Waddell

Waddell Creek is formed by the confluence of West and East Waddell creeks and consists of about 3.4 stream miles. It flows south, entering the Pacific Ocean in Big Basin Redwoods State Park. Waddell Creek was stocked in 1913 and in subsequent years (DFG 1995).

Migrant traps were operated on Waddell Creek between 1933 and 1942 *(i.e.*, nine years) as part of a study of coho salmon and steelhead. (Information developed through this "classic" study has been used widely in managing these species in California and other regions.) During this period, an average of 432 in-mig rant steelhead were collected per season (DFG 1954a). The resulting report states, "Spawning sea-run steelhead are very often accompanied by stream trout, which may eat loose eggs, but whose primary purpose in being present probably is to participate in the spawning activities" (DFG 1954a, p 286). In a 1967 report concerning Love Creek (tributary to the San Lorenzo River), the annual steelhead run of Waddell Creek was estimated to consist of 450 individuals (DFG 1967a).

In 1980, DFG noted that steelhead used the area between the mouth and the confluence of the East Fork and the West Fork, as well as the 0.6 mile portion of the East Fork immediately upstream from the confluence (DFG 1980a). This study also noted resident rainbow trout upstream of the area open to anadromous *O. mykiss*.

Records from sampling of numerous Waddell Creek sites between the years 1992 and 1997 indicate the consistent presence of 0+ and 1+ age *O. mykiss* (Smith 1997a). Scales from 202 steelhead adults collected between in the early 1990s were analyzed to provide information regarding the natural history of Waddell Creek *O. mykiss*. Researchers stated, "…about 1/3 of returning adults reared in the lagoon as juveniles" (Smith 1997a).

The lower portion of Waddell Creek and surrounding areas was investigated between 1995 and 1997. In a subsequent lagoon management plan the researchers state, "The lagoon produced an estimated 2500 steelhead in 1995 and 6600 in 1996" (Smith 1997a, p. 14). The plan notes, "Upstream of the lagoon juvenile steelhead production has been both high and stable for the last 5 years…, with an adult run in excess of 200 fish per year" (Smith 1997a, p. 15). Recommendations in the plan focused on managing diversions rights and practices to maintain stream flow appropriate for the season and water year type.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of debris clearing for flood control and water diversions on Waddell Creek (DFG 1996c). A stream inventory was conducted on Waddell Creek in 1997. Recommendations from the inventory included allowing the accumulation of woody debris, treating sediment sources, and planting riparian vegetation (DFG 1997a).

In reporting on 2006 sampling of Waddell Creek, Dr. Jerry Smith "very low steelhead densities…apparently due to the 8th consecutive year of fish kills…" (Smith 2007a). The report recommends eliminating pollution sources in the Last Chance Creek drainage that likely create the fish kills.

According to DFG staff, *O. mykiss* abundance in mainstem Waddell Creek in the years preceding 2007 is lower than expected. Investigations are planned to increase the understanding of the under-production issue (Nelson pers. comm.).

West Waddell

West Waddell Creek consists of about 6.1 stream miles and is tributary to Waddell Creek. It flows southwest to its confluence with East Waddell Creek.

According to a 1960 DFG memo, "Juvenile and adult steelhead, although not plentiful, were observed throughout almost the entire length" of West Waddell Creek (DFG 1960a). The surveyor noted individuals to 16 inches in length. The survey report indicated that logging in the Kelly Creek basin resulted in sedimentation of West Waddell Creek downstream from the Kelly Creek confluence.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of debris clearing for flood control West Waddell Creek (DFG 1996c).

West Waddell Creek was inventoried in 1997. Management recommendations in the resulting report included revegetation, particularly in areas of stream bank erosion, allowing natural recruitment of woody debris, and treating sediment sources (DFG 1997b).

Staff from San Jose State University has studied sites in West Waddell Creek as part of a long-term monitoring of Gazos, Waddell, and Scott creeks. In reporting on West Waddell Creek sampling in 2004, Dr. Jerry Smith noted, "On the upper portion of West Fork Waddell Creek streamside hog wallows and bank damage became especially common in 2002" (Smith 2004).

Staff from DFG conducted snorkel surveys in West Waddell 2003, 2004, and 2005. In each year, *O. mykiss* YOY and age 1+ individuals were observed (Nelson pers. comm.).

West Waddell tributary (Buck)

Buck Creek consists of about one stream mile. It flows west, entering West Waddell Creek at about stream mile 1.5.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use a portion of Buck Creek (County of Santa Cruz 2004).

Henry

Henry Creek consists of about 1.3 stream miles and is tributary to West Waddell Creek. It flows south, entering West Waddell Creek at approximately stream mile 2.2.

A habitat inventory was conducted on Henry Creek in 1997. Management recommendations included allowing natural recruitment of woody debris (DFG 1997c). A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes perennial flow in Henry Creek, with about three-fourths of a mile accessible to anadromous fish (DPR 2000).

Snorkel surveys were performed in Henry Creek in 2003, 2004, and 2005. Juvenile *O. mykiss* were observed in all years (Nelson pers. comm.).

Henry tributary

An unnamed tributary to Henry Creek consists of about 0.7 stream miles. If flows east, entering Henry Creek at about stream mile 0.5. A 13 foot high waterfall located at about stream mile 0.1 precludes salmonids from using the upper reaches of the creek (Nelson pers. comm.).

The Henry Creek tributary was inventoried in 1997. The survey report suggests that *O. mykiss* was present in the downstream 190 feet of the tributary, below a log debris accumulation (DFG 1997c).

Berry

Berry Creek consists of about two stream miles and is tributary to West Waddell Creek. It flows south, entering West Waddell Creek approximately 0.7 miles upstream from the Henry Creek confluence. A 40 foot waterfall occurs about 100 yards upstream from the mouth of the creek.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes perennial flow in Berry Creek, with steelhead using the reach downstream from the falls and a resident rainbow trout population occurring upstream (DPR 2000).

Kelly

Kelly Creek consists of about 0.9 stream miles and is tributary to West Waddell Creek. It flows west, entering West Waddell Creek approximately 0.8 miles upstream from the Berry Creek confluence.

In a 1960 survey, DFG found "heavy damage to the stream from siltation" due to logging (DFG 1960a).

Kelly Creek was inventoried in 1997, when no salmonids were observed. Management recommendations in the resulting report included allowing natural recruitment of woody debris and treating sediment sources (DFG 1997b).

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes perennial flow in Kelly Creek, with steelhead occurring in its lower reaches (DPR 2000).

East Waddell

East Waddell Creek consists of about 3.5 stream miles and is tributary to Waddell Creek. It is formed by the confluence of Opal and Blooms creeks and flows southwest to its confluence with West Waddell Creek. A waterfall at about stream mile 1.5 is believed to be the upstream limit of anadromy (Nelson pers. comm.).

During sampling in 1996, *O. mykiss* was observed in East Waddell Creek in the vicinity of the Big Basin Redwoods State Park sewage treatment plant. The fish were described as resident rainbow trout (DPR 2000).

A 1996 memo concerning habitat deficiencies in coastal streams of San Mateo and Santa Cruz counties addresses East Waddell Creek. The memo indicates habitat impacts by Sempervirens Creek diversions reducing flow in East Waddle Creek, and possibly by sewage treatment plant effluent (DFG 1996c).

A stream inventory was conducted on East Waddell Creek in 1997. In the resulting report DFG staff states, "Suitable size spawning substrate on East Branch Waddell Creek is limited to relatively few reaches" (DFG 1997d). Management recommendations included treating sediment sources and increasing riparian vegetation, particularly in areas of stream bank erosion.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes that steelhead can access about 1.5 miles of East Waddell Creek, downstream from a 30 foot waterfall (DPR 2000). According to the report, "Resident rainbow trout are abundant upstream of the waterfall…" (DPR 2000, p. AQ-26).

Staff from San Jose State University has studied sites in East Waddell Creek as part of long term monitoring of Gazos, Waddell, and Scott creeks. In reporting on monitoring in 2006, Dr. Jerry Smith noted "The most reasonable explanation for the extremely low numbers [of steelhead] on the East Fork and main stem of Waddell Creek in 2006 (and from 1999-2005) is highly toxic chemicals periodically coming down Last Chance Creek" (Smith 2007a, p. 10).

Last Chance

Last Chance Creek consists of about 1.5 stream miles and is tributary to East Waddell Creek. It flows west, entering East Waddell Creek at about stream mile 0.5. A 15-18 foot high waterfall is located less than 0.1 miles upstream from the confluence (Nelson pers. comm.).

In a 2006 report, Dr. Jerry Smith indicated his belief that toxic chemicals were periodically discharged into Last Chance Creek (Smith 2007a). Staff from DFG conducted a "spot check" of Last Chance Creek in spring 2006 and observed multiple *O. mykiss* year classes (Atkinson pers. comm.). Oncoryhnchus mykiss upstream from the falls are considered to be stream reproducing (*i.e.*, resident) (Nelson pers. comm.).

Opal

Opal Creek consists of about 3.8 stream miles. The confluence of Opal and Blooms creeks forms East Waddle Creek.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes that Opal Creek is perennial in its most downstream two miles. The report indicates that natural propagation of resident rainbow trout occurs in the creek (DPR 2000, p. AQ-27).

Blooms

Blooms Creek consists of about three stream miles and is tributary to East Waddell Creek. The confluence of Blooms and Opal creeks forms East Waddle Creek.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes that resident rainbow trout occurs in Blooms Creek "…throughout the portion within BBRSP" (DPR 2000, p. AQ-27).

Sempervirens

Sempervirens Creek consists of about 2.1 stream miles and is tributary to Blooms Creek. It flows south, entering Blooms Creek at about stream mile 0.8. The dam forming Sempervirens Reservoir is located about 1.6 miles upstream from the mouth of the creek. Records indicate that Sempervirens Reservoir was stocked with "steelhead" in 1989 and 1990 (DFG 1995).

A 1996 memo concerning habitat deficiencies in coastal streams of San Mateo and Santa Cruz counties addresses Sempervirens Creek. It notes diversion of Sempervirens flows as adversely affecting salmonid habitat (DFG 1996c).

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes, "[Resident rainbow trout] are normally distributed throughout Sempervirens Creek…" (DPR 2000, p. AQ-26). It adds, "The rainbow trout in Sempervirens Reservoir…most recently colonized the reservoir in 1995 following their escape from rearing pens used to hold steelhead for the Monterey Salmon and Trout Project" (DPR 2000, p. AQ-29).

Union

Union Creek consists of about 1.6 stream miles and is tributary to Sempervirens Creek. It flows southwest, entering Sempervirens Creek at about stream mile 0.6.

A draft inventory of aquatic life in Big Basin Redwoods State Park was prepared in 2000. The report notes, "[Resident rainbow trout] are present in lower and middle reaches of Union Creek (DPR 2000, p. AQ-27).

Scott

Scott Creek consists of about 10.4 stream miles. It flows south from headwaters northeast of Pine Mountain, entering the Pacific Ocean south of the community of Swanton.

Staff from DFG surveyed Scott Creek in 1934 and noted the presence of steelhead. The survey report indicates that the creek was dried in its lower reach due to diversion pumping, and that stocking had occurred.

A 1942 memo reported the presence of an estimated 1,500 to 3,000 juvenile steelhead immediately upstream from the mouth of Scott Creek. The observer notes, "I believe that these fish will form the juvenile upstream migration, or the type that has been observed to a greater or less extent in Waddell Creek each year during the autumn and winter months" (DFG 1942).

Staff from DFG surveyed Scott Creek in 1953 and noted the presence of steelhead and rainbow trout. The survey report states, "The lower parts are nursery and spawning areas for SH and salmon [and] the upper parts are trout waters" (DFG 1953a).

In a 1961 survey, DFG staff called *O. mykiss* "common throughout" Scott Creek (DFG 1961a). The creek was characterized as a "good spawning and nursery stream", while diversion for irrigation was said to dry the most downstream mile to two miles of channel in most years.

A 1987 DFG memo documents the effects of seasonal dams on lower Scott Creek. The memo states, "In Scott Creek, dewatering of the stream below the diversion has eliminated almost 50% of available lagoon habitat for juvenile steelhead trout" (DFG 1987). According to DFG staff, diversion no longer incorporates seasonal dams, and dewatering abated since the time of this memo (Nelson pers. comm.).

Trapping of downstream migrant *O. mykiss* in 1992 revealed "…nearly equal numbers of wild juvenile steelhead and hatchery juvenile steelhead" (DFG 1992a). Records from sampling of numerous Scott Creek sites between the years 1992 and the present indicate the consistent presence of 0+ and 1+ age *O. mykiss* (Smith 1997c; Smith 2004).

A 1995 DFG study used modeling to develop relationships between Scott Creek flows and salmonid habitat availability. The report states, "Optimum coho and steelhead juvenile habitat conditions are provided at 20 cfs, while juvenile habitat availability is rapidly depleted as flow falls below 8 cfs…" (DFG 1995).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of channel modifications associated with the Highway 1 bridge on Scott Creek, as well as siltation effects from local land uses, and other impacts (DFG 1996c).

Monitoring was performed in the Scott Creek lagoon and sampling occurred in six upper Scott Creek watershed sites as part of a masters thesis study in 2003-2004. The study concludes, "Although the Scott Creek estuary comprises less than 5% of the watershed area, it is critical nursery habitat, as estuary-reared juveniles make a disproportionate contribution to the spawning adult pool" (Bond 2006). A 2004 report on sampling in Scott Creek states, "The amount of fine sediment present in late summer appears to have increased…in recent years. Streambed and bank rooting by feral pigs substantially increased on Scott and Waddell creeks from 1999 to 2002, and is probably a major factor in the increase in sediment" (Smith 2004, p. 4).

In reporting on 2006 sampling Dr. Jerry Smith states, "…in years when the sandbar forms and remains in place in summer to provide rearing habitat, yearling and YOY steelhead can rear to large size in the resulting lagoon… However, over the last 2 decades the lagoon provide little summer rearing habitat in the majority of years because of heavy water diversion during dry years…and because of artificial breaching of the sandbar… In addition, the straightened estuary (modified during the construction of the Highway 1 Bridge) at Scott Creek is normally very shallow and mostly fresh water in spring prior to sandbar formation. It provides little opportunity for either feeding or adapting to salt in a brackish environment…" (Smith 2007a).

Steelhead runs in the Scott Creek watershed have typical sizes of 200 to 400 adults in recent years. Spawning occurs in upper Scott, Big and Mill creeks. Resident rainbow trout occur upstream from a natural passage barrier in Scott Creek (Hayes pers. comm.).

Scott tributary 1 (Quesaria)

An unnamed tributary of Scott Creek enters from the east at about stream mile 0.4. The tributary consists of about 1.2 stream miles. The lower creek channel has been re-aligned recently as part of a stream restoration effort.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use a portion of the unnamed Scott Creek tributary (County of Santa Cruz 2004). Researchers have observed resident rainbow trout in Quesaria Creek, and speculate that steelhead spawning occurs "occasionally" (Hayes pers. comm.).

Little

Little Creek consists of about 2.9 stream miles and is tributary to Scott Creek. It flows west, entering Scott Creek at approximately stream mile 1.9.

Staff from DFG surveyed Little Creek in 1934 and noted the presence of steelhead. The survey report indicated that stocking had occurred and deemed the extent of natural propagation to be "very little" (DFG 1934a).

Steelhead were found in 1960 to be "fairly numerous" between the mouth and the Scott Creek Road bridge, and present at lower density upstream. Staff from DFG speculated that at least some of the *O. mykiss* in the area near the confluence of the headwater forks were resident rainbow trout. The survey report cited "extreme misuse" of Little Creek by past logging practices (DFG 1960b).

In 1992, DFG found *O. mykiss* "throughout the surveyed area". The survey report noted impacts to the stream from logging, cattle ranching, and water diversions (DFG 1992b). A 1993 DFG report states, "Little Creek provides approximately 2 miles of spawning and rearing habitat for steelhead" (DFG 1993a).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use the portion of Little Creek downstream from the confluence of the headwater forks (County of Santa Cruz 2004).

Long-term sampling in lower Little Creek suggests that steelhead spawning occurs "almost every year" (Hayes pers. comm.). Also, resident rainbow trout occur in Little Creek upstream from a natural migration barrier.

Big

Big Creek consists of about 7.5 stream miles draining a watershed of about eight square miles. It flows southwest, entering Scott Creek at about stream mile 2.2. In 1960, DFG noted a 50 foot natural falls about 2.5 miles upstream of the mouth. The Monterey Bay Salmon and Trout Project operates a hatchery on Big Creek to supplement natural production.

In 1958, DFG characterized the 2.5 mile reach of Big Creek upstream from the Scott Creek confluence as a "fair spawning and nursery tributary" (DFG 1958a). The stream survey report also noted the contribution to the Scott Creek fishery from Big Creek's "permanent water flow". Staff from DFG noted under-utilization of Big Creek by steelhead in 1960, and cited "excessive erosion" and "possible silting of redds" as limiting the fishery (DFG 1960c).

A 1996 DFG review of coastal streams noted several problems in Big Creek including reduced flows from water diversions in the headwaters tributaries and the mainstem, and regular removal of woody debris (DFG 1996c).

Big Creek has been sampled regularly as part of an examination of steelhead and coho salmon resources of Gazos, Waddell and Scott creeks, and multiple *O. mykiss* year classes are regularly observed. Reporting on sampling in 2006 states, "As in several recent years densities [of steelhead] were particularly low…in Big Creek… This is apparently due to storm flows and sandy substrate that results in poor redd survival…" (Smith 2007a, p. 8).

Sampling in Big Creek suggests that steelhead spawning occurs "on an annual basis" (Hayes pers. comm.). Also, resident rainbow trout occur in Big Creek upstream from a natural migration barrier.

Boyer

Boyer Creek consists of about 2.9 stream miles and is tributary to Big Creek. It flows south, entering Big Creek at about stream mile 2.5. A dam on Boyer Creek forms Boyer Lake. In a 1953 field note, DFG cited an impassable barrier falls about 0.25 miles downstream from the reservoir (DFG 1953b).

Stocking of Boyer Lake has occurred historically, possibly beginning in 1930 (DFG 1939). In 1934, DFG staff stated, "…some of the large fish out of the lake run up to the creek to spawn, but very few" (DFG 1934b).

Mill

Mill Creek consists of about 5.2 stream miles and is tributary to Scott Creek. It flows southwest, entering Scott Creek about 1.2 miles upstream from the Big Creek confluence. Mill Creek Reservoir is located about 3.5 miles upstream from the Scott Creek confluence. Water is used for power generation by delivery to Big Creek in a flume. A 1960 survey noted, "The major barriers to steelhead migration are found in a falls area 2.6 mi. upstream from the mouth" (DFG 1960d).

Mill Creek was stocked in 1932 and in subsequent years (DFG 1932). In a DFG memo from the 1950s, the use of Mill Creek upstream of the reservoir for spawning is noted (DFG 1953c).

In a 1960 stream survey, DFG noted "a surprising number of fish for such a small stream" and found Mill Creek to be "an exceptional steelhead stream" (DFG 1960d). The survey report called Mill Creek one of three Scott Creek tributaries containing a "substantial steelhead population."

Staff from DFG examined the downstream 2.4 miles of Mill Creek in 1993 and found *O. mykiss* to be "abundant throughout the surveyed reach" (DFG 1993a). The survey report recommended protecting summer base flows from future water diversion and improving reservoir releases for instream habitat purposes. A 1996 DFG review of coastal stream habitat noted several problems in Mill Creek including reduced flows from water diversions in the headwaters and regular removal of woody debris (DFG 1996c).

Faculty from San Jose State University has studied steelhead in Mill Creek as part of a long-term examination of Gazos, Scott, and Waddell creeks watersheds. Steelhead density varied from about 42 individuals per 100 feet to about 63 individuals per 100 feet between 2001 and 2004 (Smith 2004).

Sampling in Mill Creek suggests that steelhead spawning occurs in virtually all years (Hayes pers. comm.). Also, resident rainbow trout also occur in Mill Creek upstream from a natural migration barrier.

Scott tributary 2 (Bettencourt Gulch)

Bettencourt Gulch Creek consists of about 1.6 stream miles and is tributary to Scott Creek. It flows southwest, entering Scott Creek at about stream mile 5.2.

According to staff from DFG, Bettencourt Gulch Creek "is used for spawning and minor rearing" (Nelson pers. comm.). A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use a portion of Bettencourt Gulch Creek (County of Santa Cruz 2004).

