SALMON PROTECTION AND WATERSHED NETWORK

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Coho Spawning in 2001-02 in the San Geronimo sub-Watershed with opportunistic notes on steelhead

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Summary

Salmon Protection and Watershed Network (SPAWN) staff conducted 58 spawning surveys in 8 tributaries to San Geronimo Creek during fall-winter 2001/2002. Forty three coho redds were positively identified in four tributaries (Woodacre, North Fork San Geronimo, Larsen and Arroyo Creeks). In addition, one tributary (Montezuma) of four additional tributaries (Creamery, Blue Line, Montezuma and Candellero Creeks) that were surveyed for presence of juvenile salmonids after the spawning season, indicated coho spawning had occurred.

Additionally, one positively identified steelhead redd and 41 unidentified (presumably steelhead and/or coho) redds were discovered on Woodacre, Bates Canyon, Larsen, Arroyo, El Cerrito, Barranca and North Fork San Geronimo Creeks.

The number of coho redds in tributaries were higher than previously recorded in the past five years of surveys. Rainfall for winter 2001/02 was 54.98 inches (2.64 inches above average). Presumably, significant storm events during the peak of the coho spawning migration allowed adults to reach these upper tributaries and more easily traverse culverts that may be an impediment to migration under different rainfall regimes.

Fourteen coho carcasses were collected in the watershed and tissue sample of each carcass was collected (under federal permit #1162) and sent to the National Marine Fisheries Service (NMFS) genetics laboratory in Santa Cruz.

Introduction

The Lagunitas Creek Watershed (LCW), located in west Marin County, has been identified as one of the most important waterways left for wild California coho. Approximately 550 spawning adult coho return yearly to the Lagunitas Creek Watershed, with over 50 percent of them using the San Geronimo Creek sub-watershed (SGCsW) in some years.

Current population estimates for coho in LCW are 10 percent of historic estimates (i.e. 6000 only 60 years ago). Human impacts responsible for the decline mimic those found throughout the range of the species and include building of dams, sedimentation, grazing, and urban development.

Today, the San Geronimo Valley is the highest density residential development within the LCW. The picturesque creekside habitat in this valley has attracted and encouraged the development in riparian habitat. More than 3300 residents live in the valley on over 1500 individual parcels. Nearly 180 of these landowners own property directly adjacent to creeks.

The critical need for protection of the coho salmon and steelhead trout in the Lagunitas Creek Watershed is widely recognized.

SPAWN's efforts complement the work conducted by several agencies and researchers who survey the spawning salmonid populations in other parts of the Lagunitas Watershed including, Point Reyes National Seashore in Olema Creek and its tributaries as well as Cheda Creek, a tributary of Lagunitas Creek; Marin Municipal Water District in Lagunitas Creek, Devil's Gulch Creek and San Geronimo Creek (prior to 1998, PRNS surveyed Devil's Gulch); and UC Davis in select areas throughout the watershed. The latter researchers from U.C. Davis conduct select investigations of redd sites and habitat conditions rather than continual survey of stretches.

While baseline data on the status of these populations has been collected in the main creek stems, little baseline data and trend monitoring has been established for the numerous creek tributaries of San Geronimo Creek which provide critical habitat for the remaining coho salmon and steelhead trout. The efforts of SPAWN to consistently survey these habitats represent the first known attempt to quantify the use of these tributaries by spawning coho salmon.

Methods

Surveys began with the arrival of the first significant rains of the season on 25 October 2001 and continued until 4 April 2002, and usually occurred a few days after rainfall events. Surveys were conducted in the tributaries of San Geronimo Creek by walking stretches of creek as soon as water flow decreased to a safe and passable level and water clarity allowed visibility of at least 0.5 m.

Surveyors remained on the creek banks to avoid any possibility of disturbing existing or potential redd sites. If there was a necessity to occasionally walk in the creek bed itself, surveyors were careful to avoid spawning gravel sites.

All adult fish were identified to species and gender and behavior (resting, digging, spawning) was recorded. Redd sites were recorded on maps for location and date, were measured for length and width and flags were placed on nearby vegetation so as to avoid recounting on subsequent surveys.

Results and Discussion

SPAWN staff surveyed eight tributaries to San Geronimo Creek (Woodacre, North Fork San Geronimo, Bates, Deer Camp, Larsen, Arroyo, Barranca, El Cerrito,) for spawning salmonids in winter 2001/02 (Figure 1). Forty three coho redds were discovered on Woodacre, Larsen, Arroyo and North Fork San Geronimo Creeks (Figure 2). One steelhead and 41 unidentified redds were discovered on Woodacre, North Fork San Geronimo, Bates, Larsen, Arroyo, Barranca and El Cerrito Creeks (Table 2).

