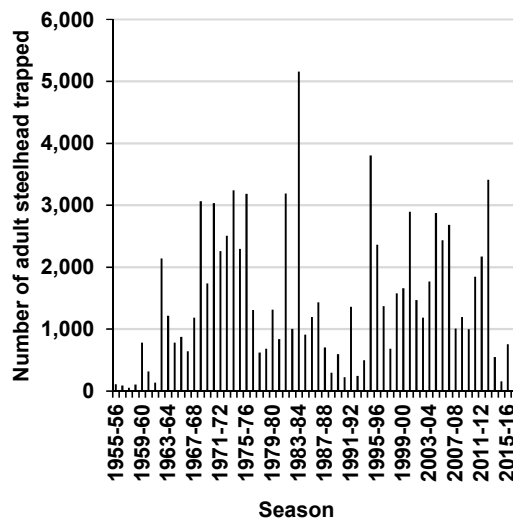
be smolting at the early release time due to cooler water temperatures which may result in poor downstream migration and high mortality. A small number of the juvenile fish may never migrate to the ocean but take up residency in the river although their survival is low.

In past seasons, U.S. Bureau of Reclamation personnel conducted steelhead redd surveys on the American River. Redd construction and most natural spawning occurs during the period from late December through the middle of March, with the peak from mid-February through early March. There does not appear to be any size difference between steelhead artificially spawned at the hatchery and the estimated size range of steelhead observed holding on redds in the American River. The majority of steelhead trapped at Nimbus Fish Hatchery are three years of age (one year in the hatchery and two years in the ocean) and range from 24 to 30 inches in length. In addition, the number of steelhead naturally spawning in the American River has been estimated to be less than the 300 fish in most seasons.

Estimates of the number of juvenile fish produced from natural spawning of steelhead in the American River are not available. Female adult winter steelhead may produce up to 6,000 eggs but the fry and juvenile fish require up to two years in the freshwater environment before migrating to the ocean. Juvenile rainbow trout produced from steelhead adults are often referred to using their scientific name *O. mykiss*, since the fish have not migrated to the ocean and may demonstrate either a resident or an anadromous life history.

During the 1990's, the CDFG attempted "to identify the general attributes of salmonid emigration on the lower American River, including timing, abundance, fish size, life stage composition, and fish condition, and to relate these attributes to primarily flow dependent, environmental conditions". However, due to the small number of juvenile *O. mykiss*

captured, most likely because of poor rearing habitat and predation, no estimates were made.



Number of adult steelhead trapped at the Nimbus Fish Hatchery during the 1955-56 through 2016-17 seasons.

Estimated numbers of steelhead in the American River were much higher in past decades as compared to today. In 1976, Department personnel estimated the steelhead run in the American river during the 1971-1972 season was 19,538 fish of which anglers caught 5,369 (27%) fish, and hatchery personnel trapped 2,256 adult steelhead (11.5%). Two years later, Department personnel estimated the steelhead run was 12,274 fish of which anglers caught 3,265 (27%) and hatchery personnel trapped 3,327 (27%) fish.

For several years the Department has implemented a Steelhead Fishing Report-Restoration Card Program designed to collect angler data. In the 2007 report to the California Legislature, the Department reported anglers kept and released an average of 1,804 wild and 1,799 hatchery steelhead each season from the American River for the period 2003 -2005. In a second report, anglers were reported to have caught hatchery 11,064 steelhead, including 4,734 wild fish during the period 2006 and 2011, for an average catch of 1,844 hatchery 789 wild steelhead each season. During the same period from 2003 to 2011, Nimbus Fish

Hatchery personnel trapped approximately 1,800 adult steelhead annually. It should be noted that during the past several years hatchery personnel trapped less than 1,000 steelhead each season.

Anglers occasionally catch small rainbow trout in the American River. Some are adipose fin marked and some are not. Since 1999, the progeny of all steelhead released from California fish hatchery have been marked by removing the adipose fin. Small trout with an adipose fin mark caught from the American River are most likely fish released from Nimbus Fish Hatchery, while unmarked fish may be naturally produced fish or strays from the Sacramento River. Due to the very small number of juvenile fish usually observed in the American River, naturally produced fish make an insignificant contribution to the fishery or steelhead trapped at Nimbus Fish Hatchery. Since 2002 when all returning adult steelhead would be marked, 97% of the fish trapped have been adipose fin marked. Unfortunately, American River water and habitat quality do not provide suitable rearing habitat for juvenile salmonids. Warm summer water temperatures and poor habitat, coupled with populations of predators such as pike minnows and striped bass, results in few naturally spawned juvenile fish surviving. As such, the steelhead fishery is maintained by releases of hatchery produced juvenile fish.