Molino

Molino Creek consists of about 3.7 stream miles. It flows southwest, entering the Pacific Ocean north of El Jarro Point. On-stream ponds occur in the lower portion of the stream.

As part of preparing a resource protection plan, Molino Creek was surveyed in spring 2001, and YOY and/or yearling *O. mykiss* were observed (ESA 2001). A long-term resource protection and access plan indicates that the stream provides "limited habitat

for anadromous salmonids" and suggests that "…the area does not appear to produce sufficient storm runoff to maintain optimal water depths throughout the spring, even with the upstream on-channel reservoir being operated as a flow-through system" (TPL 2004, p. III-10).

Unnamed coastal stream (Ferrari)

Ferrari Creek consists of about 2.5 stream miles. It flows southwest, entering the Pacific Ocean at the town of Davenport Landing. In 2008, DFG staff noted that in the most downstream 700 feet of the stream, it is channelized and flows through an abalone hatchery building (Nelson pers. comm.).

According to a 2001 memo by Coast Dairies, Ferrari Creek is an intermittent stream and is diverted for irrigation purposes. As part of preparing a resource protection plan, Ferrari Creek was surveyed in spring 2001, and YOY and/or yearling *O. mykiss* were observed (ESA 2001). The resulting report states, "…Ferrari Creek appears to provide adequate habitat for a small salmonid population. Clearly the primary limiting factor on this creek is the presence of…migration barriers…" (ESA 2001, p. 3.3-15).

San Vicente

San Vicente Creek consists of about 9.2 stream miles and drains a watershed of about 11 square miles. It flows southwest, entering the Pacific Ocean at the town of Davenport.

In 1934, DFG staff surveyed San Vicente Creek and noted both the presence of steelhead and past steelhead stocking. Natural propagation was said to be "good in normal years". The survey report states, "San Vicente was at one time the best fishing stream along the coast, and is a good fishing stream now yet only there is so much water taken out now that it is dry at mouth during the late summer" (DFG 1934c).

A 1953 survey report noted the presence of steelhead and rainbow trout in San Vicente Creek. The report states, "The upper portion of this creek is a beautiful trout creek…" (DFG 1953d).

As part of a larger study of Santa Cruz County streams, consultants sampled San Vicente Creek in 1981. The resulting report indicated that *O. mykiss* was observed at seven sites and found lack of cover to be a primary limiting factor to production (HSA 1982).

A 1991 DFG letter describes effects of quarrying operations on the natural resources of San Vicente Creek. The letter notes lack of progress "…in rectifying the impacts resulting from past and current operations which have primarily occurred to the aquatic habitats associated with the quarrying sites, as a result of excessive sedimentation and summertime water diversions" (DFG 1991, p. 2). A consultant's report from 1991 concludes, "San Vicente Creek is one of the most productive anadromous creek habitats in the greater Santa Cruz/San Mateo County area" (McGinnis 1991, p. 16).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of water diversions, improper grading, and an impassable barrier consisting of a tunnel on San Vicente Creek (DFG 1996c). A 1996 biological inventory report recommended mapping and treating erosion sources and assuring adequate bypass flows (DFG 1996d). Sampling by DFG staff in 1998 found multiple year classes, including YOY and individuals to about 14 inches in length (Nelson 1998).

A 2001 resource protection plan states, "San Vicente Creek…supports a healthy steelhead run…" (Elliot 2002). The plan also notes, "…a disproportionate volume of the stream's sediment load is entering the system from the [Coast Dairies] property…" (Elliot 2002). According to the Central Coast Regional Water Quality Control Board (CCRWQCB), water quality in the creek is impaired by sedimentation from silviculture (CCRWQCB 2006). Staff from NMFS sampled San Vicente Creek in 2006 and observed multiple *O. mykiss* year classes (Spence pers. comm.).

Mill

Mill Creek consists of about 2.9 stream miles and is tributary to San Vicente Creek. It flows southwest, entering San Vicente Creek at about stream mile 2.8. A dam located at about stream mile 0.7 constitutes a total migration barrier.

In the report from a 1960 survey of the lower portion of Mill Creek staff from DFG noted, "…it is surprising to find such large amounts of juvenile steelhead trout" (DFG 1960e). The report did not recommend removal of the dam at stream mile 0.7 as it was "…doubtful although not improbable that [the upstream reach] would be of much value for steelhead trout" (DFG 1960e).

As part of a larger study of Santa Cruz County streams, consultants sampled Mill Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two sites and found low flow and lack of cover to be primary limiting factors to production (HSA 1982). Reporting on sampling in 1990 notes, "Pools which provide summer rearing habitat for yearling fish are the limiting factor to steelhead production in San Vicente and Mill Creeks" (Engineering-Science Inc. 1991, p. 3-110).

A 1991 DFG letter describes effects of quarrying operations on the natural resources of Mill Creek. The letter notes lack of progress "…in rectifying the impacts resulting from past and current operations which have primarily occurred to the aquatic habitats associated with the quarrying sites, as a result of excessive sedimentation and summertime water diversions" (DFG 1991, p. 2). In a 1996 inventory of Mill Creek DFG staff collected multiple *O. mykiss* year classes, including YOY and individuals to [258 convert] in length. The resulting report recommended improving woody debris for cover and developing an erosion control strategy for the creek (Fisher and Renger 1996).

Liddell

Liddell Creek consists of about 3.2 stream miles. It flows southwest, entering the Pacific Ocean southeast of the town of Davenport.

Staff from DFG surveyed Liddell Creek in 1934 and noted the presence of steelhead as well as past stocking. The survey report calls the creek "small" and indicates that "very little" natural propagation occurs. However, it cites use of the creek by spawning steelhead on heavy flows (DFG 1934d).

As part of a larger study of Santa Cruz County streams, consultants sampled Liddell Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site and found low flow and lack of cover to be primary limiting factors to production (HSA 1982).

According to a 1990 paper by San Jose State University faculty, minimal "suitable" spawning substrate exists in Liddell Creek. The paper states, "Rearing habitat is more likely to be limited, and can usually be saturated by a relatively few successful spawners" (Smith 1990, p. 2).

A 1991 DFG letter describes effects of quarrying operations on the natural resources of Liddell Creek. The letter notes lack of progress "…in rectifying the impacts resulting from past and current operations which have primarily occurred to the aquatic habitats associated with the quarrying sites, as a result of excessive sedimentation and summertime water diversions" (DFG 1991, p. 2).

A 2001 resource protection plan included a survey of Liddell Creek. The plan noted, "All three branches of Liddell Creek support steelhead trout" (Elliot 2002). The plan indicates that land use in the watershed "has greatly accelerated erosion" and cites the fishery impact of the City of Santa Cruz's Liddell Spring water diversion.

According to DFG staff, the barrier beach at the mouth of Liddell Creek may limit steelhead access into the watershed regularly (Nelson pers. comm.).

West Liddell

West Liddell Creek consists of about 2.7 stream miles and is tributary to Liddell Creek. It flows southwest, entering Liddell Creek at about stream mile 0.3.

In 1960, DFG staff estimated the juvenile *O. mykiss* population in West Liddell Creek to be about 2,000 to 3,000 individuals. The survey report deems the creek "one of the least productive" of the coastal streams in the area (DFG 1960f). The report also noted that the creek was "extensively damaged by logging activity" (DFG 1960f).

As part of a larger study of Santa Cruz County streams, consultants sampled West Liddell Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one of two sites and found low flow to be a primary limiting factor to production (HSA 1982).

In a 1992 letter, DFG staff cited quarrying activities as the cause of sedimentation and water quality degradation in West Liddell Creek. The letter states, "…due to the conveyor beltline and maintenance road, the upper reaches of the west branch of Liddell Creek are no longer reachable by steelhead" (DFG 1992c, p. 2).

A 2001 resource protection plan noted sedimentation of West Liddell Creek due to quarrying operations. The report states, "… options for improving sediment containment should be a high priority for this watershed. Another significant limiting factor appears to be the unlimited water rights the City of Santa Cruz holds…" (ESA 2001, p. 3.3-21). Staff from DFG walked West Liddell Creek in 2005 and observed *O. mykiss* in "low numbers" in the lower watershed (Nelson pers. comm.).

East Branch Liddell

East Branch Liddell Creek consists of about 1.7 stream miles and is tributary to Liddell Creek. It flows southwest, entering Liddell Creek at about stream mile 1.3.

Staff from DFG surveyed East Branch Liddell Creek in 1934 and noted the presence of steelhead as well as past stocking. The survey report calls the creek "small" and indicates that "very little" natural propagation occurs (DFG 1934d).

During a 1960 survey DFG staff noted multiple *O. mykiss* year classes in low abundance. The survey report states, "It is the opinion of this writer that this stream has a population of juvenile steelhead trout far below its potential. The main factor involved

in reducing the steelhead population in the stream is believed to be extensive siltation which has occurred in the stream" (DFG 1960g).

As part of a larger study of Santa Cruz County streams, consultants sampled East Branch Liddell Creek in 1981. The resulting report indicated that *O. mykiss* was observed at five sites and found lack of cover and low flow to be primary limiting factors to production (HSA 1982).

In a 1991 letter, DFG staff noted the effect of water diversions on East Branch Liddell Creek. The letter states, "The resulting effect of these two diversions has been the drastic reduction of crucial summertime and fall streamflows into this stream system. The effect to fisheries has been reduction in rearing habitat for steelhead" (DFG 1991, p. 3).

As part of preparing a resource protection plan, East Branch Liddell Creek was surveyed in spring 2001 and "a few yearling salmonids" were observed. The plan notes large amounts of fine sediment in the creek resulting from poor management of sedimentation ponds (ESA 2001).

Yellow Bank

Yellow Bank Creek is a coastal stream consisting of about 2.7 stream miles. It flows southwest from headwaters on Bald Mountain. It may have been known previously as Respini Creek. Yellow Bank Creek has two on-channel reservoirs. The creek also passes through tunnels associated with the railroad track and Highway 1 crossing. The reservoirs and tunnels are believed to present impassable barriers.

In a 1954 DFG fish bulletin, Respini Creek was deemed a "small stream". It was noted to have a smaller steelhead run than Waddell and Scott creeks (DFG 1954a).

According to a habitat description, "Upstream of the second reservoir (Yellow Bank Dam), the creek is an undisturbed, natural stream that provides both spawning and rearing habitat for salmonids. Salmonids, presumably landlocked steelhead, were actually seen in this part of the stream" (Elliot 2002). A resource protection plan notes, "A road failure…is contributing significant amounts of fine sediments to the stream" (ESA 2001, p. 3.3-21). Other failures were observed in various reaches of the creek.

Laguna

Laguna Creek consists of about 8.5 stream miles. It flows southwest, entering the Pacific Ocean north of San Hill Bluff. In 1948, DFG staff said that a series of falls about two miles upstream from the mouth were total migration barriers (DFG 1948).

Staff from DFG surveyed Laguna Creek in 1934 and noted the presence of steelhead and past stocking (DFG 1934e). During a 1948 survey, staff observed YOY and individuals to 12 inches in length (DFG 1948).

In 1960 reports, DFG staff refers to Laguna Creek as a "good steelhead stream" that "supports a small run of steelhead rainbow trout" (DFG 1960h); (DFG 1960i). The stream survey report cited "very poor" spawning habitat below the falls as being the major limiting factor in the system. However, "a fair size [resident] rainbow trout population" was observed upstream of the falls in "pools in the upper sections of the stream" (DFG 1960i).

As part of a larger study of Santa Cruz County streams, consultants sampled Laguna Creek in 1981. The resulting report indicated that *O. mykiss* was observed at five sites and found diversion related low flow to be a primary limiting factor to production (HSA 1982). In a 1985 DFG survey report, staff concluded that "the presence of YOY upstream, and the lack of [adult] resident fish" indicated that steelhead could in-migrate past the falls (DFG 1985).

A 2001 resource protection plan involved surveying Laguna Creek. The plan notes that the creek supports steelhead, "…though Laguna Creek has severely impaired summer flow from numerous water diversions upstream of the [Coast Dairies] Property boundary" (Elliot 2002). The plan adds, "The City [of Santa Cruz] diverts close to 100 percent of the headwater flows from Laguana Creek…" (Elliot 2002). Yearling *O. mykiss* was observed during the survey.

In a memo regarding lagoon management a researcher noted, "Laguna Creek suffers from a lack of water in summer, drying the lagoon… Transition habitat in spring now depends upon the sandbar partially forming and trapping saltwater during spring tides…. Artificial breaching must be prevented" (Smith 2007b). A related memo from DFG staff states, "The limiting factor at Laguna Creek lagoon is lack of water due to upstream diversions. Diverting less water upstream would provide habitat… In addition, keeping the sandbar in place would increase lagoon water volumes as well as improve water quality" (DFG 2006).

Laguna tributary (Y)

Y Creek consists of about 1.6 stream miles and is tributary to Laguna Creek. It flows south, entering Laguna Creek at about stream mile 1.5.

Y Creek was surveyed as part of preparing a resource protection plan in spring 2001, when YOY and yearling salmonids were observed. The plan noted cattle in the channel and states, "Largely uncontrolled cattle grazing occurs on both sides of the creek" (ESA 2001, p. 3.3-23).

Majors

Majors Creek consists of about 5.9 stream miles. It flows southwest, entering the Pacific Ocean northwest of Table Rock. In a 1960 report, DFG noted a "high waterfall" less than 0.5 miles from the ocean that precluded steelhead in-migration. The City of Santa Cruz's dam at about stream mile 2.0 was cited as another passage barrier (DFG 1960h).

Majors Creek was stocked in 1938 and in subsequent years (DFG 1938a); (DFG 1945a). In 1960, staff from DFG characterized Majors Creek as "not a good steelhead stream" due to the impassable barrier, but noted "populations of [resident] native trout" upstream of the falls (DFG 1960h). Productivity downstream of the dam was described as "quite low" resulting from "heavy siltation due to extensive logging damage" and from, most importantly, "low summer flows" (DFG 1960h). Erosion control and dam releases were recommended to improve habitat. According to the 1960 stream survey report, "High productivity…is characteristic of the stream above the dam" (DFG 1960h).

As part of a larger study of Santa Cruz County streams, consultants sampled Majors Creek in 1981. The resulting report indicated that *O. mykiss* was observed at five of six sites and found diversion related low flow and lack of cover to be primary limiting factors to production (HSA 1982).

According to DFG staff, anadromous *O. mykiss* utilizes the reach downstream from the falls while the upstream area of Majors Creek "supports a viable population of landlocked rainbow trout" (DFG 1988a). Information gathered from an area resident as

part of a 1988 stream survey suggested that "steelhead trout once returned in large numbers to Majors Creek" (DFG 1988a). The survey report noted the importance of "a respite from sediment producing activities" to allow for improved spawning habitat.

Staff from DFG surveyed the east branch of Majors Creek in 1996 and observed resident rainbow trout "in spite of poor habitat" (DFG 1996e). High levels of sedimentation were noted, resulting in part from poor road crossing construction. Staff from DFG walked Majors Creek in 2000 and observed resident *O. mykiss* upstream from a waterfall located about one quarter mile upstream from Highway 1. *Oncorhynchus mykiss* was noted downstream from Highway 1 in low densities. Sedimentation and low flows in the creek continue to limit steelhead production (Nelson pers. comm.).

Majors Creek was surveyed in 2001, when multiple *O. mykiss* year classes including "abundant" YOY were observed. The resulting report states, "…the stream becomes quite steep and potentially impassible a short distance upstream of Highway 1" (DPR 2001, p. 35).

Baldwin

Baldwin Creek consists of about 4.2 stream miles and drains a watershed of approximately 2.5 square miles. It flows southwest, entering the Pacific Ocean southeast of Table Rock.

In 1960, DFG said that Baldwin Creek "is a steelhead and [resident] native trout stream and the fish populations exceed that of both Laguna Creek and Majors Creek" (DFG 1960j). Staff cited the lack of diversions on the stream and resulting permanent flow as creating an "extremely productive" system. The steelhead run size was estimated to average about 50 individuals.

As part of a larger study of Santa Cruz County streams, consultants sampled Baldwin Creek in 1981. The resulting report indicated that *O. mykiss* was observed at four of five sites and found low flow and substrate [jerry smith for translation] to be primary limiting factors to production (HSA 1982).

Baldwin Creek was surveyed in 2001, when multiple *O. mykiss* year classes including YOY were observed. The resulting report states, "Steelhead passage is likely impaired, if not severely constrained, due to the hydrologic modifications at the lowest end of Baldwin Creek… two large impoundments are located just upstream from the beach…" (DPR 2001, p. 31). A 2002 survey report states, "The diversion of Baldwin Creek into Rancho Gordola Impoundment #1, apparently an exercise of riparian water rights, probably results in downstream-migrating steelhead smolts being subject to intense predation by largemouth bass in the lentic environment" (DPR 2002).

Wilder (Medor)

Wilder Creek consists of about 2.5 stream miles and flows south, entering the Pacific Ocean west of Terrace Point. According to a 2001 report, the upstream limit of anadromy is located about 0.4 miles downstream from Cave Gulch (DPR 2001).

In 1960, DFG characterized Wilder Creek as "one of a series of small steelhead streams". The stream survey report noted "many juvenile steelhead" and "a surprisingly large steelhead population" (DFG 1960k). Staff noted some habitat damage "due to the running of cattle…and due to logging activity".

A report prepared after a 1993 stream survey noted that in the reach open to steelhead, "spawning and rearing conditions were poor because of the tremendous amount of sand and silt deposited in the area." (DFG 1993b, p. 5). Two *O. mykiss* year classes

were observed, and the report recommended removal of the Wilder Creek barriers and acquisition of water rights to allow for "perennial water".

Habitat assessment and sampling were performed on Wilder Creek in 2001. Multiple *O. mykiss* year classes were observed throughout the creek, with relatively high densities occurring in two upstream reaches. A population estimate of over 4,000 individuals per mile was noted for the reach having the highest *O. mykiss* density. The resulting report states, "Steelhead have access to approximately two miles of stream habitat in Wilder Creek" (DPR 2001, p. 25).

Peasley Gulch

Peasley Gulch Creek consists of about 2.8 stream miles and is tributary to Wilder Creek. It flows south, entering Wilder Creek at about stream mile 1.1.

Peasley Gulch Creek was visually surveyed in 2001 and multiple *O. mykiss* year classes were observed including "very abundant" fry. The resulting report states, "…it is very possible that steelhead have accessed Peasley Gulch during the last season. At a minimum there appears to be good production from resident trout" (DPR 2001, p. 27).

San Lorenzo River

The San Lorenzo River consists of about 29 stream miles as well as numerous tributaries as described below. The watershed comprises about 138 square miles. The river flows southeast from headwaters on Castle Rock Ridge, entering the Pacific Ocean at the City of Santa Cruz. The upstream limit of anadromy is an area of steep gradient within Castle Rock State Park (DPR 1996).

There are 12 main tributaries in the San Lorenzo River system, and the most important fisheries resources in the watershed likely are contained in Branciforte (including Carbonera), Zayante (including Bean), Fall, Boulder, and Bear creeks. Also, the river's lagoon provides important rearing habitat for juvenile steelhead, particularly during dry years when upstream nursery areas may be dewatered.

Diversion facilities at Tait Street include instream intakes and streamside wells than can substitute for the intakes. According to a 2001 enhancement plan, "Flow reductions at Tait Street can be significant, especially during summer months. Although the City is not required to bypass flow, it currently adjusts pumping rates to maintain a minimum flow downstream" (Alley 2004a, p. ES-11).

The Felton Diversion Dam is located about 0.5 miles downstream from the Zayante Creek confluence. The operator and DFG have developed operating procedures to improve passage efficiency at the associated fishway (Alley 2004a). About 26 anthropogenic fish passage barriers (including defunct seasonal dams and culverts) are located on the mainstem San Lorenzo River that can impede, and in some cases prohibit, adult steelhead migration (Nelson pers. comm.).

The San Lorenzo River was stocked in 1938 and in subsequent years (DFG ca 1939). In 1945, DFG staff estimated that mainstem San Lorenzo River contained 21 miles of steelhead spawning habitat (McDermott and Shapovalov 1945).

A 1954 DFG memo states, "The San Lorenzo River is the best winter steelhead stream in existence south of San Francisco Bay" (DFG 1954b). The memo notes impacts to the population from angling and closure of the "lower third" to protect nursery areas.

