Steelhead Rainbow Trout

History of the Fishery

Steelhead (*Oncorhynchus mykiss* formerly *Salmo gairdneri*) were once abundant in California coastal and Central Valley rivers and streams. American Indians utilized this resource for subsistence, trade, and ceremonial purposes. Salmon and steelhead were harvested year-round by central coast and Central Valley tribes, and primarily during late summer and fall months by north coast tribes. Nets, spears, traps, and weirs were utilized to capture the fish. Today, American Indians employ gillnets to capture salmon and are limited to the Klamath River system. These gillnet fisheries target chinook salmon, but an unknown number of adult steelhead is also taken.

There is no commercial steelhead fishery in California. Commercial salmon trollers cannot legally possess steelhead, and very few are taken incidentally in the commercial salmon catch. However, there is a well-established, popular steelhead sport fishery in California. The majority of angler effort is expended in river systems and coastal streams of the north coast, the central coast north of San Francisco Bay, and the Sacramento River system. Some rivers and streams of the central coast south of San Francisco still support a steelhead sport fishery, but these have become limited in recent years due to a decline in their populations. The steelhead fishery in southern California (south of San Luis Obispo) has been closed due to severe declines and extirpation of many of the runs and a listing of others under the federal Endangered Species Act (ESA). The San Joaquin River system presently supports a very limited fishery. The rest of California's steelhead sportfishery has instituted catch and release regulations since the ESA listing of naturally produced steelhead.

In 1993, California implemented the Steelhead Trout Catch Report-Restoration Card Program, which required that all steelhead anglers purchase a steelhead catch report card and record their catch. These data are used by the Department of Fish and Game (DFG) to generate catch statistics, including the number of steelhead caught and released. The report card has provided angler harvest information and funding for management, research, and habitat restoration projects. Current information indicates that approximately 69 percent of angler effort is expended on the north coast (north of the Mattole River), 15 percent on the north-central coast (between the Mattole River and the Golden Gate), four percent on the south-central coast (from the Golden Gate to Pt. Conception) and 12 percent in the Central Valley. In 1993, the total statewide steelhead catch estimated from report card data was 168,000 fish (but only 40,000 were kept). In 1994, estimated catch was 178,000, with 53,000 fish retained. These figures have not been corrected for non-response bias, however, so are likely overestimated. Even prior to the implementation of catch-and-release requirement for wild steelhead (see below), California steelhead anglers released approximately 70 percent of all steelhead caught.

Steelhead sport fishing is important not only for the recreation that it provides, but also for its economic benefits. A 1985 economic analysis of the anadromous sport fishery of the Sacramento-San Joaquin river system estimated that sales revenue generated from steelhead sport fishing in the Sacramento River and tributaries was over 7.2 million dollars. When non-fishing activities were included, Sacramento River steelhead generated over $9 million annually.

Status of Biological Knowledge

Steelhead are the anadromous form of rainbow trout, a salmonid native to western North America and the Pacific coast of Asia. In North America, steelhead are found in Pacific Ocean drainages from southern California to Alaska, and in Asia in coastal streams of the Kamchatka Peninsula. Spawning populations in California are known to have occurred in coastal streams from Malibu Creek (Los Angeles County) to the Smith River near the Oregon border, and in the Sacramento and San Joaquin river systems. Southern California streams south of Malibu Creek appear to support at least occasional spawning and production, but it is unknown if these coastal streams currently support steelhead populations. The present distribution and abundance of steelhead in California has been greatly reduced from historical levels.

Steelhead are similar to Pacific salmon in their ecological requirements. They spend most of their lives in the ocean where they grow to relatively large size, and then return to fresh water to spawn. Unlike Pacific salmon, steelhead do not necessarily die after spawning. Repeat spawning is common; however post-spawning survival rates are generally quite low (10 to 20 percent). Steelhead do not necessarily migrate to sea at a specific age. Some individuals remain in a stream, mature, and even spawn without ever going to sea; others migrate to sea at less than a year old. Although most spend two to six years at sea, some return to freshwater after spending less than a year in the ocean. The well-known Klamath River "half-pounders" are sexually immature steelhead that return to fresh water after spending only a few months at sea. These fish do not spawn, but return to the ocean and eventually ascend the river in a second upstream migration as a larger, mature steelhead.

