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HISTORY AND STATUS OF STEELHEAD IN CALIFORNIA COASTAL DRAINAGES SOUTH OF SAN FRANCISCO BAY

by

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Santa Ynez River Drainage

The Santa Ynez River probably supported the largest steelhead run in southern California, and was famous for its steelhead sport fishery (e.g. Mears 1947). In an early account, Holden (1910) related the popularity of the lower Santa Ynez for catching steelhead as large as 9 kg, and how these fish would ascend the stream 65–80 km to spawn in the upper drainage where resident rainbow trout were also abundant (see also Fry 1938).

Gibraltar Dam, located about 116 km upstream from the river mouth and built in 1920, was the first man-made obstruction to block steelhead access to the upper Santa Ynez drainage. Landlocked steelhead, 13–39 cm long and 2–4 years old, were captured when Curtis (1937) gill-netted Gibraltar Reservoir in November 1937. These fish included females with developing ova. No young-of-the-year steelhead were observed in the reservoir. In the tributary streams above the reservoir, Curtis (1937) identified suitable spawning grounds in the Santa Ynez River below the confluence with Mono Creek; in Mono Creek up to the debris dam; and in Gidney Creek. Although no juveniles were observed in the Santa Ynez or Mono Creek, both reportedly received spawning runs of steelhead. Spawning reportedly occurred in February, although the 1937 spawning run was apparently small. Siltation and desiccation were mentioned as potential problems for successful spawning in Mono Creek and the upper Santa Ynez River. Gidney Creek was unsilted and contained surficial flow later into the season. Camuesa Creek was apparently not used by steelhead spawners for some unknown reason.

In addition to supporting landlocked steelhead native to the drainage, the Gibraltar Reservoir stock was also supplemented with 25,000 hatchery-reared steelhead in 1932; 87,000 in 1933; 30,000 in 1934; 50,000 in 1935; and 40,000 in 1936. Some 10,000 hatchery rainbow trout were stocked in 1932. Shapovalov (1944a) also indicated that 9,000 juvenile steelhead, rescued from the Santa Ynez

River, were stocked in the reservoir in 1939, 195,000 in 1940, and 25,440 in 1944.

During the mid-1930's, the CDFG conducted a cursory survey of 120 km of the Santa Ynez River to evaluate the system's suitability for stocking of hatchery-reared trout. The survey report indicated that spawning grounds for steelhead and rainbow trout were common along the entire stream, but that flow was a limiting factor for spawning habitat quantity. During spring freshets, steelhead were observed spawning in all tributaries and in the mainstem river below Gibraltar Dam. Natural propagation produced the principle supply of harvestable juvenile steelhead and rainbow trout in the stream. Planting was not recommended for the river or tributaries because of high mortality due to intermittent flow conditions in summer. Fish rescues were conducted every summer and fish losses were typically heavy after 1 June.

Shapovalov (1944a) described the Santa Ynez River drainage, and its steelhead population and fishery, through 1944. Tributary streams typically went dry in their lower reaches during the summer, but maintained perennial flow or series of pools in their upper reaches. Much of the main stem Santa Ynez below Gibraltar Reservoir also became desiccated during May–July, except for several kilometers of stream in the vicinity of Solvang; at the lagoon, which was also several kilometers long (see Shapovalov 1940b); and occasionally at large pools elsewhere. Stream flow during the dry season in the lower Santa Ynez had been reduced by the effects of forest fires, water storage and diversion in the upper drainage at Gibraltar Reservoir and Jameson Lake, and groundwater pumping for irrigation. There was a saltwater intrusion barrier near the mouth of the Santa Ynez River which included a reportedly satisfactory fishway. Yet, despite unstable flow conditions, water discharges at Lompoc on the lower Santa Ynez during 1928–44, were great enough to allow immigration of adult steelhead to upstream spawning grounds in all years except probably 1929 and 1931, which were very dry (Moffett and Nielson 1945).