The 1965 Fish and Wildlife Plan for California states, "There are…239 miles of steelhead habitat in the San Lorenzo drainage" (DFG 1965a). At that time, the annual steelhead run was estimated to consist of 19,000 individuals. The plan adds, "The chief limiting factor is siltation of spawning beds. Maximum runs could be achieved only by stringent erosion control" (DFG 1965a). A 1967 report concerning Love Creek stated that the "San Lorenzo River is considered virtually 'lost' to spawning fish below the mouth of Boulder Creek because of heavy siltation and cementation of spawning gravel" (DFG 1967a).

Staff from DFG surveyed the upper San Lorenzo River and several tributaries in 1974. The survey report states, "The deleterious effects of siltation are rapidly degrading the habitat and discouraging fish production throughout the SLR and its tributaries. The causes include faulty logging and sand plant operations and road maintenance within the drainage" (DFG 1974a).

Staff from DFG counted steelhead spawners at the Felton Diversion Dam in 1977. The seasonal total was 1,614 individuals (DFG 1979a). The 1978-1979 steelhead run was estimated by DFG to be 625 individuals (Sullivan 1988). A 1982 draft report by the State Water Resources Control Board noted an estimated steelhead run of about 750 individuals (SWRCB 1982). The estimating method and information sources were not provided in the report.

Regular stocking has occurred since at least the 1950s, making wild steelhead run estimates problematic. Before 1982, planted steelhead were largely from Mad River hatchery stock while "native" stock from Scott Creek and the Carmel River were introduced later. The Monterey Bay Salmon and Trout Project estimated that about half of the 3,000 adults returning to the San Lorenzo River in 1987-1988 "were wild fish and the other half hatchery fish" (Sullivan 1988).

Staff from DFG and Santa Cruz County prepared a study of fishery habitat in San Lorenzo River in 1979. The study described the effect of water diversion on summer nursery habitat and recommended increasing bypass flow at the Felton Diversion Dam to 40-50 cfs (DFG 1979b).

According to Dr. Jerry Smith, "smolt production within the [San Lorenzo River] watershed appears to fluctuate with year-to-year streamflow conditions" (Smith 1994, p. 8). He noted generally similar habitat conditions in the watershed between 1981 and 1994, when he surveyed the river and its tributaries (Smith 1994). Dr. Smith also stated that channelization and artificial breaching have led to "poor summer rearing habitat" in the lagoon (Smith 1994).

According to an enhancement plan, data from monitoring between 1994 and 2001 "…suggest fairly stable steelhead populations between 1981 and [2001] with year-to-year variations dependent upon sedimentation, streamflow, and habitat conditions…" (Alley 2004a, p. ES-1). The report noted smaller population estimates for "key reaches such as the Middle River" toward the latter part of the study period that were attributed to habitat loss by sedimentation from tributary streams. The plan noted two "functional regimes" in the San Lorenzo River system, the first being the lower and middle mainstem downstream from the Boulder Creek confluence and the second comprising the upper mainstem and tributaries. According to the report, "…results suggest that smolts leaving the system (out-migrating to the ocean) each year are mostly a combination of large YOY's from the middle and lower river and yearlings from the tributaries and upper mainstem River" (Alley 2004a, p. ES-3).

Staff from DPR sampled the San Lorenzo River within Castle Rock State Park in 1996. Multiple *O. mykiss* year classes were observed upstream and downstream from the natural passage barrier, and were said to comprise resident and a likely anadromous populations (DPR 1996).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff noted that water diversions reduce flows sufficiently to impact the San Lorenzo system, particularly during summer when low flow occurs naturally (DFG 1996c). The memo cited the reduction of flow reaching the San Lorenzo River lagoon due to operations of Loch Lomond Reservoir.

The 2001 San Lorenzo River enhancement plan contained recommendations for timing and quantity of minimum bypass flows for the Felton Diversion between January 1 and April 1. It also recommended allowing sufficient bypass to maintain hydraulic continuity to the estuary and an open sandbar to the ocean between April 1 and June 1 (Alley 2004a).

Mainstem San Lorenzo River was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report indicates that "prime spawning habitat" exists in the middle and upper watershed (Allen 2003). Staff from NMFS surveyed seven San Lorenzo River locations in 2006 and observed "low numbers" of fish representing multiple *O. mykiss* year classes (Spence pers. comm.). Juvenile steelhead densities were estimated for five sites in the mainstem San Lorenzo River during 2006. The resulting report notes that "especially low" juvenile densities were observed, particularly in the lower mainstem (Alley 2007).

According to the CCRWQCB, water quality in the creek is impaired by sedimentation from specialty crop production, silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006). In a memo regarding lagoon management a researcher noted, "[The San Lorenzo River lagoon] is open due to breaching in summer so calm habitats are reduced. Steelhead would benefit from keeping [the] sand bar closed in summer and providing sufficient inflows to convert most of the system to freshwater" (Smith 2007b).

Branciforte

Branciforte Creek consists of about 9.9 stream miles and is tributary to the San Lorenzo River. It flows southwest, entering the San Lorenzo within the City of Santa Cruz. In a 1980 barrier review, DFG staff noted two dams upstream from the Crystal Creek confluence with non-functioning fishways (DFG 1980b). A 2001 enhancement plan indicates that these fishways require maintenance to allow passage (Alley 2004a).

In a 1956 stream survey report, DFG called Branciforte Creek "a very poor steelhead and spawning stream" (DFG 1956a). Another 1956 report cited "the lack of suitable spawning areas" as justification for leaving passage barriers in place (DFG 1956b).

The report from a 1974 survey noted "rainbow trout and steelhead rainbow trout present, but very scarce" in the creek (DFG 1974b). Staff from DFG found adequate summer flows but foresaw limitation of the fishery by sedimentation of spawning areas. Based on observations in August 1980, DFG again found *O. mykiss* present, "though not in any great numbers" (DFG 1980b).

A stream inventory was conducted on Branciforte Creek in 1996 and *O. mykiss* representing sizes from about two to six inches was sampled in four of the five sampling locations. The inventory report recommends treating sediment sources, allowing natural recruitment of woody debris, removing defunct dams, and modifying the culvert at stream mile 10.2 for improved passage (DFG 1996f). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of flood control projects, logging, flashboard dams, and water diversions on Branciforte Creek (DFG 1996c).

An enhancement plan noted "fairly stable" *O. mykiss* numbers from 1998 to 2000 and deemed Branciforte Creek one of seven "important producers of YOY's and yearlings" (Alley 2004a). The creek also was included in a list of six priority tributaries for

focusing sediment reduction efforts (Alley 2004a). A 2002 survey recommended maintenance in the channelized portion of the creek to allow for passage to upstream spawning and rearing habitat in Branciforte Creek and its tributaries (DFG 2002b).

In a 2002 stream survey report DFG staff states, "…it is essential that the channel be maintained for optimal adult and juvenile salmonid passage. In addition to the 10.5 miles of salmonid spawning and rearing habitat in Branciforte Creek above the concrete channel, an additional 8 miles are available in the three major tributaries to Branciforte Creek" (DFG 2002b). Branciforte Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. Juvenile *O. mykiss* density was estimated to be approximately 50 fish per 100 feet in the creek, while the range for sampling sites in the watershed was about 3 to 140 fish per 100 feet (Allen 2003). Two Branciforte Creek sites were assessed for habitat conditions in 2006 as part of a larger study of several Santa Cruz watersheds. The resulting report notes "general habitat degradation" in Branciforte Creek and states, "Percent fines, embeddedness and escape cover all worsened" in relation to conditions in 2000 and 2005 (Alley 2007, p. 58). According to the CCRWQCB, water quality in the creek is impaired by sedimentation from silviculture, road construction, and nonpoint sources (CCRWQCB 2006).

Carbonera

Carbonera Creek consists of about 9.9 stream miles and is tributary to Branciforte Creek. It flows south, entering Branciforte Creek at about stream mile 1.2. In 1956, DFG described a "forty-foot natural rock falls at [stream mile 3.5 that] forms the upstream limit for salmon and steelhead" (DFG 1956c). A 2001 enhancement plan refers to this feature as Moose Lodge Falls.

The stream survey report from 1956 calls Carbonera Creek "an important spawning tributary [to the San Lorenzo River]" while noting that "approximately 1/2 mile of spawning area has been destroyed by logging operations" resulting in siltation and debris loading (DFG 1956c). The surveyor found *O. mykiss* fingerlings to be "quite common throughout" the creek.

In a 1966 survey report, DFG states that Carbonera Creek "has some of the best spawning areas in the county" for steelhead and resident trout (DFG 1966a). By 1974, DFG said that most Carbonera Creek spawning areas were degraded by silt derived largely from logging operations (DFG 1974c). Based on observations in August 1980, DFG found *O. mykiss* present throughout Carbonera Creek, "though in small numbers" (DFG 1980b).

As part of a larger study of Santa Cruz County streams, consultants sampled Carbonera Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of three sites. The report notes "poor" rearing habitat, with substrate, lack of cover, and low flows presenting primary limiting factors to production (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note the impact of groundwater pumping, encroachment, and runoff on Carbonera Creek (DFG 1996c). A 1996 survey report recommended allowing recruitment of woody debris and controlling sediment sources into the creek (DFG 1996a).

An enhancement plan deemed Carbonera Creek one of seven "important producers of YOY's and yearlings" (Alley 2004a). According to the plan, the creek is one of three particularly important sources of summer baseflow for the San Lorenzo River (Alley 2004a). It also is said to produce high sediment loads related to urbanization.

Carbonera Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report notes that "consistently low [*O. mykiss*] densities since 2000" were observed in lower Carbonera Creek (Allen 2003).

Branciforte tributary (Glen Canyon)

Glen Canyon Creek consists of about 3.1 stream miles and is tributary to Branciforte Creek. It flows south, entering Branciforte Creek about one mile upstream from the Carbonera Creek confluence.

In 1956, DFG staff noted "scarce" rainbow trout fingerlings in Glen Canyon Creek. Spawning areas were deemed to be "too poor" to justify barrier modifications in the lower creek section (DFG 1956b).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that the portion of Glen Canyon Creek downstream from the Redwood Creek confluence is used by steelhead (County of Santa Cruz 2004).

Glen Canyon tributary (Redwood)

Redwood Creek consists of about 2.2 stream miles and is tributary to Glen Canyon Creek. It flows south, entering Glen Canyon Creek at about stream mile 0.9.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that a portion of Redwood Creek downstream from a passage barrier is used by steelhead (County of Santa Cruz 2004). Staff from NMFS surveyed Redwood Creek in 2006 and observed YOY and age 1+ *O. mykiss* in "low numbers" (Spence pers. comm.).

Granite

Granite Creek consists of about 2.6 stream miles and is tributary to Branciforte Creek. It flows south, entering Branciforte Creek approximately 1.8 miles upstream from the Glen Canyon Creek confluence.

In a 1956 stream survey report for Branciforte Creek, DFG said that Granite Creek supported "a good population of steelhead" (DFG 1956a). Another 1956 report states, "RT fingerling are quite common in this creek" (DFG 1956b). In a 1957 DFG "Basic Survey", Granite Creek was deemed an "important spawning and nursery area" (DFG 1957a).

Granite Creek was surveyed in 1996, when electrofishing was conducted at three sites. Two sites produced *O. mykiss* between about 2.4 and 7.5 inches in length. The survey report recommended allows recruitment of woody debris and reducing sediment inputs to the creek (CCC 1996).

Crystal

Crystal Creek consists of about 1.7 stream miles and is tributary to Branciforte Creek. It flows southwest, entering Branciforte Creek about 0.9 miles upstream from the Granite Creek confluence.

In a 1956 report, this creek is said to be unnamed and is referred to as "Happy Valley Road Tributary." The report noted that Crystal Creek was dry 1.5 miles upstream from the mouth and the rainbow trout fingerlings were "common in the lower section" (DFG 1956b).

Crystal Creek was surveyed in 1996 and multiple *O. mykiss* year classes, including YOY and individuals to about 12 inches in length were observed (DFG 1996g). The survey report noted a relatively small amount of cover in the creek and recommended controlling sediment inputs.

Tie Gulch

Tie Gulch Creek consists of less than one stream mile and is tributary to Branciforte Creek. It flows south, entering Branciforte Creek near Branciforte Drive about 0.4 miles southwest of the Vine Hill and Mountain View roads intersection.

In 2002, DFG staff examined a culvert near the mouth of Tie Gulch Creek. At that time, "numerous fry were observed upstream from the road crossing" (Nelson pers. comm.).

San Lorenzo River tributary 1 (Powder Mill)

Powder Mill Creek consists of about 1.7 stream miles and is tributary to the San Lorenzo River. It flows south, entering the San Lorenzo at Paradise Park.

A 1965 DFG document notes use of Powder Mill Creek by rainbow trout, but not by steelhead (Evans 1965). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of a short reach in lower Powder Mill Creek (County of Santa Cruz 2004).

San Lorenzo River tributary 2 (Eagle)

Eagle Creek consists of about 1.3 stream miles and is tributary to the San Lorenzo River. It flows west, entering the San Lorenzo about 0.8 miles downstream from the park headquarters.

A 1965 DFG document notes use of Eagle Creek by rainbow trout and by steelhead (Evans 1965).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Eagle Creek in Henry Cowell State Park is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use a short reach in Eagle Creek (County of Santa Cruz 2004).

Gold Gulch

Gold Gulch Creek consists of about 2.6 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo south of the town of Felton.

A 1957 survey report states that Gold Gulch Creek "appears to be of little value to the San Lorenzo salmon or steelhead fishery" (DFG 1957b). The report notes the occasional presence of adult steelhead in the reach immediately upstream from the mouth, but cites low flows as precluding spawning and rearing. According to the report, the main value of the creek for salmonids is its contribution to the flow of the San Lorenzo River.

In a survey in April 1980, DFG found "numerous [*O. mykiss*] fry" in the downstream portion of Gold Gulch Creek (DFG 1980b). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Gold Gulch Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Gold Gulch Creek is "likely to provide steelhead access and perennial habitat" (Alley 2002, p. 38). Staff from NMFS surveyed Gold Gulch Creek in 2006 and observed multiple *O. mykiss* year classes (Spence pers. comm.).

Shingle Mill

Shingle Mill Creek consists of about 1.5 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo south of the town of Felton.

Staff from DFG observed Shingle Mill Creek in July 1980 but did not note *O. mykiss*. The survey report cited fish migration barriers in the lower portion of the creek (DFG 1980b).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of about 0.7 miles of Shingle Mill Creek (County of Santa Cruz 2004).

Zayante

Zayante Creek consists of about 10.2 stream miles and is tributary to the San Lorenzo River. It flows southwest, entering the San Lorenzo in the town of Felton.

In 1955, DFG said that Zayante Creek had perennial flow and was an important steelhead spawning and nursery area "in the past" (DFG 1964a). A stream survey report cited damage to the stream from past logging and from the 1955 flood. A 1957 DFG "Basic Survey" called Zayante Creek one of the most important, or possibly the most important, San Lorenzo River tributary in terms of resources for steelhead (DFG 1957a).

According to a 1966 DFG survey report, Zayante Creek contributed about five cubic feet per second to the summer flow the San Lorenzo River (DFG 1966b). The report noted continuing effects of siltation, particularly in the lower stream section.

In response to a water right application, DFG estimated the Zayante Creek steelhead run in 1971. The study found that between 450 and 630 returning adult steelhead would be produced annually from the most upstream six miles of the creek (DFG 1971a). In 1973, DFG estimated the total run production potential of Zayante Creek to be about 800 individuals (DFG 1973a).

As part of a larger study of Santa Cruz County streams, consultants sampled Zayante Creek in 1981. The resulting report indicated that *O. mykiss* was observed at three of three sites. The report notes some "very good" rearing habitat, with substrate presenting a primary limiting factor to production (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Zayante Creek, particularly during summer and fall when low flow occurs naturally (DFG 1996c). A steam inventory was performed on the creek in 1997, when at least three *O. mykiss* year classes were noted at numerous sampling

sites. Management recommendations included increasing woody debris, improving screens on diversions, maintaining the three fishways on mainstem Zayante Creek, and modifying or removing several dams, weirs, and culverts (DFG 1997e).

An enhancement plan for the San Lorenzo system states, "Zayante Creek is usually the most productive [tributary] in terms of YOY's and smolt-sized fish…" (Alley 2004a, p. 19). The plan adds, "[The creek has] shown a precipitous decline in size class 1 and YOY numbers from 1998 to 2000, presumably due to sedimentation of pool habitat and a reduction in spawning success" (Alley 2004a, p. ES-4). According to the enhancement plan, Zayante Creek is one of three particularly important sources of summer baseflow for the San Lorenzo River. The plan notes pumping of "significant groundwater resources" from the basin. The stream also was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River and was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a).

Zayante Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report states, "…[*O. mykiss*] densities were especially high in Zayante Creek" (Allen 2003, p. 31). Staff from NMFS surveyed Zayante Creek in 2005 and observed multiple *O. mykiss* year classes throughout a five-mile section (Spence pers. comm.). According to the CCRWQCB, water quality in the creek is impaired by sedimentation from agriculture, silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

Bean

Bean Creek consists of about 8.5 stream miles and is tributary to Zayante Creek. It flows southwest, entering Zayante Creek at about stream mile 0.8.

Bean Creek was stocked in 1938 and in subsequent years (DFG 1938b). According to a 1956 DFG Bean Creek survey report, "This tributary appears to be one of the better producers of steelhead in the San Lorenzo drainage" (DFG 1956d). Another 1956 report cited heavy siltation effects of logging debris blocking the stream (DFG 1956b).

A 1971 survey found *O. mykiss* "in good numbers" and the survey report described a "good fishery" in Bean Creek despite a portion of the channel being dry (McIlhatten and Smith 1971). A 1974 Bean Creek stream survey report states, "…heavy accumulations of silt in [the] lower section are probably limiting fish production" (DFG 1974d). Staff from DFG expected a larger steelhead/rainbow trout population due to the stream's perennial flow.

As part of a larger study of Santa Cruz County streams, consultants sampled Bean Creek in 1981. The resulting report indicated that *O. mykiss* was observed at four of five sites. The report notes some "good" rearing habitat, with substrate presenting a primary limiting factor to production (HSA 1982).

According to a 1990 paper by San Jose State University faculty, minimal "suitable" spawning substrate exists in Bean Creek. The paper states, "Rearing habitat is more likely to be limited, and can usually be saturated by a relatively few successful spawners" (Smith 1990, p. 2).

An enhancement plan noted "fairly stable" *O. mykiss* numbers from 1998 to 2000 and deemed Bean Creek one of seven "important producers of YOY's and yearlings (Alley 2004a). According to the plan, Bean Creek is one of three particularly important sources of summer baseflow for the San Lorenzo River. The plan notes pumping of "significant groundwater resources"

from the basin. The stream also was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River (Alley 2004a).

Bean Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report indicates that "fairly high" *O. mykiss* densities were observed in the creek (Allen 2003). Staff from NMFS surveyed Bean Creek in 2005 and observed multiple *O. mykiss* year classes throughout a two-mile section (Spence pers. comm.). According to the CCRWQCB, water quality in the creek is impaired by sedimentation/siltation from road construction, disturbed sites, resource extraction, erosion, and nonpoint sources (CCRWQCB 2006).

Lockhart Gulch

Lockhart Gulch Creek consists of about 2.7 stream miles and is tributary to Bean Creek. It flows south, entering Bean Creek southwest of the town of Mission Springs.

In 1956, DFG staff said that Lockhart Gulch Creek appeared unimportant in terms of a trout fishery as residents in the area stated that they had not observed steelhead adult in the creek (DFG 1962a).

As part of a larger study of Santa Cruz County streams, consultants sampled Lockhart Gulch Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site. The report notes "poor" rearing habitat, with low flow, substrate, and lack of cover presenting primary limiting factors to production (HSA 1982).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Eagle Creek in Henry Cowell State Park is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of the reach of Lockhart Gulch Creek downstream from a passage barrier at stream mile 1.25 (County of Santa Cruz 2004).

Ruins

Ruins Creek consists of about 2.6 stream miles and is tributary to Bean Creek. It flows south, entering Bean Creek south of the town of Mission Springs.

In 1956, DFG staff said that Ruins Creek appeared unimportant in terms of a trout fishery as residents in the area stated that they had not observed steelhead adults in the creek (DFG 1962a).