In California, peak spawning in most runs occurs from December through April. Steelhead generally spawn in small tributaries where cool, well-oxygenated water is available year-round. Like salmon, the female steelhead digs a nest, or "redd," deposits eggs while an attendant male fertilizes them, then covers the eggs with gravel. The length of time it takes for eggs to hatch largely depends on water temperature. Steelhead eggs hatch in about 30 days at 51° F. Fry usually emerge from the gravel four to six weeks after hatching, but factors such as redd depth, gravel size, siltation, and temperature all influence the timing of emergence.

The newly emerged fry move to shallow, protected areas associated with stream margins where they establish feeding stations that they defend. Juveniles mainly inhabit riffles, but they can utilize a variety of other habitat types. Relatively high fingerling densities occur in association with structural complexity, such as that provided by large woody debris. Juveniles also exhibit a preference for sites with overhead cover and appear to select positions in streams in response to low light levels.

The preferred depth for steelhead spawning is approximately 14 inches and ranges from six to 24 inches. In natural channels, water depth usually does not hinder adult migration because adult steelhead normally migrate during high flows. Depth can become a significant barrier or impedance in streams that have been altered for flood control purposes. It has been reported that seven inches is the minimum depth required for successful migration of adult steelhead, although the distance fish must travel through shallow water areas is also a critical factor.

Water temperature requirements for various life stages of steelhead have been well studied, although there are relatively few data specific to California. Egg mortality begins to occur at 56° F. Thermal stress has been reported at temperatures beginning at 66° F, and temperatures demonstrated to be lethal to adults have been reported at 70° F. In California, low temperatures are not as much of a concern as high temperatures, particularly during adult migration, egg incubation, and juvenile rearing. The ability of steelhead to tolerate adverse temperatures varies depending on stock characteristics, ecological conditions, and physiological conditions such as life stage.

The life history of steelhead differs from that of Pacific salmon in two principal aspects. First, juvenile steelhead rear in fresh water for longer periods of time (usually from one to three years). Because of this multi-year rearing requirement, water temperatures and other water quality parameters must remain suitable year-round. That is why steelhead typically migrate higher into watersheds to spawn than salmon. It is mostly in these upper tributaries that water quality - most importantly water temperature - remains suitable year-round.

The second principal difference between salmon and steelhead is the amount of time steelhead spend in fresh and salt water, which is much more variable. In a study of steelhead life history in central coast streams, it was found that the majority of adults returning to spawn had spent two years in fresh water and one or two years in the ocean. However, steelhead showing other life history patterns were not uncommon. Scale analysis of adults indicated that they typically spent from one to four years in fresh water and from one to three years in the ocean. Studies on Sacramento River steelhead also show this variability.

Steelhead have traditionally been grouped into seasonal runs according to their peak migration period. In California, there are well-defined winter, spring, and fall runs. This classification is useful in describing actual run timing, but is misleading when it is used to further categorize steelhead. Run-timing may be a characteristic of a particular stock, but by itself, does not constitute race or ecotype.

There are two principal steelhead ecotypes: 1) *stream-maturing* steelhead, which enter fresh water with immature gonads and consequently must spend several months in the stream before they are ready to spawn; and 2) *ocean-maturing* steelhead, which mature in the ocean and spawn relatively soon after reentry into fresh water. This corresponds to the accepted classification that groups steelhead into two seasonal "races" — summer and winter steelhead. Stream-maturing steelhead (summer steelhead) typically enter fresh water in spring, early summer, and fall. They ascend to headwater tributaries, hold over in deep pools until mature, and spawn in winter. Ocean-maturing steelhead (winter steelhead) typically begin their spawning migration in late fall, winter, and spring and spawn relatively soon after freshwater entry. Ocean-maturing steelhead generally spawn from January through April, but some spawning can extend into May and June.

