

## **Pink salmon (*Oncorhynchus gorbuscha*) in the Salinas River, California: new record and historical perspectives**

TOM D. SKILES\*, RONALD M. YOSHIYAMA AND PETER B. MOYLE

*Columbia River Inter-Tribal Fish Commission, 729 NE Oregon Street, Suite 200, Portland, Oregon 97232, USA (TDS)*

*Center for Watershed Sciences, University of California, One Shields Avenue, Davis, CA 95616, USA (RMY, PBM)*

*\*Correspondent: skit@critfc.org*

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Pink salmon (*Oncorhynchus gorbuscha*) are widely distributed in northern latitude coastal streams of North America and Asia, but the Puget Sound region is generally regarded as the southernmost extent of their recent spawning range on the west coast of North America (Heard 1991). Although observations of them are now uncommon, pink salmon have long been known to occur in California (Jordan and Evermann 1896, Moyle 2002, Moyle et al. 2008) and have even been reported south of the San Francisco Bay in the San Lorenzo River (Monterey Bay; Scofield 1916), Lagunitas Creek (Tomales Bay; Moyle et al. 2008), the Sacramento River and its tributaries (Hallock and Fry 1967) and, in 1945, the Scripps Institution of Oceanography verified the identity of a pink salmon that had been caught as far south as La Jolla, California (Hubbs 1946).

On 24 August 2011, four pink salmon were captured on the Salinas River, Monterey County, California, approximately 7 km upstream of the river mouth. Three of the four fish were male and had prominent spawning morphology (a humped back and hooked snout). Photographs of the fish (Figure 1) were taken moments after capture and were used by local experts to verify their identity. After being photographed, the fish were returned to the Salinas River.

From its headwaters in the La Panza Range of San Luis Obispo County, the Salinas River travels approximately 275 km in a northwesterly direction to its mouth (36° 44' 58" N, 121° 48' 18" W) in the Monterey Bay, California. At its terminus, the Salinas River forms a seasonally perched lagoon. The Monterey County Water Resources Agency (MCWRA) implemented the Salinas Valley Water Project (SVWP) in 2010, which included construction of a surface water diversion facility (36° 42' 32" N, 121° 45' 2" W; hereafter SRDF).



FIGURE 1.—Male pink salmon captured in the Salinas River, Monterey County, California; this is one of 4 individuals captured at the same location (36° 44' 58" N, 121° 48' 18" W) on 24 August, 2011. Photograph by Tom D. Skiles.

The SRDF is located approximately 7 km upstream from the river mouth on the mainstem Salinas River and includes an inflatable Obermeyer dam that impounds and diverts surface water (maximum head of 3 m above sea level) between 30 April and 1 October, a pump station, and a fish ladder. In order to supply surface water to the SRDF during dry summer months, the MCWRA increased summer releases from Nacimiento and San Antonio reservoirs. Those reservoirs lie approximately 160 km upstream from the river mouth. Prior to implementation of the SVWP, the Salinas River would typically dry in the summer months and the lagoon would remain disconnected or “closed” until fall or winter storm flows breached the lagoon. In the summer of 2011, however, the Salinas River flowed from Nacimiento Reservoir to the mouth of the lagoon and, as a result, was open to the Monterey Bay.

In 2011, erosion downstream of the fish ladder necessitated in-channel structural repairs. In August, the MCWRA installed a temporary coffer dam perpendicular to river flow, approximately 90 m downstream of the diversion facility. The area between the inflated Obermeyer and the temporary coffer dam was dewatered so that heavy equipment could enter the channel. As the work area was being dewatered, fish were rescued from isolated pools using long-handled dip nets. The four pink salmon were located in one such pool, immediately downstream of the Obermeyer dam.

There is a long history of pink salmon (also known as humpback salmon) occurrences over widely dispersed points along the northern California coast, and even in the Central Valley system (e.g., Snyder 1931, Taft 1938, Hallock and Fry 1967, Moyle et al. 2008). During the late-19th century, pink salmon were included in the commercial salmon catch sent to San Francisco markets from Humboldt County fisheries on the north coast of California that, in that early period, comprised only bay and in-river fishing (Collins 1892).

For the early Central Valley salmon fishery, the California Fish Commission (CFC 1880:53) reported that pink salmon were found in the Sacramento River, which they ascended “in tolerable numbers in October.” Jordan and Evermann (1923:150d) also wrote of pink