Ruins Creek was habitat mapped and sampled by electrofishing at three sites in August and September 1997. *Oncorhynchus mykiss* was observed at one site in "very low" densities (Nelson pers. comm.). The inventory report states, "Active and potential sediment sources related to the road system and other land use need to be identified, mapped, and treated…" (CCC 1997a).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Ruins Creek is "likely to provide steelhead access and perennial habitat" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of a short reach of lower Ruins Creek (County of Santa Cruz 2004).

Mackenzie

Mackenzie Creek consists of about 1.6 stream miles and is tributary to Bean Creek. It flows south, entering Bean Creek at about stream mile 3.6.

Mackenzie Creek was habitat mapped and sampled by electrofishing in five sites in August and September 1997. *Oncorhynchus mykiss* was observed in "very low" densities at two sites (Nelson pers. comm.). The inventory report states, "Active and potential sediment sources related to the road system need to be identified, mapped, and treated…" (CCC 1997b). The report also recommended removing a failed bridge at about stream mile 0.7 from the channel.

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Mackenzie Creek is "likely to provide steelhead access and perennial habitat" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of the majority of Mackenzie Creek's length (County of Santa Cruz 2004).

Lompico

Lompico Creek consists of about 4.5 stream miles and is tributary to Zayante Creek. It flows south, entering Zayante Creek southwest of the town of Zayante. A fishway located immediately upstream from the Zayante Creek confluence has improved access since the 1980s (Collins pers. comm.).

Staff from DFG surveyed Lompico Creek in 1956 and observed multiple *O. mykiss* year classes. The survey report states, "Although several steelhead got over the 8-ft. natural bedrock falls at the mouth this year due to the heavy rains, this creek normally contributes very little or nothing to the San Lorenzo steelhead fishery" (DFG 1956e).

Lompico Creek was characterized as having "marginal spawning-nursery habitat" in a 1974 DFG stream survey report (DFG 1974e). The survey found *O. mykiss* fingerlings in the creek between the mouth and the Lompico Club dam.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Lompico Creek, particularly during summer when low flow occurs naturally (DFG 1996c). A stream inventory was conducted on Lompico Creek in 1997. Fish sampling was performed at 16 sites, all of which produced steelhead observations. Individuals represented three year classes. The resulting report recommended inventory and mapping of sediment sources, and prioritization for treatment to reduce the amount of fine sediment entering the stream (CCC 1997c).

Lompico Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. Juvenile *O. mykiss* density was estimated to be between about 40 and 80 fish per 100 feet at three sampling sites in the creek, while the range for all sampling sites in the watershed was about 3 to 140 fish per 100 feet (Allen 2003). Juvenile steelhead densities were estimated and habitat conditions assessed in Lompico Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes an estimated smolt density of 5.7 per 100 feet of stream at the sampling site, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Lompico Creek site as "Below Average."

Mountain Charlie Gulch (East Branch Zayante)

Mountain Charlie Gulch Creek consists of about 3.9 stream miles and is tributary to Zayante Creek. It flows southwest, entering Zayante Creek northeast of the town of Zayante.

In 1956, DFG staff stated, "This branch appears to be a good nursery stream" (DFG 1956b). A 1957 DFG "Basic Survey" said that Mt. Charlie Gulch was "good to fair" in its importance to the steelhead resources of the San Lorenzo River system (DFG 1957a). *Oncorhynchus mykiss* fingerlings were sampled in the creek as part of a 1968 DFG sediment study (DFG 1968a).

Mountain Charlie Gulch Creek was studied in 2004 as part of a pilot steelhead habitat and abundance survey, when multiple *O. mykiss* year classes were observed. The resulting report states, "Substrate characteristics were typical of good steelhead rearing habitat" (HES 2005, p. 2).

According to the CCRWQCB, water quality in the creek is impaired by sedimentation from silviculture, road construction, erosion, and nonpoint sources (CCRWQCB 2006).

Zayante tributary

This unnamed tributary to Zayante Creek consists of about 1.2 stream miles and flows southwest. It enters Zayante Creek about two miles upstream from the Mountain Charlie Gulch Creek confluence.

Staff from NMFS sampled the unnamed tributary to Zayante Creek in 2006. They observed multiple *O. mykiss* year classes (Spence pers. comm.).

Bull

Bull Creek consists of about two stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo in the town of Felton.

A DFG protest to a water right application on Bull Creek was prepared in 1975. The protest attributes steelhead "spawning and nursery areas" to the creek but does not provide observation information concerning *O. mykiss* (SWRCB ca 1970).

In 1980 memo, DFG noted that the creek did not have hydrologic connectivity to the San Lorenzo year-round (DFG 1980b). Staff from DFG interviewed a local landowner in the Bull Creek watershed in 1980. He stated that he had never seen salmonids in the stream (DFG 1980b).

Fall

Fall Creek consists of about six stream miles and is tributary to the San Lorenzo River. It flows southeast, entering the San Lorenzo in the northern portion of the town of Felton. A "significant" diversion is located at about stream mile one. A 2001 enhancement plan notes that the fishway at the diversion requires "continuous maintenance" for proper functioning (Alley 2004a). A boulder falls at about stream mile three is considered the upstream limit of anadromy.

A 1954 field note states, "[Fall Creek] appears to be the best small trout stream available in the San Lorenzo system" (DFG 1954c). The note indicates the presence of a stocking program on the creek. A 1957 DFG "Basic Survey" called Fall Creek "one of [the] more important streams of the [San Lorenzo River] drainage" (DFG 1957a).

In 1966, DFG said that Fall Creek was in "excellent condition" (DFG 1966c). This survey found *O. mykiss* fry upstream from a dam but did not note their origin (*i.e.*, planted or landlocked native).

Based on observations in April 1980, DFG called *O. mykiss* fry "common" in the downstream portion of Fall Creek (DFG 1980b). Staff also noted "adult steelhead" during the survey (DFG 1980b). A 1988 letter from DFG staff states, "Fall Creek is the most important tributary stream for coho salmon and steelhead trout in the San Lorenzo River watershed" (DFG 1988b).

Staff from DFG surveyed Fall Creek in 1995. The survey report stated that the creek "was still recovering from past land use activities (logging and limestone mining)" (DFG 1996h). Management recommendations included improving instream and riparian cover (DFG 1996h).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that siltation has impacted habitat in Fall Creek. Also, water diversions have decreased flows sufficiently to impact the creek (DFG 1996c). The memo cited the specific impact of the substantial water diversion at stream mile one.

An enhancement plan noted "fairly stable" *O. mykiss* numbers from 1998 to 2000 and deemed Fall Creek one of seven "important producers of YOY's and yearlings" (Alley 2004a). The plan also notes the important effect of diversions reducing Fall Creek flows on the growth rate of YOY's in the mainstem San Lorenzo River.

Fall Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. Juvenile *O. mykiss* density was estimated to be about 50 fish per 100 feet at one sampling site in the creek, while the range for all sampling sites in the watershed was about 3 to 140 fish per 100 feet (Allen 2003). According to the CCRWQCB, water quality in the creek is impaired by sedimentation from road construction, habitat modification, erosion, and nonpoint sources (CCRWQCB 2006).

Bennett

Bennett Creek consists of about 1.8 stream miles and is tributary to Fall Creek. It flows east, entering Fall Creek at about stream mile 0.7.

In 1980, DFG staff stated, "Bennett Creek is impassable to upstream migrating fish" (DFG 1980b). However, the creek was characterized as a "significant perennial tributary [to Fall Creek]" in 1996 (DFG 1996h).

South Fork Fall

South Fork Fall Creek consists of about 1.6 stream miles and is tributary to Fall Creek. It flows east, entering Fall Creek at about stream mile 1.4.

In 1980, DFG staff stated, "South Fork of Fall Creek is impassable to upstream migrating fish" (DFG 1980b). However, the creek was characterized as a "significant perennial tributary [to Fall Creek]" in 1996 (DFG 1996h).

Newell

Newell Creek consists of about 7.6 stream miles and is tributary to the San Lorenzo River. It flows southwest, entering the San Lorenzo in the southern portion of the town of Ben Lomond. Loch Lomond Reservoir, constructed in the late 1950s, is located at about stream mile 1.8 and is a total passage barrier. A minimum release of 1.0 cfs is provided into Newell Creek (Alley 2004a).

In 1956 DFG staff noted that Newell Creek was a "fair spawning and nursery area," particularly in the upper section (DFG 1956f). It was deemed to be less important in this capacity than other San Lorenzo River tributaries. Another 1956 report states, "RT fingerling are very scarce in this stream" (DFG 1956b).

In 1966, Newell Creek's importance to the steelhead fishery of the drainage was said to be "its contribution of summer flow" (DFG 1966d). A 1967 report concerning Love Creek states, "Newell Creek has been damaged [by siltation] and lost to the fish resource" (DFG 1967a).

During observations in May 1980, DFG noted "numerous [*O. mykiss*] fry" in Newell Creek (DFG 1980b). Upstream of the dam, *O. mykiss* were present in lesser numbers. In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Newell Creek, particularly during summer and fall when low flow occurs naturally (DFG 1996c).

An enhancement plan states, "…there would be little benefit in transporting adults above and providing smolt passage down past the dam. There is less than 2 miles of stream habitat for salmonids, which is of low quality…" (Alley 2004a). The plan notes that the creek is not highly productive due to the short steelhead reach. It also recommends proactive watershed management activities upstream from the reservoir to maximize storage capacity and avoid future storage projects elsewhere in the San Lorenzo River watershed.

Newell Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report notes that "consistently low [*O. mykiss*] densities since 2000" were observed in the creek (Allen 2003). A Newell Creek site was sampled to estimate juvenile steelhead density and assessed for habitat conditions in 2006 as part of a larger study of several Santa Cruz watersheds. The resulting report states, "Overall habitat quality worsened in Newell Creek from 2000 to 2006 primarily due to great loss in escape cover. Substrate generally improved…" (Alley 2007, p. 59). According to the CCRWQCB, water quality in the upper creek is impaired by sedimentation from agriculture, silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

Love

Love Creek consists of about 3.6 stream miles and is tributary to the San Lorenzo River. It flows south, entering the San Lorenzo in the town of Ben Lomond. A Denil fishway is located at about stream mile 0.9.

Staff from DFG surveyed Love Creek in 1956. Stocking in 1950 was noted in the survey report. A 1957 DFG "Basic Survey" said that Love Creek was an "important [steelhead] spawning and nursery area" (DFG 1957a).

A 1967 report concerning Love Creek divided it into three reaches: upper, middle, and lower. At the time of this report, the creek was said to be in "good condition" and supported steelhead runs annually. Most spawning occurred in "the middle and lower sections" while "a few" steelhead entered the upper section of Love Creek to spawn (DFG 1967a).

Based on observations in July 1980, DFG said that "numerous [*O. mykiss*] fry" were present in lower Love Creek and "scarce" in upper Love Creek (DFG 1980b). According to a 1982 memo, "less than 1/2 mile of Love Creek, at present, is available to anadromous salmonids" (DFG 1982a). At that time, staff from DFG cited a flashboard dam at the Love Creek Road crossing as precluding use of the upper reaches by steelhead.

An enhancement plan for the San Lorenzo system notes overall good condition of riparian vegetation except for several areas like Love Creek with "prevalent" gaps in the canopy (Alley 2004a). The plan recommends that the fishway on Love Creek be assessed, modified if necessary, and continually maintained. According to the CCRWQCB, water quality in the creek is impaired by sedimentation from sources such as silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Love Creek is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that most of Love Creek is used by steelhead (County of Santa Cruz 2004). According to DFG staff, "…the creek is very degraded with excessive sediment depostion" (Nelson pers. comm.).

Smith

Smith Creek consists of about 0.8 stream miles and is tributary to Love Creek. It flows south, entering Love Creek at about stream mile 0.8.

In 1980, DFG staff stated, "…[t]here is no possible upstream migration of fish on Smith Creek after the first 1/8 of a mile" (DFG 1980b).

Fritch

Fritch Creek consists of about 1.1 stream miles and is tributary to Love Creek. It flows southeast, entering Love Creek at about stream mile 1.7.

A 1967 report concerning Love Creek noted that "…a few [steelhead] manage to ascend Fritch Creek" (DFG 1967b). In 1980, DFG said, "Fritsch Creek is impassable to upstream migrating fish" (DFG 1980b).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of over one half of the length of Fritch Creek (County of Santa Cruz 2004).

Marshall (Hubbard Gulch)

Marshall Creek consists of about 1.5 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo west of the town of Ben Lomond.

A 1964 stream survey report characterized Marshall Creek as "a good but very small stream" (DFG 1964b). Multiple *O. mykiss* year classes were observed during the survey. In a report on observations of Marshall Creek in July 1980, DFG staff stated, "… [*O. mykiss*] fry were present in good numbers" between the mouth and the first crossing of Hubbard Gulch Road (DFG 1980b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Marshall Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the habitat impacts of sedimentation from improper grading and from a landslide on Hubbard Gulch Creek.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that a short reach of Hubbard Gulch Creek is used by steelhead (County of Santa Cruz 2004). [Kristen, recent?]

Alba

Alba Creek consists of about 1.4 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo south of the town of Brookdale. There is a high gradient bedrock feature at the confluence with the San Lorenzo River.

In 1980, DFG staff stated, "Alba Creek is impassable to upstream migrating fish" (DFG 1980c). A researcher has attributed the impassability to high gradient (County of Santa Cruz 2004).

Clear

Clear Creek consists of about 2.3 stream miles and is tributary to the San Lorenzo River. It flows east, entering the San Lorenzo in the town of Brookdale.

Clear Creek was stocked in 1945 and subsequent years. A 1957 stream survey report calls Clear Creek "[an] unimportant steelhead or catchable [*i.e.*, planted] rainbow trout tributary in the San Lorenzo drainage" (DFG 1957c).

During observations of Clear Creek in May 1980, DFG found three *O. mykiss* individuals (DFG 1980b). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Clear Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the lack of bypass requirements for water district diversions on the creek.

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Clear Creek is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). An enhancement plan notes the important effect of diversions reducing Clear Creek flows on the growth rate of YOY's in the mainstem San Lorenzo River (Alley 2004a). A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that a short reach of Clear Creek is used by steelhead (County of Santa Cruz 2004).

Boulder

Boulder Creek consists of about 7.6 stream miles and is tributary to the San Lorenzo River. It flows southeast, entering the San Lorenzo in the town of Boulder Creek. A bedrock chute located upstream from the Hare Creek confluence is considered the upstream limit of anadromy (Alley 2004a).

In 1956 DFG surveyed Boulder Creek and observed "generally scarce" fingerlings. The survey report states, "This appears to be a very good nursery stream in the lower section and a fair steelhead spawning stream. The quality and quantity of suitable spawning areas are not as good as other tributaries in its drainage (DFG 1956g).

In a 1966 survey report the creek was deemed "an important tributary to the San Lorenzo River" as if offered "both spawning and nursery areas" and contributed "summer flows" (DFG 1966e). The report noted that siltation was a "serious" problem in the system and found steelhead abundance to be "very poor".

Based on observations in July 1980 DFG staff said, "[*O. mykiss*] fry were present in Boulder Creek, though not in great numbers" (DFG 1980b). The report indicated that good spawning gravels were present in only a headwaters reach about 0.5 miles in length. A draft report by staff of the State Water Resources Control Board from 1982 estimated that the historical steelhead run in Boulder Creek was about 1,600 individuals (SWRCB 1982). The estimating method and information sources were not provided in the report.

An enhancement plan for the San Lorenzo system states, "[Boulder Creek has] shown a precipitous decline in size class 1 and YOY numbers from 1998 to 2000, presumably due to sedimentation of pool habitat and a reduction in spawning success" (Alley 2004a, p. ES-4). It nevertheless deemed Boulder Creek one of seven "important producers of YOY's and yearlings (Alley 2004a). The plan analyzed the effects of diversions in the Boulder Creek drainage and found, "Flow extractions… appeared to significantly impact the growth rate of YOY's and the overall density of smolt sized juveniles produced in the middle [San Lorenzo] River, particularly in drier years" (Alley 2004a, p. 54). The stream also was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River and was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a).

Boulder Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report notes that "consistently low [*O. mykiss*] densities since 2000" were observed in upper Boulder Creek (Allen 2003). Juvenile steelhead densities were estimated and habitat conditions assessed in Boulder Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated total juvenile steelhead densities of 30.7 and 57.6 per 100 feet of stream at the two sampling sites in 2006 (Alley 2007). The report states, "In Boulder Creek, habitat worsened overall from 2005 to 2006" and placed particular emphasis on "loss of escape pool cover" (Alley 2007, pp. 59 and 113).

Foreman

Foreman Creek consists of about 1.3 stream miles and is tributary to Boulder Creek. It flows northeast, entering Boulder Creek at about stream mile 0.9.

Rainbow trout/steelhead were noted in Foreman Creek during a 1959 survey of stream condition by DFG (DFG 1961b). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Foreman Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the habitat impacts of sedimentation from improper grading and other activities on Foreman Creek.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that Foreman Creek is not accessible to steelhead due to the high gradient (County of Santa Cruz 2004).

Bracken Brae

Bracken Brae Creek consists of about 0.7 stream miles and is tributary to Boulder Creek. It flows south, entering Boulder Creek near the town of Forest Springs.

Streams surveys and a pollution investigation in 1975 documented the presence of *O. mykiss* in Bracken Brae creek (DFG 1975). Anecdotal reports of *O. mykiss* presence between 1964 and 1975 were included in the documentation.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Bracken Brae Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the habitat impacts of sedimentation from improper grading and other activities on Bracken Brae Creek.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead cannot access Bracken Brae Creek due to a bedrock drop at the Boulder Creek confluence (County of Santa Cruz 2004).

Jamison

Jamison Creek consists of about 2.2 stream miles and is tributary to Boulder Creek. It flows east, entering Boulder Creek northwest of the town of Forest Springs.

A 1957 DFG "Basic Survey" said that Jamison Creek was of "fair, but limited" importance to the steelhead resources of the San Lorenzo River system (DFG 1957a). In a 1961 field note, DFG staff said that the creek "offers limited spawning area" (DFG 1961c).

Based on observations in July 1980, DFG said that "a few" *O. mykiss* were present in the most downstream portion of Jamison Creek (DFG 1980b). A 1982 survey report states, "The stream is in excellent condition but supports only a limited anadromous fishery" (DFG 1982b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Jamison Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites the habitat impacts of sedimentation from improper grading and other activities on Jamison Creek.

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Jamison Creek is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of less than half the length of Jamison Creek (County of Santa Cruz 2004).

Hare

Hare Creek consists of about 1.5 stream miles and is tributary to Boulder Creek. It flows east, entering Boulder Creek about 0.6 miles upstream from the Jamison Creek confluence. An earthen dam was constructed on Hare Creek in 1960 without provision for fishery water releases.

A 1961 memo cited the warden's belief that upper Hare Creek "formerly provided a limited spawning area for steelhead" (DFG 1961d). In 1961, DFG called Hare Creek "a small, unimportant, intermittent, spawning tributary of Boulder Creek" with "little fisheries value except for its contribution of flows to Boulder Creek" (DFG 1961e). The stream survey report from that year noted heavy damage (*i.e.*, siltation) from past logging.

Hare Creek was sampling in 1973 as part of a water diversion application review. Staff from DFG said "[Hare Creek] is a steelhead spawning and/or rearing area, as shown by the number of steelhead captured in the sampling" (DFG 1973b). A population estimate of 163 individuals between the mouth of Hare Creek and the dam was produced in 1973 (DFG 1973c).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use the portion of Hare Creek downstream from the dam (County of Santa Cruz 2004).

Bear

Bear Creek consists of about 8.2 stream miles and is tributary to the San Lorenzo River. It flows west, entering the San Lorenzo in the town of Boulder Creek.

Bear Creek was stocked in 1938 and in subsequent years (DFG 1938b). A 1945 DFG report notes the use of the creek by spawning steelhead (DFG 1945b).

Staff from DFG surveyed Bear Creek in 1956 and observed "common" *O. mykiss* fingerlings. The survey report states, "This tributary appears to be an important one to the San Lorenzo Salmon Steelhead Fishery. There are good spawning areas for adults and good nursery grounds for the young. Residents in the area report that this creek supports a good run of steelhead each year" (DFG 1956h).

A 1966 stream survey report noted "abundant spawning in the lower midsection of the stream" (DFG 1966f). The report noted siltation caused by logging and road building in the upper watershed that threatened the habitat value of Bear Creek.