Prior to the intensive water development of this century and the resultant loss of a considerable amount of holding habitat, stream-maturing (summer) steelhead were probably more common in California than they are today. There is some evidence that they were present in the Central Valley drainages, but were most likely extirpated with the construction of large dams that blocked access to the upper reaches on many of the major spawning tributaries. At present, summer steelhead are known to occur only in north coast drainages, mostly in tributaries of the Eel, Klamath, and Trinity river systems. Ocean-maturing (winter) steelhead are also present in north coast drainages, and are also found in the Sacramento and San Joaquin river systems and central/south coast drainages.

The above classification scheme is based on behavioral and physiological differences and may not reflect genetic or taxonomic relationships. Genetic similarity appears to be a reflection of geographical relationships. For example, summer steelhead occupying a particular river system are more genetically similar to winter steelhead of that system than they are to summer steelhead in other systems. Similarly, little or no morphological or genetic differentiation has been found between steelhead and resident rainbow trout forms inhabiting the same stream system. Taxonomists conclude that *O. mykiss* cannot be separated taxonomically by immigration timing (fall-, winter-, spring-runs), ecotype (stream-maturing vs. ocean-maturing), or their migratory behavior (steelhead vs. resident forms). Rather, rainbow trout are taxonomically structured on a geographic basis. All steelhead in California belong to the coastal rainbow trout subspecies, *O. m. irideus.*

This taxonomic classification recognizes the extreme variability that occurs within rainbow trout populations. Rather than the different life-history forms comprising distinct populations, studies and observations provide evidence that coastal rainbow trout can form a single, interbreeding population in stream systems where there is access to the ocean. These populations are comprised of individuals with different life-history traits and a continuum of migratory behaviors, the two extremes being anadromy (strongly migratory) and residency (non-migratory). Recent research demonstrating that juvenile rainbow trout can adopt a life-history strategy that is different from their parents (*i.e.,* a steelhead can produce non-anadromous progeny and non-anadromous rainbow trout can produce steelhead progeny) provides further evidence.

This type of population structure and resultant flexibility in reproductive strategies allows a population to persist in the face of unstable and variable climatic, hydrographic, and limnological conditions that frequently exist at the margins of a species' range. For coastal rainbow trout, this includes stream systems in the Central Valley and those south of San Francisco Bay. Stream systems in California are subject to extreme variations in rainfall which can result in high volume, flash flood runoff, or droughts lasting several years. Natural stream flow in these streams can vary greatly, both seasonally and annually. It is not uncommon, even under unimpaired conditions, for the lower reaches of many streams to become interrupted during the dry season, restricting the population to the perennial headwaters, with these conditions persisting for years. The flexibility inherent in this type of population structure allows fish to complete their life cycles entirely in freshwater until conditions once again allow migration to the ocean, and this flexibility has allowed populations to persist in this marginal, frequently suboptimal environment. Having several different life-history strategies among a single population effects "bet-hedging" against extinction.

Status of the Populations

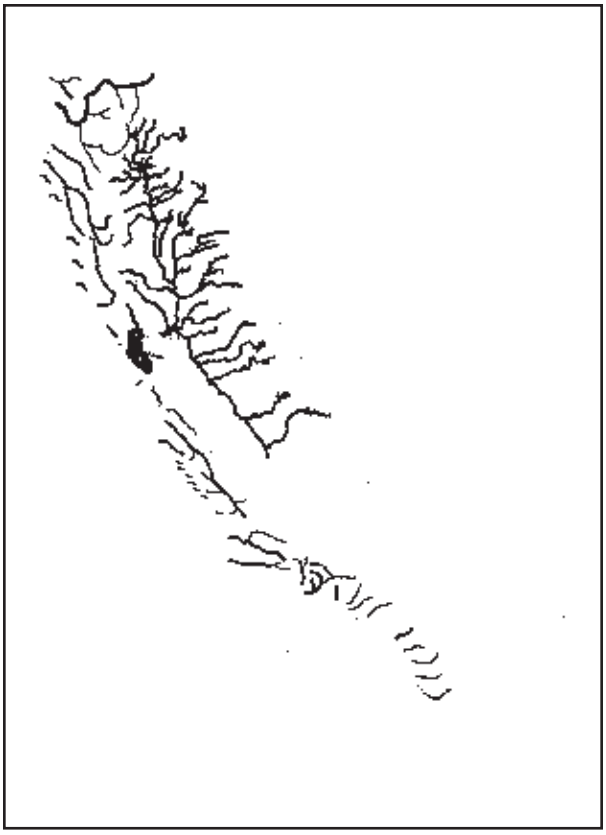
Because of the difficulty in assessing steelhead populations, we have limited estimates of adult numbers and a statewide population estimate is not available. Carcass surveys, a dependable method to estimate salmon spawning populations, are not useful for assessing steelhead spawning populations, because steelhead do not always die immediately after spawning. Counts made at weirs and fishways can be difficult because adult steelhead tend to migrate on high, turbid winter flows. Despite the lack of accurate numbers, other reliable indicators show that steelhead, like most other anadromous salmonid stocks in California, have declined significantly.