Steelhead, most of which entered the river during December–March following the first heavy rains of the season, still spawned as far upstream as Gibraltar Dam. Landlocked steelhead, and possibly various strains of rainbow trout and hybrids of the different genotypes, persisted in Gibraltar Reservoir and in the creeks upstream from there. Steelhead progeny, which were rescued annually from the drying Santa Ynez below Gibraltar Dam, were planted in creeks both above and below the dam. No counts were ever made of the adult steelhead run in the Santa Ynez, but as Shapovalov (1944a) indicated, the 1,036,980 juvenile steelhead rescued from the drying main stem in 1944 suggested a very large run. This count would serve as the basis for an underestimate of the adult run size as an additional proportion of the juvenile population went uncounted: fish which migrated to the lagoon before rescues began, those which survived in the remaining live portions of the river system, and those which presumably died in the desiccated lower reaches of tributaries. A local CDFG employee believed that the 1943-44 adult steelhead run in the Santa Ynez at least equalled the 1938-39 and 1939-40 runs at Benbow Dam on the South Fork Eel River in northern California, which he had personally observed. Adult steelhead runs at Benbow Dam had ranged from 12,995 to 25,032 fish from 1938-39 to 1943-44. Forest fires during the preceding 20 years had reduced steelhead/rainbow trout populations, especially above Gibraltar Reservoir, either by direct mortality or through the destruction of spawning and rearing habitat by erosion and siltation. Among the upper tributaries affected were Alamar, Indian, and Buckhorn creeks where trout had survived the summer dry season in perennial pools.

Shapovalov (1944a) reported that, at that time, most mainstem spawning by steelhead occurred upstream from Buellton to Gibraltar Dam. Steelhead also spawned in nearly all accessible tributaries below the dam, including Alisal, Santa Cota, Cachuma, Tequepis Canyon, and Santa Cruz creeks. Alamar and Indian creeks were among the tributaries above Gibraltar Reservoir which were known to have been utilized by steelhead before the dam was constructed (see also the

above summary of Curtis 1937).

Fish rescue operations were conducted by the CDFG each summer for several years in the Santa Ynez drainage below Gibraltar Dam. No records were available prior to 1939, but during 1939–44 (excluding 1941 when sufficient flow persisted), a total of about 2,850,000 juvenile steelhead was rescued from the lower mainstem Santa Ynez River (Shapovalov 1944a). The fish ranged in batch sizes from about 212 to 1,411 fish/kg (nearly all rescued steelhead were young-of-the-year). On average, about 73% of each year's rescue was replanted in perennial water within the Santa Ynez River system, the majority in the lagoon (see below). In addition, a combined total of about 1,450,000 juvenile steelhead was rescued in 1945 and 1946; no rescues were conducted after 1946 due to a lack of fish (CDFG, unpubl. file data; see also below). As an example of the magnitude of juvenile steelhead production in the Santa Ynez River, Shapovalov (1944a) presented approximate numbers of steelhead rescued from three river reaches in 1944; corresponding densities were 11,298, 32,219, and 51,781 steelhead/km. That nearly all rescued steelhead were young-of-the-year indicates that main stem Santa Ynez steelhead smolted and emigrated to the ocean primarily at age 1.

During 1940–1947, nearly 2,550,000 juvenile steelhead were planted in the lower Santa Ynez River, primarily in the lagoon and in perennial water at Solvang (Shapovalov 1944a; CDFG, unpubl. file data). With the exception of 1947, these fish were rescued steelhead from within the Santa Ynez River drainage. In addition, a total of 133,000 hatchery-reared juvenile steelhead were planted in the Santa Ynez River during 1930–35 (Shapovalov 1944a). Some 5,000 hatchery-reared rainbow trout were stocked in the river in 1930 (Shapovalov 1944a), 650 in the lower river in 1945, and 35,160 in the lower river during 1950–53 (CDFG, unpubl. file data).

On 28–29 March 1946, a party of state and federal fishery biologists conducted a visual survey of steelhead spawning in the Santa Ynez River (L.

