

## CHAPTER 4

# STREAM HABITAT AND SALMON FISHERIES

Chapter 3 described the basics of how actions within watersheds affect water quality and stream conditions. In this chapter the focus is on the fish populations within our watersheds – primarily salmon and steelhead. Understanding what the fish need in terms of water quality and habitat in our county’s streams, will help to understand why performing better road maintenance practices is so important.

- ◆ Salmon & Steelhead Life Cycles
- ◆ Salmon & Steelhead Habitat Needs
- ◆ Fish Passage
- ◆ Threatened and Endangered Status
- ◆ Other Aquatic or Riparian Species of Concern

### SALMON & STEELHEAD LIFE CYCLES

More than one species of fish in the salmon and trout family are presently of concern due to their dwindling numbers in our region’s streams. These species are referred to by biologists as salmonids.

Common Name	Genus & species
➤ Coho (“Silver”) Salmon	<i>Oncorhynchus kisutch</i>
➤ Chinook (“King”) Salmon	<i>Oncorhynchus tshawytscha</i>
➤ Steelhead (Rainbow) Trout	<i>Oncorhynchus mykiss irdesus</i>

Salmon and steelhead are born in freshwater river systems, then move to the ocean to live, feed and grow as adults, finally returning to their native stream to reproduce or spawn (Figure 1-1). This river-to-ocean- to river life cycle makes them **anadromous** fish. Their life cycles are opposite that of **catadromous** fish , which are species that are born in the ocean, migrate to live in fresh water as adults, finally returning to the sea to reproduce. Most eels are catadromous. Both anadromous and catadromous fish are amazing in their ability to undergo the physiologic changes necessary to adapt to salt and fresh water chemistry.

### **Important Life Cycle Terminolgy**

**Anadromous** (a-nad’-ru-mus) - Born in freshwater, anadromous fish return to the sea to grow to mature adults, returning to their natal stream to reproduce once again.

**Spawn-** the act of creating a nest or “redd” in a gravel bed and subsequent mating between a mature or “ripe” female and often more than one male.

**Alevin-** the first stage of emergence from the egg into the gravel redd, with a yolk sac attached.

**Fry-** the young fish that emerges from the gravels after two weeks.

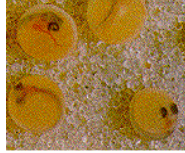
**Juvenile-** the period of time the young fish spends in fres h water until migrating out to sea.

**Smolt-** the transformation stage as the juvenile fish prepares tomigrate from fresh to salt water.

## THE SALMON LIFE CYCLE

It's a difficult journey from egg to spawning adult. Only about two percent of all salmon hatched will live to adulthood. There are many natural predators of salmon – birds, fish, marine mammals, and disease. Human-made obstacles include harvesting, river blockages, pollution and poor habitat management.

**Eggs:** The life cycle of a salmon begins as the female salmon chooses a site, digs a nest, or redd, with her tail and deposits her eggs. Each nest contains between 500 and 1200 eggs. About 20 out of each 100 eggs laid may survive to become fry.



**Alevin:** As the eggs hatch, tiny alevin emerge, nestled in gravel and living on the nutritious yolk “pot belly” on their undersides. The alevin cannot swim, but only swish their tale to move around

slightly in the gravel. While they have an yolk sac, alevins do not need to eat. Once the yolk sac is gone, they must find food quickly or they will starve.

**Fry:** When juvenile salmon, or fry, emerge from the redd, they must find food immediately. Most feed on insects



as they grow. The period of time that salmon stay in the fry stage can be very different among species. Chinook or King salmon immediately start heading for saltwater. Coho or Silver salmon will remain in their home stream for over a year before starting to swim downstream to find their way to the ocean. Some salmon will remain up to 3 years in the fresh water before heading to the ocean.