In October 1997, the federal government listed southern California steelhead as endangered and central and south Central Coast steelhead as threatened under the ESA. In May 1998, Central Valley steelhead were listed as threatened, and in August 2000, Northern California steelhead were listed as threatened. Consequently, all California steelhead populations south of the Klamath-Trinity River system are now listed under the ESA.

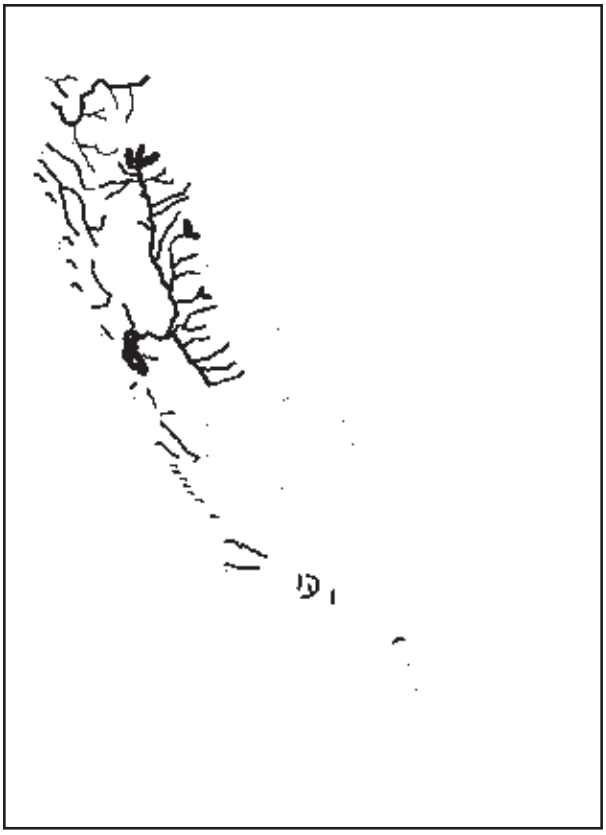
South Coast. The precipitous decline of steelhead on the south coast is well documented. Of 122 streams south of San Francisco Bay that were known to have contained a steelhead population, 47 percent had populations with reduced production from historical levels, 33 percent no longer supported steelhead populations, and only 20 percent had populations that had not declined significantly from historical levels. The percentage of streams with extinct populations ranged from zero percent in San Mateo and Santa Cruz counties in the north to 92 percent in Orange and San Diego counties.

Water development appears to be the primary cause of localized extinctions and decline in numbers. A recent study found that 35 percent of the southern steelhead populations reviewed were negatively impacted by water diversions, 24 percent by dams lacking functional fishways; 18 percent by artificial barriers other than dams (such as impassable culverts and bridge supports) and five percent from stream channelization. Overall, 21 percent of the 165 populations reviewed were impacted by blocked access to spawning and rearing tributaries due to main stem impediments. Other major impacts include urbanization and other land-use activities.

Southern steelhead stocks (those occurring south of Point Conception) are the most imperiled of all of California's steelhead populations, and are the only California steel-



The historical range of steelhead in California.
Only major streams within the range are depicted.