Based on observations in July 1980, DFG called *O. mykiss* fry "abundant" in portions of Bear Creek downstream from the Shear Creek confluence (DFG 1980b). A draft report by staff of the State Water Resources Control Board from 1982 estimated that the historical steelhead run in Bear Creek was about 1,400 individuals (SWRCB 1982). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Bear Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

An enhancement plan for the San Lorenzo system states, "[Bear Creek has] shown a precipitous decline in size class 1 and YOY numbers from 1998 to 2000, presumably due to sedimentation of pool habitat and a reduction in spawning success" (Alley 2004a, p. ES-4). It nevertheless deemed Bean Creek one of seven "important producers of YOY's and yearlings (Alley 2004a). The stream also was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River and was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a).

Bear Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. The resulting report indicates that "fairly high" *O. mykiss* densities were observed in the creek (Allen 2003). Juvenile steelhead densities were estimated and habitat conditions assessed in Bear Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes an estimated total juvenile steelhead density of 52.9 per 100 feet of stream at the sampling site (Alley 2007). The report states, "…percent fines increased in pools, embeddedness increased in all habitat types, and escape cover worsened in pools and runs [from 2005 to 2006]" (Alley 2007, p. 60). rates the smolt habitat at the Lompico Creek site as

"Below Average." According to the CCRWQCB, water quality in the creek is impaired by sedimentation from silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

Deer

Deer Creek consists of about 3.8 stream miles and is tributary to Bear Creek. It flows south, entering Bear Creek at about stream mile 4.8.

A 1957 DFG "Basic Survey" called Deer Creek one of the most important San Lorenzo River tributaries in terms of resources for steelhead (DFG 1957a). Based on observations in July 1980, DFG called *O. mykiss* "abundant" in Deer Creek (DFG 1980b). A 1982 memo describes Deer Creek as in "good condition" though lacking sufficient gravels to provide good spawning habitat.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Bear Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. A former artificial passage barrier indicated on the map has since been removed (Kittleson pers. comm.).

Two Bar

Two Bar Creek is tributary to the San Lorenzo River. It consists of about four stream miles and flows southwest, entering the San Lorenzo about 1.2 miles upstream from the Bear Creek confluence.

Two Bar Creek was surveyed in 1966, when juvenile *O. mykiss* were said to be "quite common throughout the length" (DFG 1966g). According to the survey report, "this tributary contributes approximately 2 to 3 miles of spawning and nursery area to the San Lorenzo River" (DFG 1966g).

A 1972 survey report called Two Bar Creek "a poor fishery" due in part to logging debris and silt (McIlhatten and Smith 1972). In 1974, DFG staff described the *O. mykiss* population size as "poor" (DFG 1974f). Based on observations in July 1980, DFG called *O. mykiss* fry "common" in the lower mile of Two Bar Creek (DFG 1980b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Two Bar Creek, particularly during summer when low flow occurs naturally (DFG 1996c). According to an enhancement plan, Two Bar Creek is one of six particularly important tributaries of the San Lorenzo for focusing sediment reduction efforts (Alley 2004a).

A 2004 consultant's report regarding juvenile steelhead densities in the San Lorenzo River watershed also discusses distribution in various tributaries. The report states that Two Bar Creek is "known to contain steelhead from past sampling and observation…" (Alley 2002, p. 38). A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of the over one half of the length of Two Bar Creek (County of Santa Cruz 2004).

Kings

Kings Creek consists of about seven stream miles and is tributary to the San Lorenzo River. It flows southwest, entering the San Lorenzo in the community of Redwood Grove.

Staff from DFG surveyed Kings Creek in 1956. The survey report states, "This tributary appears to be a fairly important steelhead stream. Judging by the numbers of fingerling observed, tributary apparently contributes a considerable number of steelhead to the San Lorenzo fishery" (DFG 1956i). The report noted stocking in 1945.

In a 1966 survey report, DFG said Kings Creek was in "very poor condition" due to siltation resulting from logging and road construction (DFG 1966h). In 1974, DFG said that the creek offered "a good nursery area" but poor spawning habitat (DFG 1974g). Based on observations in July 1980, DFG called *O. mykiss* fry "abundant" in the downstream portion of Kings Creek (DFG 1980b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact Kings Creek, particularly during summer when low flow occurs naturally (DFG 1996c). An enhancement plan states, "Kings Creek is relatively unproductive despite its comparably long steelhead reach. This is because of high sediment impacts and relatively low spring and summer flow" (Alley 2004a, p. 19). In the plan, Kings Creek was noted as one of five important contributors to fine sediment loading in the middle and lower reaches of the San Lorenzo River and was included in a list of six priority tributaries for focusing sediment reduction efforts (Alley 2004a).

Kings Creek was sampled in 2002 as part of continuing studies of the steelhead population in the San Lorenzo River watershed. Juvenile *O. mykiss* density was estimated to be between about 20 and 40 fish per 100 feet at two sampling sites in the creek, while the range for all sampling sites in the watershed was about 3 to 140 fish per 100 feet (Allen 2003). According to the CCRWQCB, water quality in the creek is impaired by sedimentation from silviculture, road construction, disturbed sites, erosion, and nonpoint sources (CCRWQCB 2006).

Logan

Logan Creek consists of about 1.5 stream miles and is tributary to Kings Creek. It flows west, entering Kings Creek at about stream mile 2.7.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead use a portion of Logan Creek (County of Santa Cruz 2004).

Arana Gulch

Arana Gulch Creek consists of about five stream miles and is tributary to Woods Lagoon. It flows south, entering the Pacific Ocean at the Santa Cruz Harbor.

According to a 1966 memo, residents of the area stated that they had observed "a few steelhead" ascending the stream (DFG 1966i). The memo cites the recent burial of the stream in a culvert.

Staff from DFG sampled the stream in 1983 and found *O. mykiss* (DFG 1983a). A subsequent stream survey report characterized Arana Gulch as in "poor condition" due largely to excess sedimentation (DFG 1983b).

A fisheries habitat study was conducted in the Arana Gulch watershed in 1999 including electrofishing at five sites. Multiple *O. mykiss* year classes were represented in the samples and scale analysis indicated that a portion of the population was resident, having a stream reproduction life history (DFG 2001). Based on comparison with other Santa Cruz County streams, density of smolt-sized *O. mykiss* in Arana Gulch was described as "very poor" to "below average." The study found "extremely poor" spawning habitat and "generally limited" rearing habitat largely due to sedimentation (DFG 2001). Staff from NMFS observed age 2+ *O. mykiss* in the Arana Gulch basin in 2006. The fish were believed to be resident due to the presence of a passage barrier downstream (Spence pers. comm.).

Soquel

Soquel Creek consists of about seven stream miles between the mouth and the confluence of the West Branch. Upstream of this point is regularly referred to as the East Branch, although this reach is discussed here as part of mainstem Soquel Creek.

In 1959, DFG staff said Soquel Creek upstream of the West Branch confluence appeared to be the most productive stream reach in the drainage based on a count of 11,500 "steelhead rainbow trout" (DFG 1959a). The stream survey report noted that stocking did not occur historically in the upper and middle sections of this reach.

As part of a water rights application process, DFG summarized the steelhead resources of Soquel Creek in a 1973 memo. The average annual steelhead run was estimated to be 500-1,000 individuals (DFG 1973d). According to the memo, steelhead use about 20 miles of the creek while "resident rainbow trout exist in about 16 miles of stream above barriers to migrating anadromous fishes" (DFG 1973d). Staff from DFG state that "a major threat to the existence of Soquel Creek fishes has been low flows, siltation, and pollution caused by accelerated development and resource use in the watershed" and recommend "limitations on future water uses" (DFG 1973d).

In 1982, DFG staff said Soquel Creek was "in excellent condition" (DFG 1982c). A 1988 DFG memo indicates that a diversion dewatered about 0.5 miles of Soquel Creek, resulting in a fish kill of an estimated 864 juvenile *O. mykiss* (DFG 1988c). Soquel Creek was stocked in 1988 and in subsequent years (HSA 1988).

The East Branch of Soquel Creek was the subject of a 1993 watershed assessment that found over-drafting of water and filling of pools with find sediment to be limiting to *O. mykiss* production. According to the assessment, a ten-foot natural falls at Ashbury Gulch is considered to be a barrier to upstream fish migration (CDF 1993). However, staff from CDF found *O. mykiss* upstream of the natural falls in that year. Steelehad smolts reared at the Monterey Bay Salmon and Steelhead Project were planted upstream from Ashbury Falls in the early 1990s (Nelson pers. comm.).

A 1996 estimate of the steelhead run size in Soquel Creek was about 100 individuals (Sutfin 1996). The estimating method and supporting information are not provided in the reference. In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in the Soquel Creek mainstem and lagoon, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also specifically cites flood control, logging, quarrying, and road maintenance activities as having impacts on habitat conditions in Soquel Creek.

A spawning survey was conducted in lower Soquel Creek in 2002, when redds and evidence of successful reproduction were noted. The surveyor observed "at least 13" adult steelhead at one time during the surveys (HES 2002). East Branch Soquel Creek

upstream from Ashbury Falls was surveyed in 2002 as part of a study of the Soquel Creek watershed. The resulting report states, "…the potential for production of yearling fish is high in this reach" (Alley 2003, p. 43).

Staff from NMFS sampled multiple sites on the east branch of Soquel Creek in 2003, 2004, and 2005 as part of a study of demographic processes of steelhead. A draft manuscript states, "In Soquel Creek, variability in water flow appears to play a major role in demographic processes of steelhead, with high survival, minimal movement, and limited growth during the summer and fall dry season, and low survival, extensive movement, and limited growth during the flashy flows of the winter and spring rainy season" (Sogard *et al.* In review).

A management plan update was prepared in 2004 by consultants to the City of Capitola. The report cites previously generated information that, "The [Soquel Creek] lagoon typically produces a significant 10-35% of the smolt-sized juveniles in the mainsteam Creek each year" (Alley 2004b, p. 14). According to the CCRWQCB, water quality in the lagoon is impaired by sedimentation from construction/land development (CCRWQCB 2006). The lagoon is managed by the city of Capitola, including sandbar construction and artificial breaching. A flume exists that carries a portion of the lagoon's discharge.

A mark/recapture study of the lagoon's juvenile steelhead population in fall 2006 produced an estimate of about 992 individuals, which was compared to a 14-year average of about 1,160 individuals (Alley 2006). The resulting monitoring report included numerous management recommendations including recommendations for flume operations, lagoon inflow, water quality related factors, and invasive plant species control. Juvenile steelhead densities were estimated and habitat assessed in mainstem Soquel Creek during 2006 as part of a larger study of Santa Cruz County watersheds. (Juvenile steelhead densities have been measured in Soquel Creek since 1997.) The resulting report notes that "especially low" juvenile densities were observed, particularly in the lower mainstem (Alley 2007). Estimated smolt densities at four sites ranged from 2.8 to 9.1 per 100 feet of stream, that may be compared a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Soquel Creek sites from "Fair" to "Poor."

Bates

Bates Creek consists of about three stream miles and is tributary to Soquel Creek. It flows southwest, entering Soquel Creek north of the city of Soquel. Prescott Dam (also known as "Little Hoover" dam) at stream mile 1.5 is a total barrier to fish passage.

In notes from a 1957 stream survey, DFG staff characterized Bates Creek as a "very poor steelhead spawning and nursery tributary to Soquel Creek" (DFG 1957d). The creek's value was said to be in its contribution of flow to Soquel Creek.

Notes from a 1988 survey of Bates Creek indicate the presence of *O. mykiss* in "good habitat" with flow present (DFG 1988d). A single trout also was observed upstream of the dam (and a waterfall) on Bates Creek in 1988 (DFG 1988e).

Bates Creek was surveyed in 1996 and multiple *O. mykiss* year classes were observed. The survey report recommended allowing recruitment of woody debris, controlling sediment input into the creek, and providing bypass flows (DFG 1996b).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Bates Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also cites "Little Hoover" dam as a habitat deficiency.

Bates Creek was surveyed in 2002 as part of a study of the fishery of the Soquel Creek watershed. Multiple *O. mykiss* year classes were observed, and the age structure was said to indicate "resident trout" in some portions of the creek. The resulting report states, "Spawning habitat was poor with a preponderance of sand from the Dam to the mouth" (Alley 2003, p. 41).

Grover Gulch

Grover Gulch Creek consists of about 2.5 stream miles and is tributary to Bates Creek. It flows south, entering Bates Creek at about stream mile 1.5 (upstream from the Bates Creek Dam).

Grover Gulch Creek was surveyed in 2002 as part of a study of the fishery of the Soquel Creek watershed. The resulting report noted the presence of resident trout and poor spawning conditions in the creek (Alley 2003).

Soquel tributary (Laurel Glen, Moores Gulch)

This tributary consists of about three stream miles and is called alternately Moores Gulch Greek and Laurel Glen Creek. It flows generally south before entering Soquel Creek at about stream mile three. The County of Santa Cruz has constructed a fishway at the Soquel - San Jose Road crossing.

In a 1957 stream survey, DFG found fingerling steelhead to be "quite common in the lower section" (DFG 1957e). The stream was characterized as "a fair to good spawning tributary in the lower section and an excellent nursery ground for steelhead". Limiting water diversion was recommended.

Staff from DFG surveyed Laurel Glen Creek in 1961 and observed *O. mykiss* "in fair numbers". The survey report states, "… success and natural propagation are probably poor. Lack of suitable spawning area seems to be a limiting factor" (DFG 1961f).

As part of a larger study of Santa Cruz County streams, consultants sampled Moore's Gulch Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site and found spawning habitat and substrate to be primary limiting factors to production (HSA 1982). Notes from a 1988 survey of Moore's Gulch Creek indicate the presence of *O. mykiss* in "good habitat" with summer streamflow (DFG 1988d).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Laurel Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also specifically cites flood control and logging activities as having impacts on habitat conditions in the creek.

Moores Gulch Creek was surveyed in 1996 and multiple *O. mykiss* year classes were observed. The survey report recommended a program to control erosion, assessing passage at culverts, and increasing woody cover in the creek (DFG 1996i).

Moores Gulch Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. The resulting report discounts the value of restoration actions on the creek "…because of Moores Gulch's high sediment content and poor rearing and spawning habitat" (Alley 2003, p. 42).

West Branch Soquel

West Branch Soquel Creek is tributary to Soquel Creek. It consists of about 6.1 stream miles. It flows southeast, entering Soquel Creek at about stream mile 6.4. Laurel Mill Dam, immediately downstream from the Laurel and Burns creeks confluence is a total passage barrier.

Records of DFG observations of spawning steelhead observed in West Branch Soquel Creek go back to the 1940s (DFG 1940a). In a 1957 stream survey report, DFG characterized the upper portion of the creek as "excellent steelhead spawning and nursery grounds (DFG 1957f).

As part of an investigation of a proposed dam, DFG surveyed West Fork Soquel Creek in 1963. The resulting memo states, "… it appears that a small run of steelhead frequent the area in which is this proposed dam site. This steelhead run also appears to be erratic in occurrence and size" (DFG 1963a). The memo adds, "A resident trout population appears to be well established in this stream and tributary areas above. It is not know whether the fingerling success is related to steelhead or resident trout propagation" (DFG 1963a). The memo noted an on-going stocking program on the creek.

As part of a larger study of Santa Cruz County streams, consultants sampled West Fork Soquel Creek in 1981. The resulting report indicated that *O. mykiss* was observed at three of three sites and found some "good" rearing habitat, limited in part by low flow (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in West Branch Soquel Creek, particularly during summer when low flow occurs naturally (DFG 1996c). The memo also specifically cites flood control and logging activities as having impacts on habitat conditions in West Branch Soquel Creek. West Branch Soquel Creek was surveyed in 1996 and multiple *O. mykiss* age classes were observed. The survey report noted limited spawning substrate and recommended increasing woody cover and a program of erosion control (DFG 1996j).

West Branch Soquel Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. Regarding the reach between Girl Scout Falls I and II the resulting report states, "Spawning habitat appeared to be adequate to saturate rearing habitat in 2002" (Alley 2003, p. 44). High YOY densities were noted in the reach upstream from Girl Scout Falls II. The life history form of this population (resident or anadromous) was indeterminate. According to the report, "Approximately 3.7 miles of potential steelhead habitat exists upstream of Girl Scout Falls II" (Alley 2003, p. 44).

Juvenile steelhead densities were estimated and habitat assessed in West Branch Soquel Creek during 2006 as part of a larger study of Santa Cruz County watersheds. (Juvenile steelhead densities have been measured in West Branch Soquel Creek since 1997.) Estimated smolt densities at three sites ranged from 4.7 to 14.1 per 100 feet of stream, that may be compared a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the West Soquel Creek sites as "Fair" or "Below Average."

Hester

Hester Creek consists of about four stream miles and is tributary to West Branch Soquel Creek. It flows south, entering West Fork Soquel Creek at about stream mile 0.9.

Field notes from 1953 indicate "poor spawning possibilities" in Hester Creek (DFG 1953e). In a 1959 survey, DFG staff found "few" *O. mykiss* in Hester Creek and noted that the culvert at the mouth of the stream could be a limiting factor (DFG 1959b).

As part of a larger study of Santa Cruz County streams, consultants sampled Hester Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of two sites and found some "below average" rearing habitat, limited in part by lack of cover and low flow (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Hester Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

Hester Creek was surveyed in 1996 and multiple *O. mykiss* year classes were observed. The survey report recommended a program to control erosion and allowing recruitment of woody debris (DFG 1996k).

Hester Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. The resulting report states, "Hester Creek may be expected to produce few yearlings and low densities of young-of-the-year juveniles" (Alley 2003, p. 43).

Laurel

Laurel Creek consists of about 3.1 stream miles and is tributary to West Branch Soquel Creek. It flows east to its confluence with Burns Creek, where the creeks form the West Branch. A 1948 survey notes a dam at about stream mile 0.8. A 1963 survey cited a series of natural falls at about stream mile 4.0 as constituting the natural limit of anadromy (DFG 1963b).

In a 1963 survey report, DFG characterized Laurel Creek as an important drainage due to its summer flows and its resident trout population (DFG 1963b). At the time of the survey, it was unknown if steelhead were using the stream; however, very limited spawning habitat was noted.

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Laurel Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates that Laurel Creek is not accessible to steelhead (County of Santa Cruz 2004).

Burns

Burns Creek consists of about 2.3 stream miles and is tributary to West Branch Soquel Creek. It flows south to its confluence with Laurel Creek, where the creeks form the West Branch.

Staff from DFG surveyed Burns Creek in 1963 and observed multiple year classes, including "abundant" fingerling *O. mykiss*. The survey report states, "These fish appear to be the result of natural propagation from the resident rainbow population… There was no evidence of steelhead or salmon utilization" (DFG 1963c).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in Burns Creek, particularly during summer when low flow occurs naturally (DFG 1996c).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead cannot access Burns Creek due to a dam at the mouth (County of Santa Cruz 2004).

Hinckley

Hinckley Creek consists of about 4.1 stream miles and is tributary to Soquel Creek. It flows west, entering Soquel Creek about 1.3 miles upstream from the West Branch Soquel Creek confluence.

Hinckley Creek was stocked in 1938 and in subsequent years (DFG 1938c). As part of a 1959 stream survey, DFG staff estimated the *O. mykiss* population in Hinckley Creek to be 2,000 individuals. The creek was characterized as "a moderate producer of steelhead rainbow trout" (DFG 1959c).

In 1982, DFG staff said that lower Hinckley Creek was in poor condition due to numerous landslides (DFG 1982d). Notes from a summer 1988 survey of Hinckley Creek indicate the presence of *O. mykiss* and states "flow present" (DFG 1988d).

Hinckley Creek was surveyed in 1996 and multiple *O. mykiss* year classes were observed. The survey report recommended a program to control erosion and allowing natural recruitment of woody debris (DFG 1996l).

Hinckley Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. Young-of-the-year *O. mykiss* were observed and the resulting report notes the importance of the creek in providing relatively cool summer flow to Soquel Creek.

Amaya

Amaya Creek consists of about 2.5 stream miles and is tributary to Soquel Creek. It flows south, entering Soquel Creek about 1.6 miles upstream from the Hinckley Creek confluence.

In a 1959 stream survey report, DFG said that spawning habitat was available only in the lower third of Amaya Creek. The creek was said to be "…in very poor condition due to the extensive logging operations which have occurred in the past" (DFG 1959d). The *O. mykiss* population of the creek was estimated to be about 1,500 individuals.