**Smolt:** Saltwater meets freshwater in estuaries, making a mix called brackish water. When fry enter estuaries, they begin to adapt to saltwater in a process called “smoltification”. This major change causes young salmon to become less active and more vulnerable to predators such as birds and larger fish. To survive, young salmon must find places to hide and feed. Ocean-bound young salmon may spend days or months in estuaries and nearshore waters as they adjust to saltwater and grow, getting ready for an ocean journey. Salmon are in the smolt stage when they start to swim to saltwater. Some are two years old and over 5 inches long. Smolts have a shiny silver back. Only a small

percentage of the salmon hatched actually reach the ocean.

**Adult Salmon:** When the salmon reach the ocean they are considered to be adult salmon. They will stay in the ocean from six months to five years, feeding mostly on shrimp, squid, and small fish. Adult salmon may travel thousands of miles from the stream they were born in. When they are fully mature they return to their home stream to spawn. Many scientists believe they migrate using the magnetic fields of the earth. They find their home stream by its particular smell.

**Spawner:** When salmon enter freshwater to spawn, they stop eating and lose their shiny, silvery colors. Males mat take on bright body colors, a hooked nose, and large teeth. Females may develop darker colors. Some species, such as steelhead, may spawn more than once. Most salmon species die within a week of spawning. The dead salmon are not wasted – their decomposing bodies add important nutrients to the stream or river. Dead and decaying salmon also provide food for a wide range of wildlife including bald eagles, bear, mink and river otter.



Table 1-1 gives the range of months when these species can be found in our streams. Besides their spawning period, the fish use the stream for months to years during the juvenile rearing stage.

**Table 1-1. Salmon Life Cycles in Central California Coastal Streams**

Species	Spawning	Rearing	Out-Migration	Time in Freshwater
<b>Chinook Salmon</b>				
Fall-run	Sept - Feb	all year	Mar - Sept	1- 15 months
Spring-run	mid Sept – mid Oct	all year	April - Oct	1 – 15 months
<b>Coho Salmon</b>	Oct - Mar	all year	Mar - May	1+ yr
<b>Steelhead</b>				
Winter-run	Nov - June	all year	Mar - Nov	1+ to 2 yrs
Summer-run	Mar - June	all year	Mar - Nov	1+ to 2 yrs

1/ Sources: Ross Taylor, consultant; Al Olson, Klamath National Forest; Greg Bryant, NMFS

**Coho salmon (Oncorhynchus kisutch)**- Adult coho begin to appear in the streams after the first substantial autumn rains, typically in early December through mid-January. Watch the beaches along the coast to see if the summer sand bars have been broken through by downstream river flows, allowing the fish access to upstream reaches. Avoid a trip immediately after a rainstorm due to decreased visibility from sedimentation and turbidity. Female coho are locked into a three year return, which is the time between hatching, spending a year in freshwater, out-migrating to the ocean for two years, and returning to their natal stream as a mature adult to spawn. The males return to the river as both two (jacks) and three year olds.

When returning to spawn, as soon as their bodies hit the fresh water, physiologic changes begin to happen, including the break down and disintegration of the membrane sac surrounding the eggs. This process also plays a part in the disintegration of their bodies and you will most likely observe white patches of soft disintegrating flesh on the salmon that you see- one of the factors that make coho easier to spot than steelhead. They are not feeding during migration and spawning, and when spawning is over, their lives are also. As the run progresses, you can typically see coho carcasses along the sides and bottom of the river.

While spawning, the adult female can be seen making a redd (gravel nest) with the swishing action of her body and tail. She is cleaning the gravel over which she will spawn and release her eggs, followed by fertilization by the male over the redd. Look for thrashing activity and indentations in the riffles. Sedimentation in the gravel reduces survival rates by depriving the eggs and newly hatched fish (*alevin*) of needed oxygen and prohibiting the necessary flushing of waste products from the redd. The eggs incubate for approximately six to eight weeks. Warmer temperatures may speed this process. After hatching, the *alevin* stay in the gravel for another two weeks with their yolk sacs attached. At this stage they are *fry* and will remain in freshwater for about 14 months before out-migrating to the sea between

March and early June. During this first 14 month stage of life, known as the “juvenile rearing” period, it is critical that the stream habitat provides an adequate food supply, calm water areas for protection from torrential downstream currents, shelter from predators, and deep pools of cool water refuge during hot summer months.