The present range of steelhead in California.
Only major streams within the range are depicted.

head that are listed under the ESA as endangered. The southernmost range of steelhead formerly extended to northern Baja California and they were present in streams and rivers of Los Angeles, Orange, and San Diego counties. At present, Malibu Creek in Los Angeles County is the designated southern extent of the steelhead range (in terms of the ESA listing). However, the recent discovery of a spawning population in San Mateo Creek in San Diego County has confirmed that steelhead are still present in streams south of Malibu Creek, and the federal government has recently proposed to extend the designated southern extent to include San Mateo Creek. It is not known if steelhead still occur in streams south of San Mateo Creek.

The historical run-size of the Santa Clara River is estimated to have been about 9,000 adults annually. In the past five years, several hundred steelhead smolts have been observed at fish screens at a diversion on the mainstem so it appears this population may be recovering, although only a few adult steelhead have been observed in the fishway in the diversion dam. A fishway on a small diversion dam on Santa Paula Creek, a major tributary to the Santa Clara River, was recently completed, so steelhead will now have access to some of their former spawning and rearing habitat.

The Santa Ynez River is reported to have had an annual run size from 12,995 to 25,032 adults in the 1940s. Although this was a cursory estimate, it does attest to the large size of this run, which was already reduced from former times because of forest fires and construction of dams in the upper watershed. The large size of this run is also indicated by a DFG rescue of 1,036,980 juvenile steelhead from the partially dry bed of the Santa Ynez River in 1944. Since the mid-1990s, a few adult steelhead have been observed every year, and juvenile steelhead have been observed in several tributaries.

In the mid-1940s, DFG biologists reported that a minimum of 2,000 to 2,500 adults spawned in Matilija Creek, a tributary of the Ventura River, and they believed that this represented 50 percent of the total number of adults entering the Ventura River. There are recent anecdotal reports of adult steelhead in the lower Ventura River, and juvenile steelhead have been observed.

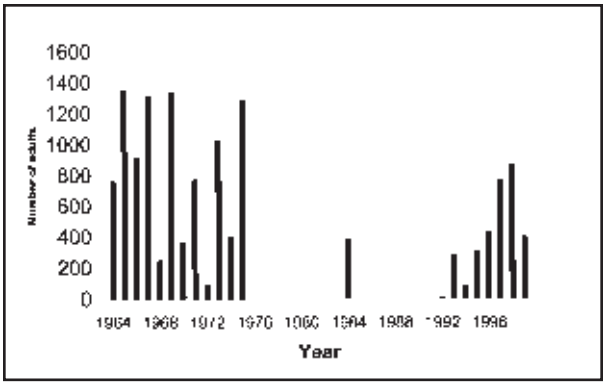
Much of the coastline of southern Monterey and San Luis Obispo counties is relatively undeveloped; hence, many of these small coastal streams still contain steelhead populations. Status of populations in these streams

range from healthy in the relatively undisturbed streams in southern Monterey and northern San Luis Obispo counties, to severely depressed or extirpated in the Morro Bay/San Luis Obispo urban area. The largest populations of steelhead (on the order of hundreds of adults) in the south-central coast region are probably in the Little Sur and Big Sur rivers.

In the Carmel River from 1964 to 1975, the average annual run-size of steelhead was estimated to be 3,177 fish, about 25 percent of historical levels. The mean number of adults counted at the San Clemente Dam fish ladder during this 12-year period was 821 fish per year. During a three-year period from 1988 to 1990, the river never breached its sand bar at the mouth making the river inaccessible to upstream migrant adult steelhead. One adult was observed in the ladder in 1991, 14 adults in 1992, and 285 adults in 1993. In 1993, the Fish and Game Commission closed the lower Carmel River to all angling to protect the remnant steelhead run. With the cessation of the recent six-year drought, the Carmel River steelhead population appears to be recovering. The average annual run size for the five-year period beginning in 1995 was 590 adults. In recognition of the increasing health of the population, the river was opened to a limited catch-and-release fishery for steelhead in 1998.