Steelhead reared at Nimbus Fish Hatchery are not listed, a candidate for listing, or a Species of Concern. Central Valley steelhead were listed as a federal threatened species in 1998 and the status reaffirmed in 2006. The Distinct Population Segment includes all naturally spawned anadromous *O. mykiss* (steelhead) populations below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries. Also include are two artificial propagation programs: the Coleman National Fish Hatchery, and Feather River

Hatchery steelhead programs. The definition includes steelhead naturally spawned in the American River downstream from Nimbus Dam but excludes steelhead propagated at Nimbus Fish Hatchery. Ironically, any rainbow trout naturally produced in the American River that migrates to the ocean and returns as a steelhead is included in the listing, even though it may genetically resemble a hatchery-produced steelhead.

Historically, American River steelhead had access to almost 300 miles of habitat in the north, south, and middle forks of the American River. Construction of Nimbus and Folsom dams, eliminated hundreds of miles of habitat above the dams, and more importantly, any opportunity for juvenile fish to migrate downstream. Nimbus Dams reduced American River steelhead habitat to just 23 miles with only about 10 miles of this providing even what could be called marginal spawning habitat and little or no nursery habitat for juvenile fish.

Today, efforts are being made to replace the present Nimbus Fish Hatchery steelhead broodstock. In 2013, the Federal Government General Services Administration solicited bids “for a study for comparing potential Broodstock Steelhead fish and selecting an appropriate broodstock to potentially replace the existing Nimbus Hatchery steelhead broodstock with genetically more appropriate sources”. This study is intended to meet reasonable and prudent alternative Action II.6.1 item 2 of NOAA's National Marine Fisheries Service's Biological Opinion on the long-term operations of the Central Valley Project and State Water Project (Solicitation Number: ID09120101)”. Specifically, the NMFS Biological Opinion on the Long-term Operation of the CVP and SWP Action II.6.1 (2), as referenced in the General Services Administration solicitation is as follows –

“Reclamation shall fund CDFG to prepare a complete draft HGMP for steelhead production at Nimbus Fish Hatchery, in accordance with current NMFS

guidelines, and submit that draft for NMFS review by June 2011. Specific actions shall include:

1) Reclamation shall fund genetic screening at Nimbus Fish Hatchery for steelhead to determine most appropriate brood stock source. This action shall be completed by March 31, 2012".

2) Reclamation shall fund a study examining the potential to replace the Nimbus Fish Hatchery steelhead broodstock, with genetically more appropriate sources. This action shall be completed by March 31, 2012".

Some studies were completed but further action is on hold due to a lack of funding. Replacement of the current Nimbus Fish Hatchery steelhead broodstock was recommended based on the conclusion that the presence of the Nimbus Fish Hatchery steelhead broodstock "*precludes their contribution to the recovery of native steelhead*". Based on the size of fish and run timing; American River steelhead continue to resemble Eel River steelhead in spite of introductions of steelhead from other sources. In general, the argument supporting the conclusion that Nimbus Fish Hatchery steelhead are "*detracting*" from the recovery of Central Valley steelhead is weak. Based on a recent study of Central Valley *O. mykiss*, only four (1.4% of 248) Nimbus Fish Hatchery produced steelhead were identified at other Central Valley locations. This low straying rate is not surprising when Nimbus Fish Hatchery juvenile fish have been released in the Sacramento River at Garcia Bend for many years. The issue of straying may have been ameliorated in recent years by releasing all Nimbus Fish Hatchery produced juvenile fish in the American River. However, more recent studies and evaluations are lacking to indicate the success of the changed release strategy.

Collection and genetic evaluations of potential replacement broodstock from the upper American River have been concluded. Experimental releases of juvenile fish derived from the Coleman National Fish Hatchery

have been discontinued due to disease considerations. Currently, replacement strategies are on hold due to a number of factors including lack of a suitable hatchery to develop the new broodstock, issues with disease and pathogens in potential wild broodstock, and availability of the necessary funding.

The plight of the American River steelhead continues. Past drought conditions have created problems for anadromous fish runs throughout California. The American River steelhead run, maintained by hatchery-produced fish, might not be as severely impacted as some natural populations. However, poor in-river, downstream, and ocean environment conditions are all factors that help determine annual run sizes and ultimately fishing success. Nonetheless, in spite of all the problems and issues, the American River is still one of the few rivers in California where anglers have the opportunity to fish for winter steelhead.

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