**Steelhead trout (Oncorhynchus mykiss)** - Steelhead, after spending their first few years in the freshwater stream system where they hatched, migrate out to sea during late spring as adults. After one or two years in the saltwater, they return to the river to spawn arriving after the first big rains, typically in Jan.-Feb. through May. The female adults are on average three to four years old and the males approximately three years old.

The female steelhead, similar to the coho salmon, makes a redd typically in the shallow riffle gravels at the tail end of a pool. The eggs that are deposited and fertilized in the redd will incubate for approximately six to eight weeks - the rule of thumb is approximately 50 days at 50 degree temperatures and warmer temperatures may speed this process. After hatching the *alevin* stay in the gravel for another two weeks with their yolk sacs attached, are approximately 3/4” long and are extremely vulnerable. After this stage they are considered *fry* and will remain in the protection of the river system for one to three years before migrating to the sea between March and early June.

After spawning, the females tend to return immediately to the sea, while the males stay in the freshwater system through much of the winter and early spring. During their prolonged time in the stream, the males are not feeding and are susceptible to disease, fungus infections, predation, turbidity problems and fighting, all factors that contribute to a much higher mortality rate for male steelhead over females. The steelhead that do survive may return to the freshwater repeatedly to spawn; a record nine year old steelhead was recently observed in the Carmel River. Steelhead can be more difficult to spot than coho because they are darker in color, do not develop the white patches of disintegrating skin, are more wary of predators than coho (having future life cycles to survive), and run during the most turbid, high water time of the year.

**Chinook salmon (Oncorhynchus tshawytscha)**- Chinook salmon are found from Northern Alaska to Central California on the North American coast and from Northern Japan to the Bering Sea on the east coast of Asia. The spawning populations in the Sacramento-San Joaquin Rivers are the southernmost range of the species, and the Sacramento River and its tributaries is the only system in the world that supports four separate races or runs of chinook which use the system for spawning year round; the fall, late-fall, winter and spring runs. Chinook are larger fish than coho and tend to be found in the bigger river systems, often spawning in the mainstem of those rivers. In our coastal region, the best places to see chinook are within the Russian River system or in the Lagunitas Creek system, after they enter the river in the fall to spawn primarily in the mainstem. Look for chinook at the hatcheries on the East Fork of the Russian River and at Warm Springs beginning in November-December. Adult spawning behavior is similar to coho but the residence time of the newly hatched fish in the stream is much shorter- the chinook fry, after only a few months in the river, will outmigrate to the sea in the spring. While coho and steelhead maximize their survival by prolonged rearing time in freshwater, chinook maximize their survival of the species by laying an enormous number of eggs per fish. In our region, Chinook stay out at sea for one to three years before returning to the river to repeat the cycle all over again. In famous rivers in Alaska such as the Kenai, Chinook salmon spend five years at sea, returning to spawn at record breaking, trophy winning sizes.

## **SALMON AND STEELHEAD HABITAT NEEDS**

- ◆ **Access** to stream habitat – upstream for adults and up and downstream for juveniles
- ◆ **Clean gravels** in riffles and runs where adults can build nests (redds) in which to lay their eggs, juveniles can rear, and stream insects (macro-invertebrates) can produce to provide food for the fish
- ◆ **Pools** that are cool and deep where young can rear and adults can rest
- ◆ **Instream shelter** (created by large woody debris (LWD), boulders, undercut banks) where fish can hide from predators or avoid being swept downstream
- ◆ **Overhead cover** to provide shade and sources of insect food
- ◆ **Sidechannels and smaller tributaries** for over-wintering use
- ◆ **Cool, flowing water** free of pollutants, with good clarity, and sufficient dissolved oxygen
- ◆ **Estuary space**, where salt and fresh water mix, for adjustment by adults moving upstream, and juveniles (smolts) moving into the ocean

Another way to look at salmon habitat needs is to remember the “**Four C’s**”:

- **Cold**
- **Clean**
- **Complex**
- **Connected**

**COLD:** Water that is too warm (>60° F) for a prolonged time can be stressful to the health of these coldwater fish, while water that is too hot (>73-79° F) will kill them.

