Problems in Redwood Creek estuary
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Introduction

The mouth of Redwood Creek is located approximately 2.5 river miles west of the town of Orick, Humboldt County (Figure 1 and 2). The location of the channel has remained relatively stable, even following the 1964 flood, as shown by aerial photography (Figure 3 and 4). However, property damage on the floodplain in 1953, 1955, and 1964 prompted the construction of levees along Redwood Creek. The downstream portion of the levee was completed in October 1968, which bypassed the last meander and directed the creek's flow directly to the ocean (Figure 5).

The estuary serves as a transition zone between freshwater and saltwater environments and plays a crucial role in the lives of adult and juvenile salmonids. Juvenile chinook salmon which use the estuary as a rearing area have a much higher survival rate than those which migrate directly out to sea.[1]

Statement of the Problem

The anadromous fishery of the Redwood Creek watershed has experienced a substantial reduction (since pristine times) as a result of natural and man-induced conditions. During the last 15 years, the most notable decline has occurred to the chinook salmon fishery. An estimated 70-80% decline of the chinook salmon fishery and a 60% decline of the coho fishery has resulted. Although extensively supported by hatchery programs, the comparably more resilient steelhead fishery has realized a 50% decline. The historic coastal sea-run cutthroat fishery is virtually non-existent in Redwood Creek. These estimates have been deduced from records available at the Humboldt County's Prairie Creek Fish Hatchery (S. Sanders, personal communication).

Some degree of this decline is related to the degradation of salmon spawning and rearing habitat in the Redwood Creek basin. Siltation of spawning habitat, creation of impassable log jams, and the destruction of streamside vegetation have occurred due to flood damage and land use practices. However, alteration of the estuarine environment has also significantly impacted the Redwood Creek fishery. Construction of levees changed the circulation pattern, isolating two backwater areas, the north and south sloughs (Figure 6). Prior to channelization, high flows kept the south meander open and created an eddy against the cliffs near the neck of the north slough. Aggradation of 4 to 8 feet of sand has occurred in the south slough since the 1966 Army Corps of Engineers survey. Movement of sand into the sloughs has been observed under conditions of high ocean swells during high tides. The source of the sand deposits will be identified by sediment analysis studies in progress.

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[1]Reimers, Paul E., 1973, The length of residence of juvenile fall Chinook salmon in Sixes River, Oregon: Research Reports of the Fish Commission of Oregon, v. 4, no. 2, p. 1-43.

Sediment deposition in the backwater areas has resulted in the loss of a major portion of the estuarine environment. The north and south sloughs are disconnected from the main channel except during periods of high water. The channelized portion of Redwood Creek lacks streamside vegetative cover. Increased water temperatures and susceptibility to predation also result from shallow water depths in the mouth area (embayment).

The mouth of Redwood Creek periodically closes due to low flows and the formation of a wave-built berm during the summer months. The river fills the embayment behind the berm, increasing the water depth and the volume of available aquatic habitat. Historically, the berm may have remained intact until fall. High river flows might erode it naturally or local fishermen would dig out the berm to encourage upstream migration of adult salmonids. Under present conditions, the berm may be dug out by local land owners whose fields and roads are flooding. Recent backwater flooding problems are a direct result of aggradation since less water is now required to fill the embayment.

Backwater flooding and the timing of mid-summer breaching present problems for estuary fisheries managment. Peak downstream migration of juvenile chinook occurs in May and June when larger volumes of water may fill the embayment. Man-induced breaching of the berm in early July 1980 decreased the available habitat by more than 75%. The productive north and south sloughs became disconnected and water depths decreased drastically. Juvenile utilization of the estuary may have continued much later into the summer but was interrupted by the breaching. An estimated 20,000 juveniles were prematurely flushed out to sea. Food resources within the estuary reach a maximum in the summer and may also be lost by premature flushing. The dominant fish food organism attains high densities during low flows when the substrate is stable and algal production contributes organic material to the benthic environment. The slough areas support high productivity throughout the year.

During early fall months, breaching of the berm during low flow increases the danger that upstream migrating salmon may fall prey to unscrupulous fishermen in shallow resting pools. In addition, spawning opportunities may be limited until after the first fall rains. Prior to channelization, there was a higher probability that the berm would remain intact until high flows eroded it naturally. This would allow salmonids to enter the freshwater environment at the proper time.