Sampling by CDF in 1998 found two *O. mykiss* year classes in Amaya Creek. The survey report notes a low population estimate due in part to "small stream size, intermittent fish barrier debris jams, and low habitat quality" (Kotter and Sutfin 1998). Amaya Creek sampling between 1997 and 2003 indicates high variability in the proportion of YOY in the population, ranging from zero percent to about 79 percent (CDF 2003). The oldest fish collected are age 2+.

Amaya Creek was surveyed in 2002 as part of a study of the Soquel Creek watershed. The resulting report states, "…the lower reaches of Amaya Creek were likely productive for juvenile steelhead due to the good cover in pools. And spawning substrate was better quality than other tributaries" (Alley 2003, p. 42).

Aptos

Aptos Creek consists of about 9.4 stream miles and drains a watershed of about 25 square miles. It flows southwest from headwaters on Santa Rosalia Mountain, entering the Pacific Ocean at Seacliff State Beach.

Aptos Creek was stocked prior to 1934 and in subsequent years (DFG 1934f). In 1960, DFG staff stated, "This stream can be considered one of the larger steelhead spawning and nursery streams in the Santa Cruz and San Mateo County areas" (DFG 1960l)

In a 1965 survey, DFG staff said that Aptos Creek contained approximately eight miles of *O. mykiss* nursery area. The population of the creek was estimated to be almost 43,300 individuals, and the stream was called "an important spawning and nursery area for steelhead trout" (DFG 1965b).

As part of a larger study of Santa Cruz County streams, consultants sampled Aptos Creek in 1981. The resulting report indicated that *O. mykiss* was observed at five of five sites. Rearing habitat quality was deemed "good" at only one site, and substrate and lack of cover were said to be primary limiting factors to production (HSA 1982).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that water diversions reduce flows sufficiently to impact habitat in the Aptos Creek mainstem and lagoon (DFG 1996c). The memo also specifically cites development within the floodplain and channel confinement in lower Aptos Creek as producing impacts on habitat conditions. A 1996 memo states, "From a fisheries standpoint, the most significant factor influencing quality and quantity of habitat in the Aptos Creek watershed is sediment" (DFG 1996m).

A 1997 habitat inventory report recommends mapping and treating priority erosion sites related to the road system (DFG 1997f). Staff from DFG surveyed Aptos Creek in 1998 and observed multiple *O. mykiss* year classes, including YOY and individuals to 10.2 inches in length. The survey report recommended discontinuing the practice of constructing rock crossings of the creek (DFG 1998).

As part of an annual survey, Aptos Creek was sampled in 2001 by DFG staff. Steelhead between about two and 12.9 inches in length were observed. Two adult steelhead also were seen, one of which was dead and measured about 21 inches (DFG 2002a).

Stream habitat in the Aptos Creek watershed was assessed in 2001, when multiple *O. mykiss* year classes were observed in five mainstem Aptos Creek reaches. The resulting report states, "Sediment is likely the major factor limiting salmonid production on both a watershed and individual reach scale" (HES 2003, p. 52). Two adult steelhead were observed in Aptos Creek during sampling in 2001 (DFG 2002a). Staff from NMFS surveyed Aptos Creek in 2005 and observed multiple *O. mykiss year* classes throughout a six-mile section (Spence pers. comm.). Juvenile steelhead densities were estimated and habitat conditions assessed in Aptos Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 10.1 and 19.0 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Aptos Creek sites as "Fair" and "Good."

According to the CCRWQCB, water quality in the creek is impaired by sedimentation from disturbed sites and channel erosion (CCRWQCB 2006). In a memo regarding lagoon management a researcher noted, "If the sandbar were in place in summer, the [Aptos Creek] lagoon would probably convert mostly to freshwater, improving mixing and reducing temperature and DO problems" (Smith 2007b).

Valencia

Valencia Creek consists of about 7.2 stream miles, draining a watershed of about 12 square miles, and is tributary to Aptos Creek. It flows southwest, entering Aptos Creek at about stream mile 0.6.

The County of Santa Cruz has constructed a fishway at the Soquel Drive crossing.

Staff from DFG visited Valencia Creek in June 1965 and observed *O. mykiss* (DFG 1965c). As part of a larger study of Santa Cruz County streams, consultants sampled Valencia Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of three sites. Rearing habitat quality was deemed "good" as only one site, and substrate and lack of flow were said to be primary limiting factors to production (HSA 1982). Staff from DFG inventoried Valencia Creek in 1997. The resulting draft report recommends mapping and treating priority erosion sites to reduce sediment input to the creek (DFG 1997g).

Stream habitat in the Aptos Creek watershed was assessed in 2001, when multiple *O. mykiss* year classes were observed in two of three sampling locations in Valencia Creek. The resulting report states, "Evidence from past sampling indicates that Valencia Creek has had higher densities of rearing trout and lower levels of fine sediments than currently occur… The greatest increase in steelhead production on a watershed scale would come from restoring the greatly diminished productive capacity of Valencia Creek (HES 2003, p. 52).

Young of the year *O. mykiss* likely of resident trout ancestry were observed in the Bear Valley headwater fork of Valencia Creek in 2006 (Spence pers. comm.). Juvenile steelhead densities were estimated and habitat conditions assessed in Valencia Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 3.8 and 12.9 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Valencia Creek sites as "Poor" and "Fair." It states, "…much habitat degradation [since 1981 was] observed in the lower reach and similar habitat quality in the upper reach" (Alley 2007, p. 16). The lower reach was deemed "badly sedimented."

Trout Creek Gulch

Trout Creek Gulch consists of about four stream miles and is tributary to Valencia Creek. It flows south, entering Valencia Creek in the city of Aptos.

Trout Creek Gulch was inventoried in 1997 and no salmonids were observed. The resulting report notes a culvert under Trout Gulch Road as a barrier to migration. Trout Creek was surveyed in 2001 as part of a fisheries habitat assessment of the Aptos Creek watershed, and *O. mykiss* was not observed (HES 2003).

Bridge

Bridge Creek consists of about 2.4 stream miles and is tributary to Aptos Creek. It flows south, entering Aptos Creek at about stream mile 4.5. In 1960, DFG staff noted that a 30 to 40 foot natural falls was a barrier to fish passage (DFG 1960m).

In a 1960 stream survey, DFG staff found *O. mykiss* "throughout the lower and mid sections in fair numbers" (DFG 1960m). The report notes that Bridge Creek "appears to be a good spawning and nursery stream up to the natural falls" (DFG 1960m).

Staff from DFG noted in 1982 that Bridge Creek was "suffering from numerous slides" and had "virtually no habitat to support an anadromous fishery" (DFG 1982e). A 1997 stream inventory included sampling at 13 locations, of which nine had *O. mykiss*

comprising two year classes (CCC 1997). Staff from DFG surveyed Bridge Creek in 1998 and observed *O. mykiss* YOY at one site (DFG 1998).

Bridge Creek was surveyed in 2001 as part of a fisheries habitat assessment of the Aptos Creek watershed, when multiple *O. mykiss* year classes were observed. The resulting report notes very little spawning habitat in the creek and states, "Fine sediments…likely limit the productive capacity of Aptos and Bridge Creeks…" (HES 2003, p. 52).

Pajaro River

The Pajaro River consists of about 31 stream miles and drains a watershed of approximately 1,300 square miles. It flows west from headwaters at San Felipe Lake, entering the Pacific Ocean southwest of the city of Watsonville.

A 1960 DFG letter states, "…steelhead runs in the Pajaro apparently fluctuate greatly from a few fish to several hundred" (DFG 1960n). In 1961, DFG noted, "Warden Smith feels that the Pajaro River provides more fish and fishing than any other stream in this area" (DFG 1961g).

According to a DFG estimate, the 1963-1964 steelhead run comprised 1,500 individuals (DFG 1964c). A 1964 DFG memo noted that steelhead used the mainstem Pajaro River near the "gravel plant at Gilroy" for spawning (DFG 1964c). In 1965, DFG staff offered the following assessment:

> "The Pajaro River has lost the majority of its anadromous fish runs. Only a limited steelhead run persists in the lower reaches and enters several small tributary streams. Logging, conversion of land to agricultural crops, and construction of dams have resulted in the decline of this habitat in the drainage. Not much hope can be expressed for improving this situation.
>
> The limiting factor is siltation erosion of the spawning grounds. Maximum runs could be achieved only by stringent erosion control measures" (DFG 1965d, p. 397).

In a 1966 memo, DFG staff noted that most spawning in the Pajaro River system occurred in the mainstem Pajaro River between the Granite Rock Company Plant and the Llagas Creek confluence (DFG 1966j). The memo states, "Over the last ten years it is estimated that the runs varied from a low of 500 to a high of 2,000 spawning pairs. Some spawning takes place, but results are nil due to activities of flood control people with bull-dozers" (DFG 1966j). The memo characterized the Pajaro River lagoon as having "year-round fishery importance" due in part to its function of providing a holding area for downstream steelhead migrants.

In 1975, Jerry Smith stated, "Three general factors affect the steelhead populations in the Pajaro system: the migration pathway, spawning sites, and nursery areas. Of the three, the most critical is suitable nursery areas" (Smith 1975).

In a 1994 report Jerry Smith notes, "…because of the very poor passage conditions during the drought, most of the steelhead now in the watershed are probably descended from hatchery origin fish" (Smith 1994, p. 9). In a 1996 memo concerning habitat limitations in central coast streams, DFG staff note that severe erosion due in part to the removal of riparian vegetation and illegal grading has led to sedimentation of spawning habitat in the mainstem Pajaro (DFG 1996c). The memo also specifically cites reduced stream flow due to diversion and well pumping, lack of riparian cover, and pollution from agricultural, septic, and stormwater sources as degrading habitat.

In a draft 2002 report Jerry Smith states, "Steelhead apparently do not rear in the lagoon because spawning areas are far upstream within Pajaro River tributaries… However, the lagoon provides potentially important feeding habitat in spring for outmigrating smolts" (Smith 2002, p. 2). The draft also notes, "The Pajaro River serves as a migration pathway for steelhead, but because of low and warm summer streamflows and substrate dominated by sand or silt it provides almost no potential rearing habitat for steelhead" (Smith 2002, p. 1). According to Dr. Smith, spawning and rearing habitat occurs in Corralitos, Pescadero, Uvas, Llagas and Pacheco creeks.

A 2002 letter from NMFS staff addressed the flood control project in the lower portion of the Pajaro. The letter states, "Existing impacts to the Pajaro River fishery include, but are not limited to, water diversions, permanent and seasonal dams, urban and agricultural pollution, sedimentation, timber harvest, loss of riparian and instream habitat, and channelization. Impacts to this fishery are pervasive, chronic, and ongoing: viable steelhead runs are limited to a few tributaries principally located in Uvas, Bodfish, Corralitos, Salsipuedes, and Llagas Creeks" (NMFS 2002a). Based in part on the approach being taken to flood control, the environmental organization American Rivers named the Pajaro River the "most endangered river" in the United States in 2006.

Corralitos (Salsipuedes)

Corralitos Creek consists of about 16 stream miles and is tributary to the Pajaro River. On USGS maps and in some reports, Corralitos Creek between the mouth and Highway 152 is referred to as Salsipuedes Creek. The creek flows southeast, entering the Pajaro in the southeast portion of the city of Watsonville. A diversion dam supplying Watsonville is located upstream from the town of Corralitos. According to DFG staff, the existing fishway may be replaced to improve fish passage prior to the year 2010 (Nelson pers. comm.).

In 1959, DFG referred to Corralitos Creek as one of the principal tributaries of the Pajaro River, noting that the stream supported a "good steelhead run" and included more than nine miles of spawning area (DFG 1956j). A 1960 stream survey report stated that the creek was small but served as nursery habitat due to perennial flow produced by springs in the drainage (DFG 1960o).

A 1966 memo notes that lower Corralitos and Salsipuedes Creek is an important migration route. The memo states, "Corralitos Creek from the water diversion is an important steelhead spawning and nursery area" (DFG 1966j).

San Jose State University faculty noted "good extensive spawning and nursery areas" in Corralitos Creek in 1975 (Smith 1975). In 1980, Dr. Smith referred to Corralitos Creek as an "important steelhead stream" for the Pajaro River system (Smith 1980). According to a consultant's report, Salsipuedes Creek "has persistent, low summer streamflow and, due to lack of shading, has high summer water temperatures (to 80 degrees)" (Swanson ca 1991).

As part of a larger study of Santa Cruz and Monterey counties streams, consultants sampled Corralitos Creek in 1981. The resulting report indicated that *O. mykiss* was observed at nine of nine sites. Rearing habitat was deemed "good" or better at three sites, with substrate and lack of flow comprising primary limiting factors to production (HSA 1982).

A 1994 study of *O. mykiss* in Corralitos and Browns creeks found a substantial decrease (74 percent) in the estimated number of YOY from the 1981 estimate. The study produced an estimate of 259 "total spawners" in the basin (Alley 1994). The report noted that the expected run size could be 50 percent of the estimated value, or about 130 individuals. In a 1994 report, Jerry

Smith notes that the Corralitos Creek steelhead population, unlike those in other Pajaro River tributaries, "is likely to still retain a substantial native genetic component" (Smith 1994).

In a 1996 memo concerning habitat limitations in central coast streams, DFG staff noted silt loading from logging and poor road maintenance and lack of riparian cover as adversely affecting habitat (DFG 1996c).

Juvenile steelhead densities were estimated and habitat conditions assessed in Corralitos Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 19.3, 13.2, and 41.6 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Corralitos Creek sites as "Good," "Fair," and "Very Good." It states, "Substrate conditions in Corralitos Creek have generally degraded in the 3 reaches studied [since 1994]" (Alley, p. 115). The report recommends installing stream gages at the diversion dams on Browns Valley and Corralitos Creeks to allow comparison of streamflow upstream and downstream from the diversions.

Casserly

Casserly Creek consists of about 6.2 stream miles. It flows south, and its confluence with Corralitos Creek north of the city of Watsonville marks the beginning of Salsipuedes Creek. College Lake is formed seasonally by impounding Casserly Creek flows.

As part of a larger study of Santa Cruz County streams, consultants sampled Casserly Creek in 1981. The resulting report indicated that *O. mykiss* was not observed at any of three sites. Rearing habitat was deemed "below average", with substrate and lack of flow comprising primary limiting factors to production (HSA 1982). As part of a 1982 barrier survey, staff from DFG noted "abundant" steelhead YOY in Banks Canyon, which is the headwaters of Casserly Creek (DFG 1982f).

In a 1997 letter, Jerry Smith reported observing multiple *O. mykiss* age classes and smolts in Casserly Creek. The letter states, "…outmigration from Casserly is difficult; by 3 May flows in the lower part of the creek were already too low to permit outmigration" (Smith 1997d).

Green Valley

Green Valley Creek consists of about 5.1 stream miles and is tributary to Casserly Creek. Green Valley Creek flows south, entering Casserly Creek upstream from the location of College Lake.

A 1958 memo states, "The College Lake drainage is intermittent. It is of no value to fishlife. We have taken measures in the past to prevent steelhead from ascending this drainage, as flows dry before many of the adults and all of their spawn have a chance to reach permanent water" (DFG 1958b).

As part of a larger study of Santa Cruz County streams, consultants sampled Green Valley Creek in 1981. The resulting report indicated that *O. mykiss* was not observed at any of four sites. Rearing habitat was deemed "below average" or worse and migration access was generally "poor" (HSA 1982).

In a 1997 letter, Jerry Smith notes that *O. mykiss* in Green Valley Creek, "may be exclusively or primarily a resident trout population" (Smith 1997d). The letter states, "Up and downstream passage is difficult in this system…" (Smith 1997d). A 2001

restoration plan states, "Size structure in spring 1997, lack of smolted fish, and distinctive genetics indicate that all or most of the 'rainbow trout' in Green Valley Creek are now resident, rather than migratory steelhead" (ESE 2001, p. 98).

Browns (Browns Valley)

Browns Creek consists of about 5.9 stream miles and is tributary to Corralitos Creek. It flows southwest, entering Corralitos Creek near the town of Corralitos. A diversion dam on the creek has a fishway.

Staff from DFG surveyed Browns Creek in 1934 and noted the presence of steelhead. The survey report indicates past stocking and "very good" natural propagation (DFG 1934g).

In 1962, DFG noted "limited and scattered pockets of suitable spawning gravel" in Brown's Valley Creek (DFG 1962b). This survey report stated that the stream was accessible to spawning steelhead only after heavy flows when fish could pass downstream "dry areas" (DFG 1962b). Surprisingly, perennial flow was attributed to the stream. A 1966 memo states, "From 2.5 miles from mouth upstream to Gamecock Canyon (3 miles) is a steelhead spawning and nursery area. Summer trout fishery…exists" (DFG 1966j).

Jerry Smith noted "good extensive spawning and nursery areas" in Browns Valley Creek in 1975 (Smith 1975). In 1980, Dr. Smith referred to Brown's Valley Creek as an "important steelhead stream" for the Pajaro River system (Smith 1980).

As part of a larger study of Santa Cruz County streams, consultants sampled Browns Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of two sites. Some rearing habitat was deemed "good to very good", with substrate and lack of flow comprising primary limiting factors to production (HSA 1982).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of most of the length of Browns Creek (County of Santa Cruz 2004). However, the portion of Browns Creek that flows through the alluvial valley is de-watered during the summer months (Nelson pers. comm.).

Juvenile steelhead densities were estimated and habitat conditions assessed in Browns Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 17.0 and 16.9 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Browns Creek sites as "Good." It states, "Substrate conditions in Browns Valley Creek generally declined in 2006 compared to 1994 in the 2 reaches studied" (Alley, p. 28). The report recommends installing stream gages at the diversion dams on Browns Valley and Corralitos Creeks to allow comparison of streamflow upstream and downstream from the diversions.

Ramsey Gulch

Ramsey Gulch Creek consists of about 2.2 stream miles and is tributary to Brown's Creek. It flows south, entering Brown's Creek east of the mouth of Redwood Canyon.

A 1966 memo states, "Lower Gamecock Canyon and Lower Ramsey Gulch have steelhead spawning and nursery areas" (DFG 1966j). In a 1967 survey of Browns Valley Creek, DFG staff noted multiple *O. mykiss* year classes in Ramsey Gulch Creek (DFG 1967c).

As part of a larger study of Santa Cruz County streams, consultants sampled Ramsey Gulch Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site. Rearing habitat was deemed "below average", with substrate and lack of flow comprising primary limiting factors to production (HSA 1982).

Staff from DFG surveyed Ramsey Gulch Creek in 2002 and observed *O. mykiss*. The survey report states, "The anadromous portion of this stream is relatively short" (DFG 2003).

Gamecock Canyon

Gamecock Canyon Creek consists of about 2.3 stream miles and is tributary to Brown's Creek. It flows south, entering Brown's Creek immediately upstream from the Ramsey Gulch Creek confluence.

A 1966 memo states, "Lower Gamecock Canyon and Lower Ramsey Gulch have steelhead spawning and nursery areas" (DFG 1966j). In a 1967 survey of Brown's Valley Creek, DFG staff noted multiple *O. mykiss* year classes in Gamecock Canyon Creek (DFG 1967c).

As part of a larger study of Santa Cruz County streams, consultants sampled Gamecock Canyon Creek in 1981. The resulting report indicated that *O. mykiss* was observed at one site. Rearing habitat was deemed "poor to below average", with substrate and lack of flow comprising primary limiting factors to production (HSA 1982). A 1996 DFG memo indicates that poor grading practices and removal of riparian vegetation adversely impacted habitat in the creek (DFG 1996c).

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead can access the lower one mile of Gamecock Canyon Creek, while resident rainbow trout occur upstream from a natural passage barrier (County of Santa Cruz 2004).

Rider

Rider Creek consists of about 1.8 stream miles and is tributary to Corralitos Creek. It flows southeast, entering Corralitos Creek about 1.8 miles upstream from the Browns Creek confluence.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates that steelhead can access the one half mile reach downstream of Rider Creek downstream from a natural passage barrier (County of Santa Cruz 2004).

Eureka Gulch

Eureka Gulch Creek consists of about 1.5 stream miles and is a headwaters tributary of Corralitos Creek. It flows east, entering Corralitos Creek in Eureka Canyon.