**CLEAN:** Water, pools and gravels should be clean and not be polluted from excess sediment or nutrients or any chemicals.

**COMPLEX:** A stream should not be cleaned or altered significantly of its naturally complex structure, such as large wood, overhanging riparian vegetation, meanders, flow patterns, and floodplain connections.

**CONNECTED:** Fish must be able to get from the ocean to their spawning areas and juveniles to the ocean, with no manmade, impassable barriers preventing this migration.

## **FISH PASSAGE**

### **Salmon and Steelhead Location in the Watershed**

Salmon and steelhead use stream systems from the top to the bottom. Adults will go up as high in the system as they can physically reach, which depends upon the species. Steelhead are able to navigate steeper gradient streams and can go higher up in the drainages than coho. Steelhead can also use streams that only flow seasonally (winter and spring) during a part of their life cycle. Chinook salmon tend to spawn in the mainstem of larger, lower gradient rivers such as the Russian River.

Salmon and steelhead are powerful jumpers and can ascend many potential barriers as long as there is a pool of sufficient depth below the jump and a place of slow water to rest between a series of jumps. If a barrier is too high to jump or there is not a deep pool directly below it, salmon and steelhead will often repeatedly attempt to overcome it until they become exhausted or die trying; when water velocity is too great or the

amount of flow is too low, mortality can also occur.

The table below displays minimum water depth requirements and recommended swimming and leaping abilities for several salmonid species and lifestages commonly found in California.

**Table 1-2. Depths and swim speeds (adapted from DFG Salmonid Stream Habitat Restoration Manual, Part IX, 2002) )**

Species or Lifestage	Minimum Water Depth	Prolonged Swimming Mode		Burst Swimming Mode		
		Maximum swim speed	Time to Exhaustion	Maximum swim speed	Time to Exhaustion	Maximum leap speed
Adult salmonids	0.8 feet	6.0 feet/sec	30 minutes	10 feet/sec	5.0 sec	15.0 feet/sec
Resident trout and juvenile steelhead trout > 6"	0.5 feet	4.0 feet/sec	30 minutes	5.0 feet/sec	5.0 sec	6.0 feet/sec
Juvenile salmonids	0.3 feet	1.5 feet/sec	30 minutes	3.0 feet/sec	5.0 sec	4.0 feet/sec

Typical passage problems created by undersized, improperly installed, or poorly maintained stream crossings are:

- ◆ Excessive drop at outlet (entry leap is too high for fish)
- ◆ Excessive velocities within culvert
- ◆ Lack of depth within culvert
- ◆ Excessive velocity or turbulence at culvert inlet
- ◆ Debris accumulation at culvert inlet or within culvert barrel

Barriers may occur as temporal, partial or total depending upon flows and timing. The following table defines the type of barriers, based on these variables.

**Table 1-3. Definitions of barrier types and their potential impacts. (adapted from DFG Salmonid Stream Habitat Restoration Manual, Part IX, 2002)**

Barrier Category	Definition	Potential Impacts
Temporal	Impassable to all fish based on run timing and flow conditions	Delay in movement beyond the barrier for some period of time
Partial	Impassable to some fish at all times	Exclusion of certain species and lifestages from portions of a watershed
Total	Impassable to all fish at all times	Exclusion of all species from portions of a watershed

**Barrier Forms:**

- 1) Physical Barriers (too tall or long)

- 2) Flow Barriers (too little, too fast)
- 3) Thermal Barriers (too hot)

### **Types of Physical Barriers:**

- ◆ Natural waterfalls
- ◆ Water diversion dams and weirs (without fish ladders)
- ◆ Flood debris dams (without fish ladders)
- ◆ Water storage dams (without fish ladders)
- ◆ Landslides in stream      ⇐ SOMETIMES ROAD-RELATED
- ◆ Culverts & other types of stream crossings      ⇐ ROAD-RELATED