Shapovalov, CDFG, unpubl. field correspondence of 2 April 1946). In addition to observations of recently completed redds, adult steelhead were seen moving upstream and actually spawning among four river locations from Alisal Creek to Oso Canyon, where high quality spawning grounds occurred. In contrast, no live steelhead or spawning activity were observed from the saltwater intrusion barrier near the river mouth to the Highway 150 crossing at Lompoc. The substrate in this river reach was dominated by shifting silt, sand, and fine gravel. Shapovalov concluded that spawning habitat quality for steelhead was very poor from the mouth to the Salsipuedes Creek confluence, of doubtful quality from Salsipuedes Creek to Solvang (a conservative judgement since no observations were documented for this reach), and excellent from Solvang to Gibraltar Dam. He also noted that high quality spawning grounds existed in tributaries but that the flow in these streams was too low at the time of the survey to allow the ascent of adult steelhead. Finally, many adult steelhead carcasses were observed in the lower river between the mouth and Lompoc; apparently high adult mortality had occurred in this area during the previous 2 weeks when water temperature peaked at $\geq 21°$ C.

The winter of 1946-47 was relatively poor for steelhead due to little precipitation and low flow. There was no steelhead run in the fall of 1951 (W. A. Evans, CDFG, unpubl. field notes). Cachuma Dam, known now as Bradbury Dam which creates Lake Cachuma about 76 km upstream from the river mouth, was completed in early 1953. The last substantial steelhead run occurred in 1945-46 (H. L. Lantis, CDFG, unpubl. file letter). In 1946-47, large numbers of steelhead were observed outside the mouth of the river, waiting for the sandbar to breach to make their ascent. This never occurred due to lack of precipitation and consequently there was no spawning run that year. Observations or catches of steelhead in the Santa Ynez after 1946 were relatively rare. For example, about 25 fish were taken in the river in 1952. Adult steelhead were otherwise taken by anglers in the ocean surf near the river mouth during 1947–52; too little

freshwater outflow prevented these fish from entering the river system. Juvenile steelhead had been planted in the lagoon in an effort to reestablish the run, but low precipitation and reduced river outflow due to Bradbury Dam were cited as causes for the failure of these plantings. Some 20–40 adult steelhead, reportedly up to 5.5–6.5 kg, were observed at the head of the Santa Ynez lagoon in March 1956. Steelhead were also observed in the lower Santa Ynez tributary, Salsipuedes Creek. Some steelhead were also reportedly taken in the river during the spring of 1962.

Lake Cachuma has been heavily stocked with hatchery-reared rainbow trout. The CDFG stocked the reservoir with 199,250 rainbow trout fingerlings (Arrowhead, Hot Creek, and Mt. Shasta strains @ 55–317/kg) from 24 February 1953 through 16 October 1953 in preparation for the 1 May 1954 opening of angling at the reservoir (CDFG, unpubl. file data). Some 10,271 catchable-sized rainbow trout (@ about 11/kg) from a private hatchery were stocked on 6 August 1954, under purchase by the County of Santa Barbara (S. M. Soule, CDFG, unpubl. intraoffice correspondence of 7 October 1954). The CDFG planted an additional 2,277,767 fingerlings during 1954–1958 but, overall, survival and thus creel returns were low because of poor water quality for trout in summer. Fingerling plants were discontinued in 1959, and the management recommendation of stocking only catchable-size rainbow trout during cool-water months (H. L. Huddle, CDFG, unpubl. file report of 23 October 1958) has been followed since 1960. The extent to which these planted trout disperse up- and downstream in the system, and the effect they may have on native steelhead and rainbow trout, is not known.

No wild rainbow trout were found in the Santa Ynez River between Lake Cachuma and Gibraltar Reservoir during a survey in November 1972 (S. Sasaki, CDFG, unpubl. memo.). Steelhead were reportedly caught in the lower Santa Ynez during 1972-73, a high water year, although these catches were unverified (S. Sasaki, CDFG, unpubl. memo.).

By 1975, Bradbury Dam had all but eliminated the Santa Ynez steelhead run from its estimated average annual size of 20,000 migrant adults, as reported by the CDFG (California Department of Fish and Game 1975). Insufficient water releases from Lake Cachuma, to provide flow for migrations, spawning, and rearing, and a lack of adult steelhead salvage facilities at the dam, were cited as the primary causes for the demise of the run.

In 1986, the CDFG indicated that excellent spawning areas still existed in the main stem Santa Ynez below Bradbury Dam (S. Sasaki, CDFG, unpubl. file report of 3 October 1986). However, it was also indicated that even in years of high rainfall when adults could conceivably enter the river and spawn, flow below the dam would not be maintained through the summer and fall to allow for juvenile survival.