Staff from DFG noted *O. mykiss* in Eureka Gulch Creek in 1945 (DFG 1945c). A 1963 memo relays observations of adult steelhead in the creek in that year (DFG 1963d).

A 1983 consultants' report does not note a native fish association in Eureka Canyon Creek. The report states that Eureka Gulch has "barriers and poor substrate which prevent…use for steelhead rearing" (Alley 1983).

Shingle Mill Gulch (Shingle Mill)

Shingle Mill Gulch Creek consists of about 1.6 stream miles and is a headwaters tributary of Corralitos Creek. It flows east, entering Corralitos Creek in the northern portion of Eureka Canyon.

Staff from DFG surveyed Shingle Mill Gulch in 1967 and observed *O. mykiss*. The survey report noted the presence of suitable spawning areas (DFG 1967d).

As part of a larger study of Santa Cruz County streams, consultants sampled Shingle Mill Gulch Creek in 1981. The resulting report indicated that *O. mykiss* was observed at three of three sites. Rearing habitat was deemed "fair", with low summer flow comprising a primary limiting factor to production (HSA 1982).

Shingle Mill Gulch was sampled as part of a study of Santa Cruz County streams in 1994. Three *O. mykiss* year classes were noted, and results were used to estimate a possible contribution to the Corralitos Creek steelhead run (Alley 1994).

Juvenile steelhead densities were estimated and habitat conditions assessed in Shingle Mill Gulch Creek in 2006 as part of a study of several Santa Cruz County watersheds. The resulting report notes estimated smolt densities of 16.2 and 3.4 per 100 feet of stream at the sampling sites, that may be compared to a range of 1.2 to 41.6 per 100 feet throughout the study area (Alley 2007). The report rates the smolt habitat at the Shingle Mill Creek sites as "Good" and "Poor." It states, "Substrate conditions in Shingle Mill Gulch have generally degraded since 1994" (Alley, p. 28).

Rattlesnake Gulch

Rattlesnake Gulch Creek consists of 1.5 stream miles and is tributary to Shingle Mill Gulch Creek. It flows south, entering Shingle Mill Gulch Creek at Grizzly Flat.

A 1967 survey report for Corralitos Creek notes that Rattlesnake Gulch has steelhead spawning areas (DFG 1967d). A 1996 DFG memo indicates that poor grading practices and removal of riparian vegetation adversely impacted habitat in the creek (DFG 1996c).

A steelhead and coho salmon distribution map was prepared by Santa Cruz County in 2004. The map indicates steelhead use of a short reach of Rattlesnake Gulch Creek (County of Santa Cruz 2004).

Diablo Gulch

Diablo Gulch Creek consists of about 1.7 stream miles and is tributary to Corralitos Creek. It flows southwest entering Corralitos Creek near the headwaters.

A steelhead and coho salmon distribution map was produced by Santa Cruz County in 2004 based on information from DFG and local fishery biologists. The map indicates the presence of resident rainbow trout in Diablo Gulch Creek (County of Santa Cruz 2004).

Coward

Coward Creek consists of about 5.2 stream miles and is tributary to the Pajaro River. It flows southwest, entering the Pajaro River south of Johnston Corner.

Coward Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

A 1983 consultants' report states, "The upper section of the stream…has summer flow but spawning substrate is very poor. Pools are shallow and rearing habitat is also poor (no fish were seen in 1982)" (Alley 1983).

Pescadero

Pescadero Creek consists of about 8.6 stream miles and is tributary to the Pajaro River. It flows southeast, entering the Pajaro near the town of River Oaks.

A 1964 DFG memo noted that steelhead used Pescadero Creek "at Chittenden, up approximately 3 miles" for spawning (DFG 1964c). In a 1967 report, DFG notes that the creek "is an important tributary in that it contributes about 7 miles of spawning and nursery area for steelhead" (DFG 1967e).

As part of a larger study of Santa Cruz County streams, consultants sampled Pescadero Creek in 1981. The resulting report indicated that *O. mykiss* was observed at two of two sites. Rearing habitat was deemed "fair", with substrate and lack of flow comprising primary limiting factors to production (HSA 1982). A 1983 consultants' report states, "In dry years, rearing habitat is greatly reduced, with much of the lower streambed going dry. Even in dry years, however, the stream is important for steelhead rearing because migration into and out of the creek is still possible" (Alley 1983, p. 250).

In a 1996 memo, staff from DFG noted that logging operations produced high sedimentation levels in Pescadero Creek (DFG 1996c). Information collected by NMFS staff indicates that steelhead was observed in Pescadero Creek in the years 1999 to 2001. Observations included *O. mykiss* YOY and adults (NMFS 2002b).

In a recent survey, staff from DFG observed *O. mykiss* YOY and 1+ in Pescadero Creek upstream to about stream mile 4.0 (Nelson pers comm.). Habitat appeared to be in relatively good condition although some excess sedimentation was occurring due to cattle access to the riverine/riparian area.

Star

Star Creek consists of about 1.3 stream miles and is tributary to Pescadero Creek. It flows east, entering Pescadero Creek at about stream mile 3.7.

Star Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

San Benito River

The San Benito River consists of more than 100 stream miles and is tributary to the Pajaro River. It flows northwest, entering the Pajaro east of the town of River Oaks.

The San Benito River was stocked in 1938 and in subsequent years (DFG 1940b). In a 1940 correspondence, DFG states that San Benito Creek "is a good trout stream in its headwaters" with "considerable runs of sea-run steelhead" in some years. The letter also noted annual drying of the lower portions of the San Benito River (DFG 1940b).

A 1962 DFG correspondence states that the "small sporadic run of steelhead" in the San Benito River "has been largely if not completely eliminated by the construction of the Hernandez Project near San Benito (DFG 1962c). In a 1965 letter, DFG states that the San Benito River has "steelhead runs when there is a series of wet winters" (DFG 1965e). In 1968, DFG said that the San Benito River had four miles of "trout water" (DFG 1968b).

A 1983 consultants' report indicates that no rearing habitat exists downstream from Hernandez Reservoir. The report states, "From the mouth upstream to Prescott Road, the San Benito River is dry in summer (and most of the rest of the year)" (Alley 1983, p. 244).

A 2002 draft report states, "Steelhead have occasionally entered tributaries of the San Benito River in recent wet yeas (1995-1998)… The observed steelhead were probably the result of adult straying by hatchery-reared smolts planted in the Pajaro River and Uvas Creek" (Smith 2002, p. 5). Staff from NMFS found *O. mykiss* to be absent from the San Benito River in 2003 (NMFS 2005).

San Juan Canyon

San Juan Canyon Creek consists of more than ten stream miles and is tributary to the San Benito River. It flows through San Juan Canyon, then the San Juan Valley, and enters the San Benito River immediately upstream from the Pajaro River confluence.

In a 1965 letter, DFG states that San Juan Canyon Creek has "steelhead runs when there is a series of wet winters" (DFG 1965e). In 1993 DFG staff stated, "This stream is one of the higher quality stream corridors that I have observed in San Benito County because of the cleaner gravel substrate, the existence of water flow, and the healthy riparian vegetation" (DFG 1993c).

Bird

Bird Creek consists of about 7.8 stream miles and is tributary to the San Benito River. The stream flows northeast, entering the San Benito River south of Hollister.

Bird Creek is included in a DFG list of Monterey County streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

Juvenile *O. mykiss* were observed in Bird Creek in 1995. The fish were believed to be the progeny of hatchery-reared trout planted in the Pajaro River and Uvas Creek (Smith 2002, p. 5). Staff from DPR surveyed Bird Creek in 2004 and observed *O. mykiss* to about seven inches in length near Cienega Road. The survey report indicates that most of Bird Creek is dry during the summer. Within the Hollister Hills Vehicular Recreation Area, the creek was said to be largely "pristine," while downstream areas showed "pronounced" effects from cattle grazing (DPR 2004).

Tres Pinos Creek

Tres Pinos Creek is tributary to the San Benito River. It flows generally northwest, entering the San Benito River just west of the town of Tres Pinos.

Tres Pinos Creek was sampled between 1972 and 1974 by Dr. Jerry Smith. *Oncorhynchus mykiss* was not observed in the three sampling locations (Smith 1974).

Pescadero

Pescadero Creek consists of about 13.8 stream miles and is tributary to the San Benito River. It flows east, entering the San Benito south of the town of Paicines.

A 1973 DFG warden's letter describes steelhead trout in the Pajaro and San Benito river systems. The letter states, "A small stream…called Pescadero Creek…used to have great numbers of steelhead trout" (DFG 1973e).

Dead adult steelhead were observed in Pescadero Creek in 1997. The fish were believed to be straying individuals of hatchery origin (Smith 2002, p. 5).

Picacho

Picacho Creek consists of about 2.7 stream miles and is tributary to the San Benito River. It flows southwest from Picacho Peak, entering the San Benito upstream from Hernandez Reservoir.

A 1946 DFG record indicated that *O. mykiss* was present in Picacho Creek (DFG 1946). The origin of the fish was not stated.

Uvas (Carnadero)

Uvas Creek consists of more than 27 stream miles and is tributary to the Pajaro River. The confluence is south of the town of Carnadero. In surveys and maps, the most downstream reach is referred to as Carnadero Creek. Uvas Dam, constructed in the late 1950s, is located at about stream mile 17.5.

A 1912 report noted, "The dead bodies of large steelheads were occasionally seen in Uvas, Arroyo Seco, and Nacimiento Creeks. At high water they are said to enter all the streams in large numbers" (Snyder 1912). A 1955 field note reports loss of about 200 "large SH spawners" due to drying of the Uvas Creek channel (DFG 1955).

In 1963, DFG estimated that the Uvas Creek fingerling *O. mykiss* population in 1954 (prior to completion of Uvas Dam) exceeded one million individuals (DFG 1963e). In a 1960 survey report, DFG states that "Uvas-Carnadero Creek is the largest in that area and in the past has had the largest steelhead run" (DFG 1960p). The report notes, "…steelhead trout still ascend the stream every year although in diminishing numbers" (DFG 1960p). The surveyors observed "highly productive" habitat between the Adams School bridge and the base of Uvas Dam, with less productive downstream conditions due to lack of flow (DFG 1960p). Uvas Creek upstream from the reservoir also was surveyed in 1960 by DFG. While the report notes "excellent trout habitat" in the stream, it cites low summer flows as a limiting factor to production (DFG 1960q).

A DFG letter from 1963 noted that approximately 30 stream miles of nursery area were "wiped out" by dam construction (DFG 1963e). In 1966, DFG staff stated about Uvas Creek, "Poor nursery area due to poor summer flows from Uvas Dam" (DFG 1966j).

A 1983 consultants' report states, "A portion of the water stored in Uvas Reservoir is transferred to the Llagas Creek basin for groundwater percolation. The loss of this water, the timing of its transfer to Llagas basin, and variation in releases from Uvas Reservoir from year to year, limit steelhead production downstream of the reservoir" (Alley 1983, p. 234)

In a 1994 memo, Jerry Smith notes that releases are made from Uvas Dam for percolation, "potentially providing good summer steelhead rearing except in extreme drought years" (Smith 1994). In a 1997 letter, Dr. Smith reported observing multiple *O. mykiss* year classes in upper Uvas Creek (Smith 1997d). He notes, "…the trout population [upstream from the reservoir] appears to depend upon immigration of fish from upstream" (Smith 1980).

A draft 2002 report states, "Uvas Reservoir is the only reservoir in the Pajaro river watershed…whose water right specified minimum winter releases and summer releases (usually 10 cfs, except in drought years) for maintaining fish resources" (Smith 2002, p. 7). It adds, "…fish captured during recent late summer sampling (1997-2000) have generally been substantially smaller and scarcer than in the past, apparently due to declines in substrate quality and food availability due to development along the stream" (Smith 2002, p. 10). According to the draft report, *O. mykiss* occurring in Uvas Creek likely is descended from stocked smolts. However, "Fish upstream of barriers on Bodfish and Little Arthur creeks and upstream of the reservoir on Uvas Creek appear to be native strains, but they are resident rainbow trout, rather than anadromous steelhead" (Smith 2002, p. 10).

Tar

Tar Creek consists of about 7.9 stream miles and is tributary to Carnadero Creek. It flows southeast, entering Carnadero Creek at about stream mile 0.3.

Staff from DFG surveyed Tar Creek in 1967 and observed *O. mykiss*. The survey report states, "It is possible that steelhead may ascend this stream occasionally but absence of fingerlings show it probable none ascended this year. There appears to be sufficient cover, food and low enough water temperatures to support trout but stream may be intermittent in dryer years" (DFG 1967f).

Tar Creek was surveyed in 1978 and *O. mykiss* was observed. The survey report states, "Tar Creek appears to support some salmonid production… Overgrazing of the watershed and wallowing in the streambed by cattle has caused heavy silt loads in the streambed" (DFG 1978). The creek was characterized as having "minor importance" for spawning and nursery, but greater value in providing winter and spring flows to downstream areas. Faculty from San Jose State University sampled Tar Creek in 1979. The resulting report indicates "…a good population of yearling and young-of-the-year steelhead" (Smith 1979).

Staff from DFG visited Tar Creek in 2000 and observed multiple *O. mykiss* year classes. Abundance was not quantified but population density appeared to be in the medium range. Low flows and sedimentation were identified as factors limiting the population (Nelson pers. comm.).

A draft 2002 report states, "This small tributary provides spawning and rearing in most years, but the small size of the stream, low streamflows, dense shading, and shallow pools probably limit young-of-year steelhead density and growth rate" (Smith 2002, p. 6).

Tick

Tick Creek consists of about 2.8 stream miles and is tributary to Carnadero Creek. It flows southeast, entering Carnadero Creek immediately upstream from the Tar Creek confluence.

Tick Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

Bodfish

Bodfish Creek consists of about 7.9 stream miles and is tributary to Uvas Creek. The stream's watershed is about 7.5 square miles and the confluence with Uvas Creek is just west of Gilroy.

A 1959 survey report noted that steelhead spawned mostly in the lower section of Bodfish Creek, although "scarce" native trout existed in the upper (DFG 1959e). In 1967, DFG characterized Bodfish Creek as providing "important nursery and spawning areas" for the Pajaro River steelhead run (DFG 1967g). A 1968 survey report indicated that the best spawning habitat occurred "one mile above and below the Granite Creek tributary" (DFG 1968c, p. A-29).

Jerry Smith noted "good spawning and nursery areas" in Bodfish Creek in 1975 (Smith 1975). In a 1976 letter he stated, "Bodfish Creek produces relatively stable numbers of steelhead juveniles" (Smith 1976). A 1980 summary of sampling results describes Bodfish Creek as a "small, generally shallow, cool stream" (Smith 1980).

A 1983 consultants' report notes the presence of a "fair trout" association in Bodfish Creek, as well as some "good" or better rearing habitat. Access to spawning steelhead is not available upstream from Sprig Lake, according to the report. It states, "Sprig Lake provides good to excellent rearing habitat for juvenile steelhead in most years…" (Alley 1983). Stocking of the lake is cited.

According to a draft 2002 report, *O. mykiss* occurring in Bodfish Creek likely is descended from stocked smolts. However, "Fish upstream of barriers on Bodfish and Little Arthur creeks and upstream of the reservoir on Uvas Creek appear to be native strains, but they are resident rainbow trout, rather than anadromous steelhead" (Smith 2002, p. 10).

Bodfish tributary 1 (Renz Gulch, Granite)

Granite Creek consists of about one stream mile and is tributary to Bodfish Creek. It flows north through Renz Gulch, joining Bodfish Creek in the Whitehurst area.

A 1967 DFG stream survey noted *O. mykiss* in Granite Creek. The survey report states, "…two tributaries of Bodfish [Creek] provide spawning and nursery areas" (DFG 1967g). Granite Creek is assumed to be one of the tributaries.

Blackhawk Canyon

Blackhawk Canyon Creek consists of about 1.8 stream miles is tributary to Bodfish Creek. The creek flows east to its confluence with Bodfish Creek at Sprig Lake.

A 1940 DFG survey report for Blackhawk Canyon Creek found "excellent" propagation of steelhead (DFG 1940c).

In 1990 Jerry Smith wrote, "…Blackhawk Canyon Creek…has only very shallow pools, supports only small young-of-the-year steelhead, and is unable to provide overwintering habitat for steelhead, which move into Bodfish Creek with heavy winter flows. The fish are able to fulfill their additional needs elsewhere, and Blackhawk Canyon Creek is heavily and continuously utilized by spawning steelhead" (Smith 1990, p. 3).

Bodfish tributary 2

This unnamed creek consists of about 2.1 stream miles and is tributary to Bodfish Creek. It flows east, parallel to Highway 152 in Mt. Madonna County Park.

A 1967 DFG stream survey indicates observations of *O. mykiss* in this unnamed tributary. The survey report states, "two tributaries of Bodfish [Creek] provide spawning and nursery areas" (DFG 1967g). The unnamed headwater tributary to Bodfish Creek is identified as one of the tributaries.

Little Arthur

Little Arthur Creek consists of about 6.1 stream miles and is tributary to Uvas Creek. It flows east, entering Uvas Creek about four miles downstream from Uvas Reservoir. A fishway was constructed on Pickel's Dam, located at stream mile 1.5, in the mid 1980s. Ferbrache Dam also is a barrier to upstream passage.

A 1961 DFG field note conveys the observation of the game warden that approximately 200 steelhead spawned in Little Arthur Creek in the winter of 1959-1960 (DFG 1961h). In a 1968 memo concerning central coast streams, the annual steelhead run of Little Arthur Creek was estimated to consist of 25-150 individuals (Wood 1968).

A 1973 DFG survey report states, "Summer flow is the limiting factor regarding steelhead production" (DFG 1973f). In 1975, Jerry Smith noted "potentially good spawning and nursery areas" in Little Arthur Creek upstream from the dam (Smith 1975). A 1976 memo from Jerry Smith states, "Ferbrache Dam is a barrier preventing use of 2 miles of nursery areas downstream from Redwood Retreat" (Smith 1976). The memo also notes that the stream typically goes dry downstream of the dam.

According to a draft 2002 report, *O. mykiss* occurring in Little Arthur Creek likely is descended from stocked smolts. However, "Fish upstream of barriers on Bodfish and Little Arthur creeks and upstream of the reservoir on Uvas Creek appear to be native strains, but they are resident rainbow trout, rather than anadromous steelhead" (Smith 2002, p. 10).

Uvas tributary

This creek consists of about 1.7 stream miles. It flows north, entering Uvas Creek about 0.2 miles downstream from Uvas Dam.

In 1983, staff from DFG noted *O. mykiss* juveniles in the unnamed tributary to Uvas Creek. A memo states, "This stream reportedly had a large number of adult steelhead enter it this last season…" (DFG 1983c).

Croy

Croy Creek consists of about 2.4 stream miles and is a headwaters tributary of Uvas Creek. It flows north, on the western flank of Croy Ridge.

In a 1997 letter, Jerry Smith reported observing multiple *O. mykiss* year classes in Croy Creek (Smith 1997d).

Llagas

Llagas Creek consists of about 30 stream miles and is tributary to the Pajaro River. It flows southwest, entering the Pajaro southeast of the city of Gilroy. Chesbro Dam, constructed in the late 1950s, is located about two miles west of the city of Morgan Hill at stream mile 29.5.

A 1956 DFG plan for Llagas Creek notes, "even in the winter in most years…there is seldom a flow as far downstream as U.S. Highway 101. As a consequence, there is no significant annual run of steelhead…" (DFG 1956k). The plan characterizes the impact of Chesbro Dam:

> "During those rare winters when flows permit a good run of steelhead in Llagas Creek, the dam will block the fish from about 11 miles of fair spawning gravel. Since this occurs only about once in 10 or more years on the average, the run in not felt to contribute much to the steelhead population of the Pajaro River drainage" (DFG 1956k).

In a 1960 survey report, DFG summarized the portion of Llagas Creek upstream of the reservoir thusly, "Because of the general lack of water which occurs in the stream during the summer months, it is estimated by this investigator that the stream is of little use as a game fish fishery" (Schreiber 1960).

A 1966 memo states, "Nursery areas for steelhead are doubted to exist due to poor flows originating from Chesbro Dam" (DFG 1966j). In a 1968 memo concerning central coast streams, DFG staff state, "…the steelhead resource is almost completely gone because of this reservoir" (Wood 1968).