### **When are they barriers?**

- ◆ Seasonally, during low – or very high - flow periods
- ◆ Temporarily – if alteration is not completely successful
- ◆ Permanently – if not altered

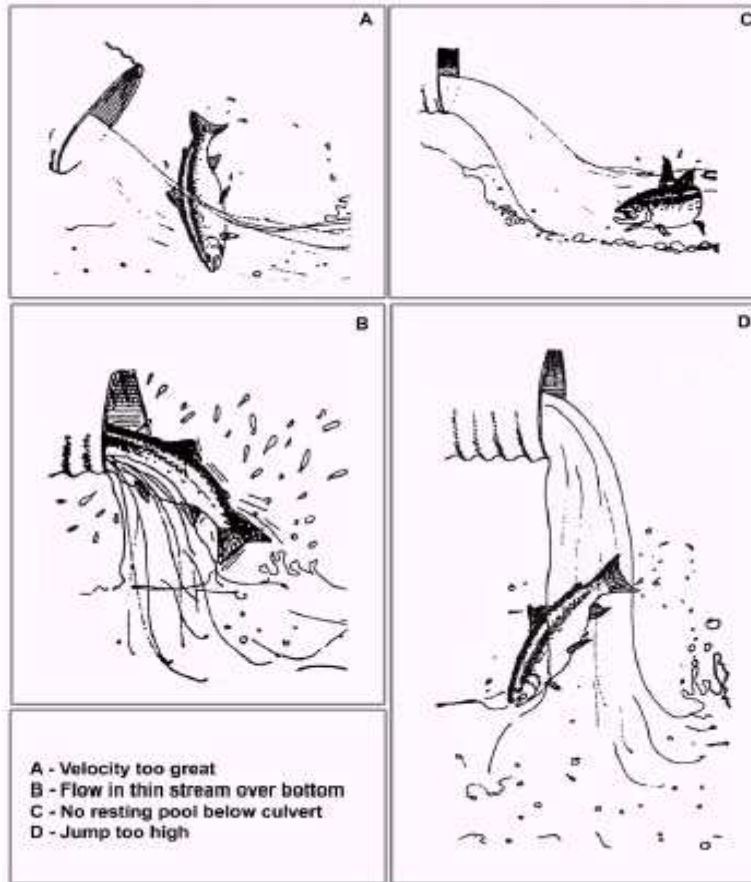
NOTE: Upper reaches of streams may still be home to other coldwater fish, such as resident rainbow trout, as well as other sensitive aquatic species. Barriers to migration may not be their problem, but clean water is still needed.

### **Sources of Information on Local Salmon Habitat and Barrier Locations**

Not all of the streams crossed by County roads provide habitat for salmon and steelhead. Some may have natural barriers while others may be too steep for upstream migration. If you want to know specific stream areas used by salmon and steelhead, here are some useful references:

- 1) Stream Crossing Inventory and Fish Passage Evaluation; conducted for the counties of Mendocino, Sonoma, Marin, San Mateo and Santa Cruz by Ross Taylor & Associates. Available at each county DPW/DOT. Also available online at <http://www.rosstaylorandassociates.com>.
- 2) NOAA Fisheries Salmon & Steelhead Habitat Distribution Tables – organized by county and stream. Website: <http://swr.nmfs.noaa.gov>.
- 3) California Dept. of Fish and Game (DFG) Fishery Biologists & Wardens – each county.
- 4) Recovery Strategy for California Coho Salmon; Department of Fish and Game, 2004. Available online at [www.dfg.ca.gov/nafwb/CohoRecovery/RecoveryStrategy.html](http://www.dfg.ca.gov/nafwb/CohoRecovery/RecoveryStrategy.html).

Common conditions that block fish passage. (California Salmonid Stream Habitat Restoration Manual; Chapter IX, California Dept. of Fish and Game, Flosi et. al 2002.)