In 1989, the California Sportfishing Protection Alliance (CSPA) submitted a petition to the California Fish and Game Commission to list the Santa Ynez River steelhead as an endangered species under the California Endangered Species Act (R. J. Baiocchi, CSPA, petition of 25 August 1989). The basic tenet of the petition was that the Santa Ynez steelhead was unique because of the maximum size of 9 kg attained by adults, and because of the size of the estimated average adult run, which historically was on the order of 20,000 fish. The CDFG rejected the petition based on the conclusion that these characteristics were not uncommon in California steelhead populations (P. Bontadelli, CDFG, unpubl. memo. of 7 December 1989). See "Discussion" for more on this issue.

Nehlsen at al. (1991) listed the Santa Ynez River steelhead stock as being at a high risk of extinction.

Santa Ynez River Lagoon. During late spring and summer 1940, the CDFG rescued more than 525,000 young steelhead from the drying Santa Ynez River (Shapovalov 1940b). Nearly all of these fish were young-of-the-year, and 191,700 were planted in the Santa Ynez River lagoon. One lot of about 8,700 steelhead

was retained at the Fillmore Hatchery in Ventura County, to be used in a lagoon stocking experiment and in brackish water challenge tests. The steelhead were marked by clipping both ventral fins, and reared through September 1940. On 5 October 1940, when the fish had reached an average size of nearly 9 cm and 9 g, the young steelhead were planted in the freshwater portion of the Santa Ynez lagoon, apparently with success as no signs of stress or mortality were seen over the next several hours of observation. A short-term experiment had also been made at the hatchery on 26 September 1940 of transferring small samples of marked steelhead (3 and 12 fish in two trials) from fresh hatchery water to brackish lagoon water and back to fresh water. The fish in both trials showed no signs of stress. The combined results of both experiments suggested that young steelhead could be planted directly in brackish water lagoons from fresh water with little or no mortality.

Hundreds of thousands of juvenile steelhead rescued from the Santa Ynez River were planted in the lagoon during 1940–1947 (see above). In February 1954, 16,500 catchable rainbow trout were planted in the lagoon with apparently poor returns to the creel (H. L. Huddle, CDFG, unpubl.intraoffice correspondence of 3 December 1957). During 17–18 June 1954, the CDFG seined both shallow (1 haul) and deep water (4 hauls) habitat in the lagoon to cursorily evaluate the retention of these rainbow trout (P. E. Giguere, CDFG, unpubl. intraoffice correspondence of 9 July 1954). Several marine and euryhaline fishes were captured but no rainbow trout or juvenile steelhead. However, one each hatchery rainbow trout (26.0 cm) and juvenile steelhead (15.0 cm) were seined from small freshwater pools upstream from the saltwater intrusion barrier. On 14 July 1954, two rainbow trout (~17.0–18.0 cm) were seined from the most seaward extension of the lagoon but not at any of three other lagoon stations (CDFG, unpubl. field report of 14 July 1954).

During 12–13 March 1958, one group of 10 of each 7.5–10.0 cm long and 20.0–23.0 cm long hatchery rainbow trout were placed in live cages at two lagoon

locations where surface salinity ranged from 2.5 to 4.0 ppt (H. L. Huddle, CDFG, unpubl. intraoffice correspondence of 21 March 1958). All trout survived after 24 h, as had rainbow trout fingerlings tested at 12 ppt salinity in aquaria. These results seemed to corroborate the results of Shapovalov's (1940b) seawater challenge tests, as reported above.

Agua Caliente Creek

Although no historical record was discovered, steelhead probably spawned in Agua Caliente Creek prior to the construction of Gibraltar Dam, as they did in other tributaries in the upper Santa Ynez River drainage. Agua Caliente Reservoir, created by a debris dam completed on the creek in 1937, was planted with 13,000 juvenile steelhead rescued from the Santa Ynez in 1939, and 27,000 in 1940 (Shapovalov 1944a). The reservoir basin was completely filled with sediment by 1944.