A 1971 DFG estimate of the Llagas Creek steelhead run was 50-150 individuals (DFG 1971b). In 1973, Jerry Smith estimated the YOY population in the 0.5 reach below Chesbro Dam to be 1,000 individuals (Smith 1973). A 1978 summary of sampling results noted that drought and the presence of a migration barrier might have "temporarily eliminated the run" in Llagas Creek (Smith 1978).

In a 1980 letter, DFG staff stated, "…steelhead spawning and rearing apparently were restricted to the approximate 5-mile reach from Chesbro Dam downstream to Santa Teresa Boulevard" (DFG 1980d). The letter notes, "…channel modification, streamflow regulation, and the severe 1976-1977 drought…may have eliminated the steelhead population as a self-sustaining resource" (DFG 1980d). To re-establish the population, DFG recommended dam releases of 5 cubic feet per second to provide "significant rearing habitat" and 15 to 20 cubic feet per second to support "good spawning conditions" (DFG 1980d, p. 4).

In a 1994 memo, Jerry Smith notes that releases are made from Chesbro Dam for percolation, "potentially providing good summer steelhead rearing except in extreme drought years" (Smith 1994). He points out, however, that minimum release requirements are not in place for the reservoir.

A draft 2002 report states, "The present steelhead run in Llagas Creek probably amounts to relatively few adult fish, possibly as strays, in wetter years only" (Smith 2002, p. 27). The report adds that the perennial headwaters of Llagas Creek upstream from the reservoir contain a healthy population of resident rainbow trout. Staff from NMFS observed Llagas Creek to be dry in 2003, and therefore not supporting *O. mykiss* (NMFS 2005). According to the CCRWQCB, water quality in the creek is impaired by low dissolved oxygen from municipal point sources, irrigated crop production, agricultural return flows, and habitat modification (CCRWQCB 2006).

Machado Creek

Machado Creek consists of about 2.2 steam mile and is tributary to Llagas Creek. The confluence is located at the south end of Paradise Valley.

In a 1973 report Jerry Smith states, "In wet years, steelhead will also spawn in small tributary streams such as the one which parallels Sycamore Avenue; they did so in 1973. However, these tributary streams dry up early and strand the steelhead fry" (Smith 1973). The creek being described is assumed to be Machado Creek.

Tequisquita Slough

Tequisquita Slough is tributary to the Pajaro River via San Felipe Lake. The confluence is west of the town of San Felipe.

Tequisquita Slough appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). While we did not find records of *O. mykiss* observed in the slough, upstream tributaries appear to have had historical *O. mykiss* occurrence.

Santa Ana

Santa Ana Creek consists of about 20 stream miles and is tributary to Tequisquita Slough. The confluence is south of the town of Dunneville.

Santa Ana Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

A draft 2002 report indicates that Santa Ana Creek is "…apparently too dry to support stream fishes" (Smith 2002, p. 30).

Arroyo de las Viboras

Arroyo de las Viboras consists of more than 13 stream miles and is tributary to Tequisita Slough. It flows west, entering Tequisita Slough north of the Hollister airport.

In a 1938 letter to DFG, a sportsman describes Arroyo de las Viboras as an "excellent" stream for trout (Garcia 1938). Stocking occurred in years prior to 1938, and it is unclear the origin of *O. mykiss* in the arroyo. However, the letter indicated that steelhead accessed the creek in some years.

Arroyo de las Viboras appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

A 1983 consultants' report summarized conditions in the arroyo by stating, "Unused dams at miles 2 and 2 1/2…block steelhead access to perennial habitat upstream. No suitable rearing habitat is now present below the dams due to low flows and high water temperatures. Adult steelhead do occasionally enter the stream…" (Alley 1983, p. 244).

A draft 2002 report indicates that Arroyo de las Viboras is "…apparently too dry to support stream fishes" (Smith 2002, p. 30).

Sulfur

Sulfur Creek consists of about three stream miles and is tributary to Arroyo de las Viboras. It flows south in the canyon east of Dunne Ridge.

Sulfur Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

Arroyo Dos Picachos

Arroyo Dos Picachos consists of about 11.8 stream miles and is tributary to Tequisquita Slough. It flows west to its confluence with Arroyo de las Viboras north of the town of Hollister.

In a 1938 letter to DFG, a sportsman describes Arroyo Dos Picachos as an "excellent" stream for trout (Garcia 1938). Stocking occurred in years prior to 1938, and it is unclear the origin of *O. mykiss* in the arroyo. However, the letter indicated that steelhead accessed the creek in some years.

A 1938 stream survey report noted juvenile *O. mykiss* in Arroyo Dos Picachos (DFG 1938d). Arroyo Dos Picachos appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

Arroyo Dos Picachos was surveyed in 1969. The survey report indicates that a self-sustaining "native" *O. mykiss* population existed in the upper 4.5 miles of the arroyo (DFG 1969).

Oncorhynchus mykiss was collected in Arroyo Dos Picachos in the early 1970s. Abundance was characterized as "5" on a ten point scale (with ten indicating greatest abundance) (Smith 1974).

A draft 2002 report states, "Arroyo Dos Picachos has a healthy population of resident rainbow trout. Steelhead originally used this watershed for spawning and rearing, and may still use it in wet years". According to the report, fish in this creek likely are "native strain". (Smith 2002, p. 30)

Lone Tree

Lone Tree Creek is tributary to Arroyo Dos Picachos. The confluence is in the Arroyo Dos Picachos canyon immediately north of Coyote Peak.

In a 1938 letter to DFG, a sportsman describes Lone Tree Creek as an "excellent" stream for trout (Garcia 1938). Stocking occurred in years prior to 1938, and it is unclear the origin of *O. mykiss* in the creek. However, the letter indicated that steelhead accessed the creek in some years.

Pacheco

Pacheco Creek consists of about 21 stream miles and is tributary to the Pajaro River via San Felipe Lake. It flows southwest from headwaters near Pacheco Pass.

In a 1957 survey report, DFG noted, "…there was a good run of steelhead up Pacheco Creek as far as North Fk. Dam and on up the South Fk. of Pacheco Creek in 1955" (DFG 1957g). The report provides the following estimate:

"[Pacheco Creek] appears to be a fair steelhead spawning stream when sufficient water is present in the winter to allow adult steelhead to ascend through Tequisquito Slough…[T]his creek goes dry every summer at the [State Forestry] station and below and becomes intermittent above. This stream also appears to support a fairly good population of trout" (DFG 1957g).

A 1973 report summarized fishery resources in Pacheco Creek in response to the application to build a dam in the watershed. The report cites "an estimated 36 miles of stream in the Pacheco Creek drainage below the North Fork Dam which are accessible to

steelhead trout" (DFG 1973g). Regarding the run size circa 1973 DFG states, "Estimates by local Department personnel place the steelhead run, depending on the water year, at 50-150 adults" (DFG 1973g).

A report on sampling in Pacheco Creek in November 1975 noted that despite "very successful spawning", insufficient releases from Pacheco Reservoir led to the destruction of "miles of steelhead nursery habitat and thousands of steelhead" (Scoppettone and Smith 1975). According to Jerry Smith in 1976, "Maintenance of adequate flows through until the winter rains is critical to perpetuating this substantial [Rancho los Laureles] steelhead nursery area" (Smith 1976). A 1978 summary of sampling results ascribed the lack of juvenile steelhead in Pacheco Creek to the drought occurring at the time (Smith 1978). Jerry Smith said in 1980 that the Rancho Los Laureles area of Pacheco Creek "was probably the most productive area [for smolts] in the entire Pajaro River basin" (Smith 1980).

Consulting biologists visited Pacheco Creek in the vicinity of Casa de Fruta in 1992 to assess habitat conditions. The resulting report notes "limited and sporadic" spawning gravel and states, "low flows, hot water temperatures, the lack of shade, and absence of instream structure were the limiting factors…in Pacheco Creek" (Rich 1992, p. 2). No fish were observed during surveys.

According to a 2002 draft report, "Rearing habitat in Pacheco Creek is almost completely dependent upon releases from North Fork Pacheco Reservoir" (Smith 2002, p. 32). Staff from NMFS observed *O. mykiss* in Pacheco Creek in 2003 (NMFS 2005).

Harper Canyon

Harper Canyon Creek consists of about 3.6 stream miles and is tributary to Pacheco Creek. It flows northwest, entering Pacheco Creek upstream from the Pacheco Ranger Station.

A 1973 DFG warden's memo relayed historical accounts of steelhead in Harper Canyon Creek (DFG 1973e).

Cedar

Cedar Creek consists of about 6.1 stream miles and is tributary to Pacheco Creek. It flows south through Hurricane Canyon to the Pacheco Creek confluence near Bell Station.

A 1973 report summarized fishery resources in the Pacheco Creek watershed in response to the application to build a dam. Regarding the Cedar Creek run size circa 1973 DFG states, "Estimates by local Department personnel place the steelhead run, depending on the water year, at 50-150 adults" (DFG 1973g). In 1975, Jerry Smith noted "good, cool-water nursery areas" in Cedar Creek in wet years (Smith 1975).

A 1983 consultants' report notes mostly "poor" rearing habitat in Cedar Creek. Low flow is deemed a primary limiting factor to production (Alley 1983).

North Fork Pacheco

North Fork Pacheco Creek consists of about 18.4 stream miles and is tributary to Pacheco Creek. It flows south, entering Pacheco Creek northeast of Lovers Leap. North Fork Dam was constructed in 1938 near the Pacheco Creek confluence.

In a 1957 survey report, DFG noted, "…there was a good run of steelhead up Pacheco Creek as far as North Fk. Dam…in 1955" (DFG 1957g).

North Fork Pacheco Creek was sampled upstream from the dam in the early 1970s. Rainbow trout was not observed (Smith 1974).

East Fork Pacheco

East Fork Pacheco Creek consists of about 5.2 stream miles and is tributary to North Fork Pacheco Creek. It flows southwest, entering North Fork Pacheco Creek at Chimney Rock, upstream of the North Fork Reservoir.

East Fork Pacheco Creek appears on a DFG list of streams with historical steelhead populations (DFG ca 1990). The basis for inclusion is not known.

South Fork Pacheco

South Fork Pacheco Creek is tributary to Pacheco Creek. It flows north, entering Pacheco Creek upstream of the North Fork confluence.

In a 1957 survey report, DFG noted, "…there was a good run of steelhead up Pacheco Creek…and on up the South Fk. of Pacheco Creek in 1955" (DFG 1957g).

A survey report from 1982 indicates *O. mykiss* adults were observed in South Fork Pacheco Creek (Logan and Turner 1982). A 1983 consultants' report noted "poor to below average" rearing habitat in South Fork Pacheco Creek due to low flow (Alley 1983).

Other information regarding Santa Cruz County steelhead resources

As part of the 1965 state fish and wildlife plan, DFG prepared an inventory of anadromous salmonids. The major steelhead streams of Santa Cruz County were said to be the San Lorenzo and Pajaro rivers. According to the inventory, there are about 67 stream miles of steelhead habitat in the minor streams of the county (DFG 1965a). The combined spawning population in the minor streams was estimated to be about 5,000 steelhead individuals. Including the estimates for the San Lorenzo and Pajaro runs, the 1965 DFG estimate for the average annual steelhead run in all streams of Santa Cruz County was about 26,000 individuals. The estimation method is not provided.

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Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Waddell	Waddell	DF	DF	Y	Y	3
Waddell	West Waddell	DF	DF	Y	Y	3
Waddell	West Waddell tributary (Buck)	DF	DF		Y	3
Waddell	Henry	DF	DF		Y	3
Waddell	Henry tributary	DF	DF		UN	2
Waddell	Berry	DF	DF		Y	3
Waddell	Kelly	DF	DF	Y	Y	1
Waddell	East Waddell	DF	DF	Y	Y	3
Waddell	Last Chance	DF	DF		N	3
Waddell	Opal	DF	DF		N	3
Waddell	Blooms	DF	DF		N	3
Waddell	Sempervirens	DF	DF	Y	N	3
Waddell	Union	DF	DF		N	3
Scott	Scott	DF	DF	Y	Y	3
Scott	Scott tributary 1 (Quesaria)	DF	DF		Y	2
Scott	Little	DF	DF	Y	Y	3
Scott	Big	DF	DF	Y	Y	3
Scott	Boyer	DF	UN	Y	N	0
Scott	Mill	DF	DF	Y	Y	3
Scott	Scott tributary 2 (Bettencourt Gulch)	DF	DF		Y	1
Molino	Molino	DF	DF		Y	2
Unnamed coastal stream (Ferrari)	Unnamed coastal stream (Ferrari)	DF	DF	Y	N	1
San Vicente	San Vicente	DF	DF	Y	Y	3
San Vicente	Mill	DF	DF	Y	Y	3
Liddell	Liddell	DF	DF	Y	Y	3
Liddell	West Liddell	DF	DF	Y	Y	2
Liddell	East Branch Liddell	DF	DF	Y	Y	2

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Yellow Bank	Yellow Bank	DF	DF	Y	N	3
Laguna	Laguna	DF	DF	Y	Y	3
Laguna	Laguna tributary (Y)	DF	DF	Y	UN	3
Majors	Majors	DF	DF	Y	N	3
Baldwin	Baldwin	DF	DF	Y	Y	3
Wilder (Medor)	Wilder (Medor)	DF	DF	Y	Y	3
Wilder (Medor)	Peasley Gulch	DF	DF		UN	3
San Lorenzo River	San Lorenzo River	DF	DF	Y	Y	3
San Lorenzo River	Branciforte	DF	DF	Y	Y	3
San Lorenzo River	Carbonera	DF	DF	Y	Y	3
San Lorenzo River	Branciforte tributary (Glen Canyon)	DF	DF		Y	1
San Lorenzo River	Glen Canyon tributary (Redwood Creek)	DF	DF		Y	2
San Lorenzo River	Granite	DF	DF	Y	Y	3
San Lorenzo River	Crystal	DF	DF	Y	Y	3
San Lorenzo River	Tie Gulch	DF	DF		Y	2
San Lorenzo River	San Lorenzo River tributary 1 (Powder Mill)	DF	DF		UN	1
San Lorenzo River	San Lorenzo River tributary 2 (Eagle)	DF	DF		Y	1
San Lorenzo River	Gold Gulch	DF	DF	Y	Y	3
San Lorenzo River	Shingle Mill	DF	DF		Y	1
San Lorenzo River	Zayante	DF	DF	Y	Y	3
San Lorenzo River	Bean	DF	DF	Y	Y	3
San Lorenzo River	Lockhart Gulch	DF	DF		Y	1
San Lorenzo River	Ruins	DF	DF		Y	2
San Lorenzo River	Mackenzie	DF	DF		Y	2
San Lorenzo River	Lompico	DF	DF	Y	Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
San Lorenzo River	Mountain Charlie Gulch (East Branch Zayante)	DF	DF	Y	Y	3
San Lorenzo River	Zayante tributary	DF	DF		Y	3
San Lorenzo River	Bull	UN	PA		UN	0
San Lorenzo River	Fall	DF	DF	Y	Y	3
San Lorenzo River	Bennett	UN	PA		N	0
San Lorenzo River	South Fork Fall	UN	PA		N	0
San Lorenzo River	Newell	DF	DF	Y	Y	3
San Lorenzo River	Love	DF	DF	Y	Y	1
San Lorenzo River	Smith	UN	PA		N	0
San Lorenzo River	Fritch	DF	DF		Y	1
San Lorenzo River	Marshall (Hubbard Gulch)	DF	DF	Y	Y	1
San Lorenzo River	Alba	UN	PA		N	0
San Lorenzo River	Clear	DF	DF	Y	Y	1
San Lorenzo River	Boulder	DF	DF	Y	Y	3
San Lorenzo River	Foreman	DF	UN	Y	N	0
San Lorenzo River	Bracken Brae	DF	UN	Y	N	0
San Lorenzo River	Jamison	DF	DF	Y	Y	1
San Lorenzo River	Hare	DF	DF	Y	Y	1
San Lorenzo River	Bear	DF	DF	Y	Y	3
San Lorenzo River	Deer	DF	DF	Y	Y	1
San Lorenzo River	Two Bar	DF	DF	Y	Y	1
San Lorenzo River	Kings	DF	DF	Y	Y	3
San Lorenzo River	Logan	DF	DF		Y	1
Arana Gulch	Arana Gulch	DF	DF	Y	Y	3
Soquel	Soquel	DF	DF	Y	Y	3
Soquel	Bates	DF	DF	Y	Y	3
Soquel	Grover Gulch	DF	DF		UN	1
Soquel	Soquel tributary (Laurel Glen, Moores Gulch)	DF	DF	Y	Y	3

[1]Please see Methods section for an explanation of titles and values used in this table.

Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Soquel	West Branch Soquel	DF	DF	Y	Y	3
Soquel	Hester	DF	DF	Y	Y	3
Soquel	Laurel	DF	UN	Y	N	0
Soquel	Burns	DF	UN	Y	N	0
Soquel	Hinckley	DF	DF	Y	Y	3
Soquel	Amaya	DF	DF	Y	Y	3
Aptos	Aptos	DF	DF	Y	Y	3
Aptos	Valencia	DF	DF	Y	Y	3
Aptos	Trout Creek Gulch	UN	PA		N	0
Aptos	Bridge	DF	DF	Y	Y	3
Pajaro River	Pajaro River	DF	DF	Y	Y	1
Pajaro River	Corralitos (Salsipuedes)	DF	DF	Y	Y	3
Pajaro River	Casserly	DF	DF		Y	3
Pajaro River	Green Valley	DF	DF	Y	N	2
Pajaro River	Browns	DF	DF		Y	1
Pajaro River	Ramsey Gulch	DF	DF		Y	3
Pajaro River	Gamecock Canyon	DF	DF	Y	Y	1
Pajaro River	Rider	PB	PB		UN	0
Pajaro River	Eureka Gulch	DF	PA	Y	UN	0
Pajaro River	Shingle Mill Gulch	DF	DF		Y	3
Pajaro River	Rattlesnake Gulch	DF	DF	Y	Y	1
Pajaro River	Diablo Gulch	DF	DF		N	1
Pajaro River	Coward	PS	PA		UN	0
Pajaro River	Pescadero	DF	DF	Y	Y	3
Pajaro River	Star	PS	UN		UN	0
Pajaro River	San Benito River	DF	PA	Y	UN	0
Pajaro River	San Juan Canyon	DF	UN		UN	0
Pajaro River	Bird	DF	DF		UN	2
Pajaro River	Tres Pinos	UN	UN		UN	0
Pajaro River	Pescadero	DF	PA		UN	0
Pajaro River	Picacho	DF	UN		UN	0

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Table 2. Distribution status of *O. mykiss* in coastal streams of Santa Cruz County, California[1]

Watershed	Stream/Tributary	Historical Presence	Current Presence	Evidence of Decline	Anadromy	Current Population Status
Pajaro River	Uvas (Carnadero)	DF	DF	Y	Y	3
Pajaro River	Tar	DF	DF	Y	Y	3
Pajaro River	Tick	PS	UN		UN	0
Pajaro River	Bodfish	DF	DF	Y	Y	3
Pajaro River	Bodfish tributary 1 (Renz Gulch, Granite)	DF	UN		UN	0
Pajaro River	Blackhawk Canyon	DF	DF		Y	2
Pajaro River	Bodfish tributary 2	DF	UN		UN	0
Pajaro River	Little Arthur	DF	DF	Y	N	3
Pajaro River	Uvas tributary	DF	UN		UN	0
Pajaro River	Croy	DF	DF		UN	3
Pajaro River	Llagas	DF	DF	Y	N	3
Pajaro River	Machado	DF	UN		UN	0
Pajaro River	Tequisquita Slough	DF	UN		UN	0
Pajaro River	Santa Ana	PS	PA		UN	0
Pajaro River	Arroyo de las Viboras	DF	PA	Y	UN	0
Pajaro River	Sulfur	PS	UN		UN	0
Pajaro River	Arroyo dos Picachos	DF	DF		UN	3
Pajaro River	Lone Tree	DF	UN		UN	0
Pajaro River	Pacheco	DF	DF	Y	UN	2
Pajaro River	Harper Canyon	DF	UN		UN	0
Pajaro River	Cedar	DF	UN	Y	UN	0
Pajaro River	North Fork Pacheco	DF	UN	Y	UN	0
Pajaro River	East Fork Pacheco	PS	UN		UN	0
Pajaro River	South Fork Pacheco	DF	UN	Y	UN	0

[1]Please see Methods section for an explanation of titles and values used in this table.