With the recent occurrence of several years of ample precipitation, it appears that steelhead in this region may be starting to recover from the six-year drought of the late 1980s through early 1990s. Opportunistic observations confirmed the presence of steelhead in many small southern California streams that were not known to have contained steelhead populations for many years. Steelhead have been observed in Carpenteria, Maria Ygnacio, Gaviota, Mission, and Arroyo Hondo creeks in Santa Barbara County; Arroyo Sequit and Topanga creeks in Los Angeles County; and San Mateo Creek in San Diego County. Since the ESA listing, habitat restoration projects have increased in the past five years and include modification of grade stabilization structures to facilitate passage on Gaviota Creek, development and design of a fishway and screens on the Robles Diversion on the Ventura River, initial discussions on removal of Matilija Dam on Matilija Creek, construction of a new fishway at Harvey Dam on Santa Paula Creek, and various restoration projects in Topanga and San Mateo creek watersheds.

North Coast. The historical range of steelhead on the north coast (north of San Francisco Bay) has not been reduced to the extent it has in other areas of the state. Major dams that have blocked access to historical spawning and rearing areas are Iron Gate Dam on the Klamath River, Lewiston Dam on the Trinity River, Ruth Dam on the Mad River, Scott Dam on the Eel River, Coyote Dam on the Russian River, and Warm Springs Dam on Dry Creek (a tributary to the Russian River). All of these dams except the latter two are at elevations greater than 1,500 feet, so a considerable amount of habitat is still available downstream. The Russian River is the notable exception - dams block access to the headwaters and a major tributary.



Adult Steelhead Counts at San Celmente Dam on the Carmel River
Data show steelhead counted at the San Clemente Dam on the Carmel River between 1964 and 1999. Data not available for 1978-1983 and 1985-1987; no steelhead were counted at the San Celmente Dam during the years 1976-1977, 1989, and 1990.

The north coast rivers and streams have the largest area of steelhead habitat in the state and the most abundant populations of steelhead. The *California Fish and Wildlife Plan* of 1965 estimated an annual spawning escapement of 513,500 steelhead for this region. Because many of the spawning and rearing tributaries are largely undeveloped and fairly remote, the north coast runs are in better condition than other areas of the state. However, these populations have also had some declines.

In the 1960s, the Smith River was estimated to have a spawning escapement of 30,000 adult steelhead. There have been no recent spawning surveys done for steelhead and the population size is unknown at present. The Smith River is presently protected by federal Wild and Scenic River designation and has one of the most undisturbed watersheds in California. Steelhead populations appear to be healthy in this system and the habitat is relatively pristine. The Smith River is well known among anglers for producing trophy-size steelhead.

The largest population of steelhead in California inhabits the Klamath River system. The *California Fish and Wildlife Plan* estimated an annual run size of 283,000 adult steelhead for the entire Klamath River system. The size of the fall-run from the 1977-1978 to the 1982-1983 seasons ranged from 87,000 to 181,410 adults annually. The size of the winter steelhead population in this system in the early 1980s was probably about 10,000 to 30,000 adults annually, based on limited sport angler and Native American gillnet harvest data. The steelhead population of the Klamath River excluding the Trinity River has declined

dramatically, most likely due to high summer water temperatures in the mainstem.

The most reliable population estimates for steelhead on the north coast are for the Trinity River, a major tributary of the Klamath River. DFG has operated several weirs in the system since 1977 to obtain steelhead run size, sport harvest, and spawning escapement estimates. Estimates for some years during this period are not available because of the difficulty in maintaining weirs in high water. Eight years of run size estimates for the Trinity River upstream of Willow Creek range from 7,833 to 37,276 and average 15,185 adults. The 1991-92 estimated run size for the Trinity River above Willow Creek was 11,417.