Alisal Creek

Alisal Creek, which enters the Santa Ynez below Bradbury Dam, has been used historically for spawning by steelhead (Shapovalov 1944a). Some 26,000 juvenile steelhead were rescued from the creek in 1940. An adult O. mykiss about 38 cm in length, which was presumably a steelhead, was captured in the creek by an angler during the 1992-93 steelhead season (M. Cardenas, CDFG, pers. comm. of 5 April 1993).

Ballard Creek

Steelhead probably spawned in Ballard Creek, a Santa Ynez tributary below Bradbury Dam, as they did in most accessible tributaries (Shapovalov 1944a). The creek received a plant of 1,500 juvenile steelhead rescued from the Santa Ynez in 1943.

Cachuma Creek

Steelhead spawned in Cachuma Creek (Shapovalov 1944a), prior to the

construction of Bradbury Dam. The creek received a plant of 7,000 juvenile steelhead rescued from the Santa Ynez in 1942. Steelhead runs occurred at least as late as 1948, and the creek, which now flows into one of the main arms of Lake Cachuma, has also historically contained resident rainbow trout (CDFG, unpubl. file data).

Gidney Creek

Steelhead probably spawned in Gidney Creek prior to the construction of Gibraltar Dam; it now flows into one of the main arms of Gibraltar Reservoir. Curtis (1937) identified favorable spawning grounds in the creek, where juveniles (5–12.5 cm long) of landlocked steelhead from the reservoir were seen at a density of about 30 trout/pool. Gidney Creek was unsilted and contained surficial flow late into the season.

Hilton Canyon Creek

O. mykiss adults were observed spawning in Hilton Canyon Creek, the uppermost tributary to the Santa Ynez below Bradbury Dam, during mid- to late February 1993 (C. Fusaro, Santa Barbara City College, pers. comm. of 9 March 1993). One spawning pair comprised fish which were 46–51 cm in length. Some 22 adult trout, at visually estimated weights of 1.8–2.7 kg, were observed in the creek on one day. It was not known if these fish were actual steelhead or large rainbow trout which had moved downstream out of Lake Cachuma, although this problem was being investigated. Adult fish continued to be observed in the creek through late April 1993 (M. Cardenas, CDFG, pers. comm. of 22 April 1993).

Mono Creek and Tributaries

Steelhead spawned in Mono Creek, a tributary to the upper Santa Ynez, prior to the construction of Gibraltar Dam. Curtis (1937) identified suitable steelhead spawning grounds in Mono Creek up to the debris dam, and although no juveniles were observed, the creek reportedly received spawning runs of landlocked steelhead from the reservoir. Siltation and desiccation were mentioned

as potential problems for successful spawning in the creek.

Sea-run steelhead also spawned in the Mono Creek tributaries, Alamar and Indian creeks, before the dam was built (Shapovalov 1944a). Forest fires since the 1920's had reduced O. mykiss populations in these tributaries, and in the Indian Creek tributary, Buckhorn Creek, either by direct mortality or through the destruction of spawning and rearing habitat by erosion and siltation. Trout had survived the summer dry season in perennial pools in these streams. Indian Creek received a plant of juvenile steelhead rescued from the Santa Ynez in 1945.

Salsipuedes Creek and Tributaries

As of 1974 (P. R. Gantt, Goleta, CA, unpubl. correspondence in the CDFG file) and 1986 (S. Sasaki, CDFG, unpubl. file report of 3 October 1986), Salsipuedes Creek and its tributary, El Jaro Creek, reportedly continued to support natural steelhead propagation. According to Sasaki, the Salsipuedes, which enters the lower Santa Ynez River about 24 km above the mouth, had suitable steelhead spawning areas, perennial flow, and an intact riparian canopy which sheltered the stream. Although the presence of spawning adult steelhead had not been investigated, Sasaki did observe many O. mykiss fingerlings in the creek in some of the 17 years he had worked in the area.