## ESUs AND THREATENED OR ENDANGERED STATUS

Not all salmon and steelhead populations are identical when it comes to being listed as “threatened” or “endangered” under the federal Endangered Species Act (ESA). NOAA Fisheries adopted the concept of an ESU- “Evolutionarily Significant Unit” to define distinct population segments of anadromous salmonids, based on genetic similarities. Populations of genetically similar fish get listed together in an ESU. The intent is to conserve the genetic diversity of these species and the ecosystems they inhabit.

**Table 1-4. Status of ESA Listings of Salmon & Steelhead in Coastal California**

Species/ESU	Federal Listing <sup>1</sup> Date of Action	State Listing <sup>2</sup> Date of Action	ESU Area
<b>COHO SALMON</b>			
Central Calif. Coast	Endangered 8/05	Endangered 3/05	Punta Gorda south to San Lorenzo River (Santa Cruz County)
So. Oregon / Northern California (SONCC)	Threatened 6/97	Threatened 3/05	Punta Gorda north to Elk River, OR. Includes Klamath & Trinity Basins
<b>CHINOOK SALMON</b>			
California Coastal	Threatened 11/99	Not listed	Redwood Creek (Humboldt) south to and including Russian River basin (Sonoma).
Southern Oregon / Northern California (SONCC)	Not listed	Not listed	Cape Blanco (Oregon) south to lower Klamath R. downstream of Trinity River
<b>STEELHEAD</b>			
Central Coast	Threatened 10/97	Not listed	Russian River (Sonoma) thru Aptos Creek (Santa Cruz).
South Central Coast	Threatened 10/97	Not listed	Aptos Creek (Santa Cruz) -San Luis Obispo
Northern Calif. Coast	Threatened 8/00	Not listed	Redwood Cr.(Humboldt) through Gualala River (Sonoma).

<sup>1</sup> Species status updates for both state and federal listings can be found at the Department of Fish & Game website: <http://www.dfg.ca.gov/nafwb/LISTSTAT.pdf>

## **OTHER AQUATIC OR RIPARIAN SPECIES OF CONCERN**

Working within seasonal restrictions for other listed species is a concern when conducting road maintenance projects and fisheries restoration projects. See *Appendix A- Seasonal Planning BMP* to view calendar restrictions for listed species including coho salmon, chinook salmon and steelhead trout, red-legged frogs, northern spotted owl, Least Bell's Vireo, marbled murrelet, and the willow flycatcher.

Another designation used by Fish and Game is California Special Concern species (CSC): these species have declining population levels, limited ranges, and/or continuing threats that have made them vulnerable. There is also a Federal Special Concern (FSC) species list. Some of these species may soon reach the point where they meet the criteria for listing as threatened or endangered under the State and/or Federal Endangered Species Acts. Lists of these Species of Concern should be available through your county planning department. Whenever you are in doubt about a project's impact on an animal or plant species that is on this list, consult a local agency biologist for advice on avoiding impacts to these species.

## **HELPFUL REFERENCES**

California Department of Fish and Game (2002) California Salmonid Stream Habitat Restoration Manual. Flosi et al. ([www.dfg.ca.gov](http://www.dfg.ca.gov))

National Marine Fisheries Service. (June 2000). A Citizen's Guide to the 4(d) Rule for Salmon and Steelhead on the West Coast.

National Marine Fisheries Service. (1996). "Factors for Decline: A Supplement to Notice of Determination for West Coast Steelhead Under the ESA". ([www.nwr.noaa.gov](http://www.nwr.noaa.gov))

Spence, B. et al. (1996). "An Ecosystem Approach to Salmonid Conservation." ManTech Environmental Technology. Prepared for NOAA Fisheries. ([www.nwr.noaa.gov](http://www.nwr.noaa.gov))

# Guide to Observing Salmonid Spawning and Migration Within the Central California Coastal Counties

---

## **A few important tips:**

- Please *do not walk in* any of these streams, even to cross them. The fish spawn in the gravels of the shallow riffles (typically the best places to cross) and their redds (gravel nests) can be disturbed or ruined by trampling. This can be avoided in all of the places listed by walking along the stream, along a road adjacent to the stream, or looking down on the stream from a crossing or bridge.
- Note that this is only a partial list of the spawning and migration streams, selected for their accessibility. Many other streams within our region flow through private property and the access at road crossings would not be suitable for viewing fish.
- Additionally note that poaching is a potential problem in all of these streams, so discretion when viewing and interacting with the public is appreciated.
- Last but not least- dress for the cold! Many of these runs are down in the shade and cool dampness of the redwood forest.