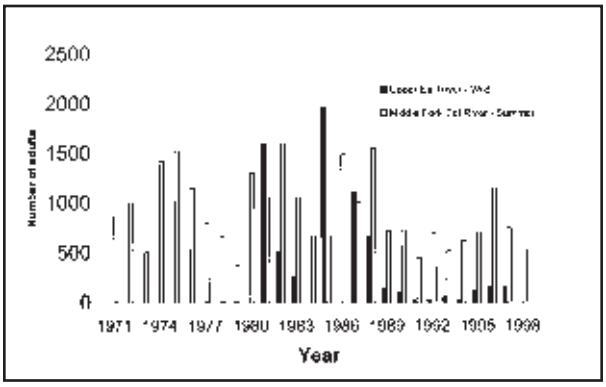
Steelhead runs in the Eel River system have declined significantly. Annual counts made at Benbow Dam on the South Fork Eel River show a decline from an average of 18,784 during the 1940s to 3,355 during the 1970s (counts were discontinued after 1975). Annual counts of adults at Cape Horn Dam in the upper watershed of the main stem Eel River declined from an average of 4,063 during the 1930s to 540 during the 1990s. Annual counts of wild steelhead at this location show an even greater decline: from an average of 893 in the 1980s to 82 in the 1990s. Recent anecdotal information indicates that steelhead populations also appear to have declined significantly in the South Fork Eel River, partly due to predation or competition from introduced Sacramento squawfish, which are now widespread throughout the system.

The *California Fish and Wildlife Plan* estimated an annual spawning escapement of 50,000 steelhead in the Russian River. Presently, escapement of naturally produced steelhead in this system probably ranges from about 1,750 to 7,000 adults. Historically, steelhead spawned throughout the Russian River system, but today many of the tributaries, including the East Fork, are now inaccessible due to dam construction.

Marin County tributaries to San Pablo and San Francisco bays have all sustained intensive urban development and anadromous runs in many streams have been extirpated. West Marin County tributaries to Tomales Bay and the Pacific Ocean still have steelhead with small population estimates. Steelhead escapement in Lagunitas Creek is probably about 400 to 500 adults annually.

There are four DFG hatcheries in the north coast area: Iron Gate Hatchery on the Klamath River, Trinity River Hatchery, Mad River Hatchery, and Warm Springs Hatchery on Dry Creek (tributary to the Russian River). Average annual production for these four hatcheries totals about 1,750,000 steelhead yearlings per year. The private, nonprofit Rowdy Creek enhancement hatchery on the Smith River releases approximately 125,000 steelhead smolts annually. Despite the significant number of hatchery smolts released, steelhead runs in north coast drainages are comprised mostly of naturally produced fish.

Since the early 1970s, systematic surveys have been undertaken on summer steelhead holding habitat to census adult summer steelhead. The most abundant populations are in the Middle Fork Eel and the North Fork Trinity rivers. The Middle Fork Eel River population has not fully recovered from the devastating 1964 flood which

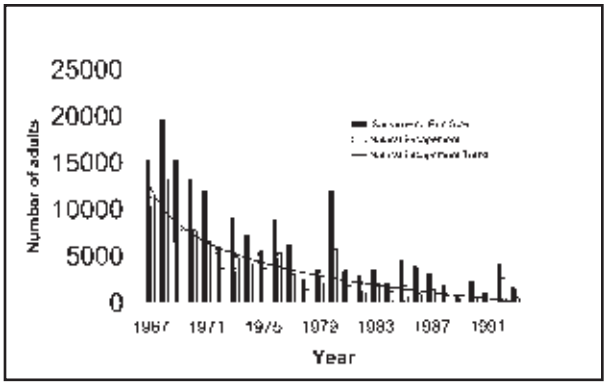


Eel River Steelhead Population Trends
Data shows steelhead population trends between 1971 and 1998 as counted for the Upper Eel River wild steelhead population and the summertime steelhead population (wild and hatchery) of the Middle Fork of the Eel River.

aggraded the river bed, filled-in holding pools, and smothered spawning gravels. The adult population has declined steadily since 1987 and is now about 500. The present estimated annual statewide abundance of summer steelhead is about 2,000 adults.

Major factors impacting north coast steelhead stocks are watershed disturbances due to logging, grazing, and road building, water diversions, and other agricultural impacts. Poaching is a problem, especially for summer steelhead, which must over-summer in fresh water, often concentrated in a few pools. This renders them susceptible to snagging and netting, especially if the pools are located in accessible areas. Urbanization of the watershed and gravel mining operations have caused serious problems on central coast streams.