Electrofishing surveys were conducted in Salsipuedes and El Jaro creeks in March 1987 and 1988 (Harper 1988), in which both juvenile and adult steelhead were observed. Four adult trout were captured on 11 March 1987 in the lowermost 5 km of Salsipuedes Creek: (i) a 48 cm FL female steelhead which was age 4+ and had spent 2 years each in fresh and marine water; (ii) a 34.5 cm FL ripe male which could not be distinguished as a resident or migrant trout; (iii) a 30.5 cm FL female which appeared to be a migrant; and (iv) a 30 cm FL ripe male which could not be distinguished as a resident or migrant trout. Another large trout, about the same size as the 48 cm FL female steelhead above, was seen but not captured. Some 10–15 juvenile trout, >10 cm FL, were also captured on this date. On 12 March 1987, two adult trout were captured in El Jaro Creek: a 22.5

cm FL male which appeared to be a stream resident, and a 28.5 cm FL female which appeared to be a migrant that had grown in the lagoon or ocean. On 17 March 1988, several juvenile trout about 16 cm in length were seen but not captured in lower Salsipuedes Creek. On 31 March 1988, eight juvenile trout, 9.5–18.5 cm FL, were captured by electrofishing; these fish appeared to be stream residents as they displayed no signs of smolting. Thus, Salsipuedes Creek supported a small, self-sustaining O. mykiss population, which appeared to include both steelhead and resident rainbow trout.

Several adult O. mykiss were reportedly caught by anglers in Salsipuedes Creek during February–March 1993 following heavy precipitation (M. Cardenas, CDFG, pers. comm. of 5 April 1993). The catches were to have included about a dozen 30 –33 cm fish, and about five fish which were nearly 46 cm in length. These catches were not verified by the CDFG, however.

Santa Cota (Zanja de Cota) Creek

Santa Cota Creek, which enters the Santa Ynez below Bradbury Dam, has been used historically for spawning by steelhead (Shapovalov 1944a). The creek was stocked with 10,000 hatchery-reared rainbow trout in 1932.

Santa Cruz Creek and Tributaries

Steelhead spawned in Santa Cruz Creek (Shapovalov 1944a) prior to the construction of Bradbury Dam. The creek now flows into one of the main arms of Lake Cachuma. The creek was planted with 10,000 hatchery-reared juvenile steelhead in 1932, and received 3,000 juveniles rescued from the Santa Ynez in 1939. Some 10,000 juvenile steelhead were rescued from the creek in each of 1939 and 1940 (Shapovalov 1944a).

Steelhead could not access the Santa Cruz Creek tributary, Peach Tree Creek, because of impassable waterfalls on Santa Cruz Creek. However, the creek received a total of nearly 125,000 juvenile steelhead rescued from the Santa Ynez River during 1939–44 (Shapovalov 1944a). There was no indication whether the

plants were made to take advantage of a favorable but inaccessible rearing area in Peach Tree Creek, or if the fish were to support summer trout fishing there.

Tequepis Canyon Creek

Tequepis Canyon Creek was used historically by spawning steelhead, where 3,660 juveniles (@ 970 fish/kg) were rescued in May 1941 (Shapovalov 1944a). Steelhead access to the creek is now blocked by Bradbury Dam.

Zaca Creek

No records were discovered of historical steelhead use of Zaca Creek, although the stream was planted with juvenile steelhead rescued from the Santa Ynez River. This stream enters the Santa Ynez downstream from Bradbury Dam.

Tecolote Creek Drainage

In a report to the CDFG, Gantt (1973) presented the efforts of a local property owners association to restore the steelhead/rainbow trout resource of Tecolote Creek. Included in the report appendix were photographs of juvenile steelhead/rainbow trout caught by anglers during the 1930's. Historically, steelhead had access to about the lowermost 10 km of the stream, at which point a 6 m natural waterfall blocked upstream passage to the remaining 5 km of stream contained within Los Padres National Forest. The original steelhead/rainbow trout population was apparently decimated when early landowners pumped the creek dry.

As of 1973, two flood control dams, 1.8 m and 3.7 m in height, respectively, created migration barriers downstream from the waterfall. A 23 m long, inclined concrete culvert was also a potential barrier to upstream migration of steelhead under high flow conditions. Otherwise, high quality spawning and rearing habitats existed along most of the stream. Exceptions were a 1.6 km long section of the lower stream which had interrupted surficial flow during the summer dry season, and another lower stream reach that was silted due to construction activities and associated erosion. There was a small lagoon at the creek mouth,