## **Best Salmon Runs to Visit on the Central California Coast:**

### **Sonoma County:**

**East Fork of the Russian River-** In Ukiah at the Coyote Dam egg taking and imprinting facility. The dam sits on the east branch of the Russian River and forms Mendocino Lake. Look for steelhead, chinook and some coho salmon. Best time for chinook is Nov-Dec, but the facility is probably open from Nov through April.

**Warm Springs Hatchery,** off of Dry Creek Rd. west of Healdsburg in Sonoma County. The hatchery is located at the Warm Springs dam facility on Dry Creek and is an excellent place to see a mixture of wild and hatchery chinook, coho, and steelhead close-up; both adults and juveniles. For the convenience of visitors the hatchery follows a fixed schedule. Call Lake Sonoma Visitor Center (707-433-9483) to find out when they are open.

**Mill Creek along Mill Creek Rd. in Sonoma County** (west of Healdsburg) has a fairly strong run of both coho and steelhead but the viewing is not great. All the property along the road is privately held and trespassing down the banks to the creek's edge is not encouraged.

**Mark West Creek intersection with St. Helena Rd.** Traveling east from Santa Rosa look for steelhead from the St. Helena Rd. bridge approximately 1 mile after St. Helena departs from Calistoga Rd. There is a small waterfall here that the fish have to jump. The best time is just after a storm when the water is still a little high. Be careful, parking is not great.

### **Marin County:**

**Lagunitas Creek**- The best place in Marin County to see coho salmon is in Lagunitas Creek at Samuel P. Taylor State Park on Sir Francis Drake Blvd. Walk down the hill behind the ranger station and kiosk. Another great place is between Shafter Bridge and Peters Dam, on Lagunitas Creek immediately east of Samuel P. Taylor State Park. Park in the Leo Cronin Memorial fish watching place at the east end of S. P. Taylor State Park and walk up the service road toward the dam on the west side of the creek. This area can be spectacular at times.

**San Geronimo Creek in San Geronimo Valley at Roy's Pools**. Take San Geronimo Valley Drive south off Sir Francis Drake at the west end of the golf course and bear to the left. Stop at the bridge and look over the upstream side toward the golf course. During and just after a storm fish can be seen jumping into the fish ladder and trying to go over the remains of the old dam. This area has recently been restored by a huge community effort to improve fish passage, creating a series of beautiful jump pools for the fish. Great viewing spot!

**Redwood Creek in the Muir Woods National Monument**- Also a good place to observe coho salmon, Redwood Creek is located in southern Marin County. Take the Stinson Beach exit from Highway 101 just north of Sausalito and take Highway 1 west following the signs for Muir Woods National Monument, about 15 minutes off of Highway 101.

### **San Mateo County:**

**San Pedro Creek**- Located in San Mateo County south of Pacifica. Look for steelhead spawning in the headwaters of the creek in the county park.

**Mill Creek, tributary to Pilarcitos Creek**- This is a more remote tributary to Arroyo de Leon Creek which then flows into Pilarcitos Creek. Mill Creek can be accessed from Burleigh Murray State Park on Higgins Canyon Rd. out of Half Moon Bay. Hike to the creek located approximately one mile from the parking lot. The remainder of Pilarcitos Creek runs through private property and trespassing is discouraged.

**San Gregorio Creek**- While this creek has both steelhead and coho salmon, most of the land is privately owned and trespassing is discouraged.

**Pescadero Creek** - A great place to look for steelhead because of the relative ease of access through Memorial and Pescadero Creek County Parks and Portola State Park. Fish are visible for a long distance along the mainstem of the creek. Coho have been sighted in Pescadero Creek but are rare and hard to observe.