In addition, four tributaries (Creamery, Blue Line, Montezuma and Candellero Creeks) were surveyed for the presence of juveniles salmonids following the spawning season. Coho were discovered only in Montezuma Creek, indicating that at least one additional SGVsW tributary was used for coho spawning in 2001-02.

Eleven coho carcasses were collected in the tributaries and three found in the mainstem of San Geronimo Creek. All samples have been sent to National Marine Fisheries Service (NMFS) lab in Santa Cruz, CA for genetic analysis.

The number of coho redds discovered this year was nearly double the 24 redds noted in the previous year (Figure 2) and is the highest recorded since 1997. It is our belief that actual numbers were in fact higher this year than all previous years, though comparison with the first three years of surveys are not directly comparable, as both the total number of creeks surveyed and the total number of surveys increased significantly in the past two years. More coho spawning in these tributaries during 2001-02 is supported by a large number of coho juveniles counted in tributaries during summer fish rescue and relocation efforts (unpublished data, in prep.). For the first year since relocation efforts were begun in 1999, the relative abundance of coho versus steelhead reversed, from primarily steelhead to primarily coho.

In addition, rainfall for the season (54.98 inches) was above the average of 52.34 inches and the majority of rainfall occurred during early winter, coinciding with the peak of the coho spawning season (MMWD Spawner Survey Report 2002, in Prep.). Relatively low and inconsistent levels of rainfall in late winter coincided with the steelhead spawning season. In order to enter the San Geronimo Creek system, salmonids must negotiate a series of jumps at the Lagunitas – San Geronimo Creek confluence (called the Inkwells) that requires significant water flow. Furthermore, since access to most tributaries surveyed by salmonids requires traversing culverts which are impediments to migration under certain flow regimes (unpublished data, in prep.), not only the quantity, but the timing of rainfall events is assumed to be a limiting factor to use of these habitats in some years.

The absence of spawning coho in four creeks this year (Deer, Creamery, Blue Line and Candellero) is probably due to a combination of insufficient flow, impassable migration barriers and in some cases woody debris jams that prevented upstream migration in winter. Culverts, which prevent or make salmonid passage nearly impossible under most flow regimes, is probably the primary limiting factor. Nonetheless, one individual 2+ year class steelhead (~6" in length) was observed in Montezuma Creek, and a second similar-sized individual was observed trapped in a pool on Candellero Creek in spring 2002.

The steelhead in Montezuma Creek was observed actively foraging approximately 1,000 feet upstream from the confluence from San Geronimo Creek and presumably had moved upstream

from the confluence. This individual only had to traverse one culvert to reach the site where it was observed, and presumably moved back downstream to San Geronimo Creek after a brief period of active feeding. How the steelhead in Candellero Creek arrived to its observed location is more mysterious. This individual was located approximately 2,000 feet upstream of San Gerionimo Creek confluence and would have had to negotiate multiple culverts, of which some are perched 2 m above the creekbed, to reach its destination.

In addition to 43 redds identified as coho redds, one steelhead redd was positively confirmed (through observation of species on nest site). An additional 41 redd sites were not positively assigned to either the coho or steelhead categories. Typically, female coho remain on their nests for 1-2 weeks following egg deposition making identification conclusive. In contrast, steelhead normally do not remain on nest sites for more than 2 days. Because of extremely muddy conditions following every rainfall event, it is impossible to survey streams for a few days until the water clarity has improved.

However, we believe that 26 of these 41 redds are likely steelhead based on their morphology and date of their establishment. Discussion with other researchers in the watershed (Brannon Ketcham, Pers. comm) concur that the morphology of redds established by steelhead are typically smaller in size (less than 1m x 1m) and are established later in the rainy season (the peak of the steelhead spawning season spans from February to April).

As a result, an accurate estimate of steelhead redd abundance is difficult because steelhead spawn quickly and usually depart before water clears enough to survey. This in combination with potential superimposition of redds over existing ones suggests that numbers of steelhead noted is clearly an underestimate. The remaining 15 unidentified redds were either larger in size and/or established earlier in the spawning season following surveys that occurred a week or more after the previous survey. Thus, we do not attempt to assign species identification to these redds.

Since fall 2000, SPAWN's methodical survey of spawning salmonids throughout the winters in the main tributaries to San Geronimo Creek has resulted in over a two-fold increase of creek habitat surveyed in the San Geronimo Valley. In both winter 2000/01 and 2001/02, 30 percent of the coho redds counted within the San Geronimo Valley were found within these tributaries (Figure 2). Furthermore, this represents between 10-15 percent of total coho redds counted in the entire Lagunitas Watershed[1] for the past two winters.

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[1] This includes Lagunitas Creek, Devil's Gulch Creek as well San Geronimo Creek and its tributaries.