Central Valley. Steelhead were historically well-distributed throughout the Sacramento and San Joaquin river systems, from the upper Sacramento/Pit river systems south to the Kings River (and possibly Kern river systems in wet years) and in both east- and west-side tributaries of the Sacramento River. Present distribution of steelhead in the Central Valley has been greatly reduced, mainly from construction of impassable dams that block access to essential spawning and rearing habitat. It is estimated that 82 to 95 percent of the historical steelhead spawning and rearing habitat in the Central Valley has been lost to dam construction/passage problems.



Adjusted Counts of Upper Sacramento River Steelhead at Red Bluff Diversion Dam
Data shows steelhead counted at the Red Bluff Diversion Dam between 1967 and 1993.

Naturally-spawning steelhead stocks are known to occur in the upper Sacramento River and tributaries, Mill, Deer, and Butte creeks, and the Feather, Yuba, American, Mokelumne, Calaveras, Stanislaus, and Tuolumne rivers. Naturally spawning populations could be more widespread, however, as indicated by recent implementation of monitoring programs that have found steelhead smolts in streams previously thought not to contain populations, such as Auburn Ravine, Dry Creek and the Stanislaus River. It is possible that naturally spawning populations exist in many other streams but are undetected due to lack of monitoring or research programs. A genetic evaluation by the National Marine Fisheries Service provides evidence that a native Central Valley steelhead stock still exists.

Until very recently, steelhead were considered to be extinct in the San Joaquin River system. However, this conclusion was based on little information and no field studies. The presence of steelhead in the San Joaquin River system has been confirmed by observations of steelhead smolts in the Stanislaus River and observations of steelhead adults and smolts in the Calaveras and Tuolumne rivers. Adult steelhead have also been observed in the Stanislaus River and in the San Joaquin River at its confluence with the Merced River.

The *California Fish and Wildlife Plan* estimated that there were 40,000 adult steelhead in the Central Valley drainages in the early 1960s. In the 1950s, the DFG estimated the average annual steelhead run size in the Sacramento River system above the mouth of the Feather River was 20,540 adults. Estimating steelhead abundance before extensive water development and habitat modification occurred is difficult given the paucity of historical information. However, an estimate can be made by comparing the relative abundance of chinook salmon and steelhead in other, relatively unimpaired river systems. These estimates show that steelhead abundance in these river systems is at least as great as chinook salmon abundance, and in some cases, is greater. It is estimated that chinook salmon escapement was one to two million spawners annually in the Central Valley prior to large-scale habitat changes, so a cursory estimate of the annual steelhead run size is one to two million adults

A cursory estimate of current steelhead abundance in the Central Valley, based on Red Bluff Diversion Dam (RBDD) counts, hatchery counts, and past natural spawning escapement estimates for some tributaries, is no greater than 10,000 adult fish. A more reliable indicator of the magnitude of the decline of Central Valley hatchery and wild stocks is the trend in the RBDD adult steelhead counts, which have declined from an average annual count of 11,187 adults for the ten-year period beginning in 1967, to 2,202 adults annually in the early 1990s. Natural spawning escapement estimates above RBDD for the period 1967 to 1993 averaged 3,465 and ranged from zero (1989 and 1991) to 13,248 (1968). Natural escapement has shown a more substantial decline than hatchery escapement. There are four steelhead hatcheries in the Central Valley: Coleman National Fish Hatchery on Battle Creek, Feather River Hatchery, Nimbus Hatchery on the American River, and the Mokelumne River Hatchery. Together, these hatcheries produce about 1.5 million yearlings annually.

Factors affecting abundance, persistence, and recovery have been identified for anadromous fishes in the Sacramento and San Joaquin River systems and these apply reasonably well to Central Valley steelhead. These factors include: water diversions and water management, entrainment, dams and other structures, bank protection projects, dredging and sediment disposal, and gravel mining. The primary impact to Central Valley steelhead is the substantial loss of spawning and rearing habitat due to dam construction at low elevations on all the major tributaries.

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