salmon, “In the Sacramento River it occurs each year but in very limited numbers and is there known as the lost salmon” (also Jordan and Evermann 1896:478). It is evident that pink salmon were occasionally observed, but were a very minor component of the native Central Valley salmonid fauna recognized by early Sacramento River commercial fishermen. Indeed, Hallock and Fry (1967:13) reported, “Many commercial gill-net fishermen who formerly fished for salmon in the Sacramento River have also fished for pink salmon in Alaska. These men recognize the species and some of them remember having taken an occasional pink in the Sacramento. Vincent Catania, a former Sacramento River gill-net fisherman now employed by the Department of Fish and Game, estimated that 30 years or so ago, in some seasons, the entire fishing fleet would take perhaps a dozen of these fish. Other fishermen recall the number as being higher than this.” Notably, several pink salmon were caught at the U.S. Fish Commission’s Baird Station on the McCloud River in September 1891, >480 km upriver from the San Francisco Bay-Estuary. As reported by Station Superintendent George B. Williams (USFC 1894: LVII), “In the latter part of September, after the close of the first run of the quinnat [Chinook] salmon, there were caught in one of the traps two females and one male of the humpback salmon (*Oncorhynchus gorbusha*), which were spawned, the eggs hatched at the station, and in February the fry planted in the McCloud River.”

Pink salmon continued to occur in the Central Valley through the 20th century. One specimen was reported at the U.S. Bureau of Fisheries egg-taking station on Mill Creek in 1933 (Taft 1938). In a concerted review of records from salmon studies and hatchery operations in the Central Valley during 1949–1958, Hallock and Fry (1967:13) found that a total of 38 pink salmon had been “taken, identified, and recorded from the Sacramento River system.” In contrast to adults, reports of pink salmon progeny are exceedingly rare anywhere in California, but in March 1990 seven pink salmon smolts reportedly were salvaged at the State’s J. E. Skinner Fish Protective Facility near Tracy (D. McEwan, California Department of Fish and Game [CDFG], personal communication, 17 October 1990).

In the early 20th century, Snyder (1931) indicated that pink salmon had been reported from the Salinas River, but he presented no data or documentation in support of his statement. According to Snyder (1931:16), “Humpback [pink] and dog [chum] salmon are not common enough anywhere in the State [California] to be of commercial importance; in fact, they are so rarely seen as to be unknown to any but the most observant fisherman. Both species occur as far south as Salinas River.”

Over subsequent decades, pink salmon repeatedly appeared in California coastal streams, occasionally in substantial numbers. Taft (1938:198) cited reports from CDFG wardens that in 1937 there were “many quite large schools of them” in Ten Mile River in Mendocino County, “several hundreds” in the Garcia River in Mendocino County, “spawning all over from the Red Bridge to the western boundary of the Indian Reservation, a distance of about two miles” and unspecified numbers were observed in the Russian River. Subsequently, small numbers of pink salmon have been caught from, or have been observed spawning in, the Russian River, Sonoma and Mendocino Counties, in occasional years (Fry 1967). For example, a sport fisher landed two pink salmon (1 male, 1 female) from the Russian River in October 1955; those two spawners were acquired by a CDFG agent who subsequently found four additional spawned-out pink salmon carcasses (2 males, 2 females). Later that month, a CDFG biologist observed pink salmon spawning on “at least six different nests” with several females and males, plus another decomposed post-spawn (female) carcass (Fry 1967).

In more recent years, adult pink salmon occurred in the Russian River in 2003 and 2008 (Chase et al. 2005; S. Chase, Sonoma County Water Agency [SCWA], personal communication, 22 October 2012) and in the lower Garcia River during multiple years (including at least 23 pink salmon redds in the lower Garcia River in 2003), while small numbers of juvenile pink salmon were caught in outmigrant traps on Redwood Creek in 2000, 2002, 2004 and 2005 (Moyle et al. 2008). In September and October of 2011 three pink salmon were captured and identified in Big Creek and its tributary, Devils Creek, in Monterey County (36° 4' N, 121° 35' W; approximately 80 km south of the mouth of the Salinas River) within the University of California's Landels-Hill Big Creek Reserve (T. H. Williams, National Oceanic and Atmospheric Administration, personal communication, 11 January 2012). Most records of adult pink salmon in California are for odd years, possibly suggesting a relationship to the Puget Sound runs which are mostly (12 of 13 runs) odd-year spawners (Hard et al. 1996). Although pink salmon are occasionally caught further south in the ocean (Hubbs 1946, Moyle 2002), the pink salmon captured on the Salinas River, Big Creek, and Devils Creek are the southernmost verifiable accounts of this species in fresh water on the west coast of North America.

The pink salmon captured on the Salinas River clearly were in spawning morphology and their timing is consistent with spawning patterns of the species (Hard et al. 1996). Operation of the SVWP created a passage opportunity that in most years had not existed. The 2011 findings suggest that pink salmon have the ability to establish new populations if opportunities present themselves. Despite our incomplete understanding of salmonid straying, there are recognizable population-scale benefits to this behavior. For example, straying may lead to the colonization of new habitat (Milner and Bailey 1989) or, conversely, to the avoidance of degraded habitat (Leider 1989). On the other hand, it is likely that central-coastal California streams were, on occasion, utilized by small runs of pink salmon that went unnoticed because of their short residence time in fresh water and their tendency to spawn in the lowermost reaches of streams, which made them difficult to detect in small numbers (Moyle 2002).

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