**Peter's Creek and Slate Creek**- Located in Portola State Park you can observe steelhead spawning on both of these tributaries.

**Gazos Creek**- A great coho spawning stream with a long distance of mainstem to watch fish. Heading south on Highway 1 towards Santa Cruz from Half Moon Bay look for the old Gazos Creek gas station and turn left up into the coastal mountains. The road winds up into the watershed and follows the stream for quite a distance. Please do not walk down into the active creek channel but remain on the road looking down on the creek. A pair of binoculars might help here.

## **Santa Cruz County:**

**Waddell Creek in Big Basin State Park-** Definitely the most reliable and best place to observe salmonid spawning in Santa Cruz County. Located approximately 15 miles north of the town of Santa Cruz on Highway 1. Find parking in the large beachside parking area, typically filled with windsurfers catching amazing rides on offshore waves. Crossing the highway walk up the Waddell Creek-Big Basin Road approximately 1.5 miles at which point you can hike over to and along the creek looking for fish for the next 2.5 miles, (between road miles 1.5-4.0). A beautiful hike all around.

**Scott Creek-** While a great spawning creek, most of the watershed is held in private land ownership and trespassing is discouraged. Occasionally fish can be seen from road crossings. The Monterey Bay Salmon and Trout Project operates a hatchery located in the watershed at 324 Swanton Road (coming from the north, access Swanton Road a short distance south of Waddell Creek). Hatchery staff and volunteers conduct periodic searches for both coho and steelhead for both inventory and brood stock purposes.

**San Lorenzo River in Santa Cruz-** Look for steelhead migrating up through the mainstem heading for spawning grounds higher in the watershed. High flows prohibit spawning along most of the mainstem until approximately Boulder Creek. Migrating steelhead may be spotted in Henry Cowell Park, approximately 6 miles Empire Grade Road from Santa Cruz. Fall Creek, Zayante Creek, and Boulder Creek, all tributaries to the San Lorenzo River offer limited access for coho and steelhead spawning observations. Other fish bearing tributaries are located on private lands and trespassing is not recommended.

**Soquel Creek in the Soquel Demonstration State Forest** - Look for steelhead in the upper five miles of the creek within the Soquel Demonstration State Forest in Santa Cruz County. The forest is open to the public with nice walking areas from which to view steelhead. You cannot enter from the town of Soquel but should instead look to enter from the headwaters through Highland Dr. in Corralitos.

**Aptos Creek in Nisene State Park-** Leaving the town of Aptos you can drive part way in past the park kiosk. In winter the road to the upper watershed is closed to cars and hikers and bicycles take over making this a great family style walk. The road and trails run fairly close to the creek. Dress warmly.

**Pajaro River** - While most of the Pajaro system is in private ownership there may be steelhead to observe from the county park on Uvas Creek in the Santa Clara Valley.

## **Monterey County:**

**Arrovo Seco Creek, tributary to the Salinas River-** This is a great creek for access because it is on US Forest Service land. You can see steelhead in the late spring (April) if the fish ladder is functioning properly. The runs occur later in the year due to the high flows during the earlier winter months.

**Carmel River** - Most of the land within this watershed is in private ownership and trespassing is discouraged. Los Padres dam plunge pool is viewable from a public bridge across the spillway, pretty good for the mobility-challenged, and about the only place south of San Francisco that you can see dozens of adult steelhead.

**Big Sur River in Andrew Molera and Julia Pfeiffer State Parks-** An excellent and spectacular place to look for both migrating and spawning steelhead. The lower 6 miles of the river runs through the

beautiful lower meadows of Andrew Molera State Park where migrating fish can be easily observed because of the clear water and open access. Spawning can be observed higher in the watershed in Pfeiffer State Park, where the flows are not as great.

**Big Sur River off of Highway 1**- Driving down the highway south of Andrew Molera State Park you can park at Gates 10, 9, 8 etc... which are California State Park public access gates to the Big Sur River. Walk down to a point where you can look down into the creek. A great place to look for spawning later in the spring.