

Balancing the Three R's (Regulation, Research, and Restoration) On the Kenai River, Alaska



The Kenai River is Alaska's most popular salmon sport fishery. By attracting fishermen, the river contributes about \$40 million annually to the local economy. Much of the fishing effort is in pursuit of the river's chinook salmon, which are among the largest in the world. Many people benefit from the river through its numerous recreational opportunities or by making a living providing fishery support services. To preserve the fishery and the opportunities the river provides, we must find the proper balance of regulation, research, and restoration in the watershed.

Kenai River Characteristics

The Kenai River watershed drains about 2,200 square miles of the Kenai Peninsula in southcentral Alaska (see map). The Kenai River begins at the outlet of Kenai Lake, a narrow, 22-mile long lake, and flows for 17 miles before it passes through 15-mile-long Skilak Lake. From Skilak Lake, the river flows another 50 miles before entering Cook Inlet near the city of Kenai. Near Skilak Lake, about 16 miles of the Kenai River flow through the Kenai National Wildlife Refuge, where development is restricted. Because the Kenai River is within easy driving distance from Anchorage—the main population center of Alaska—development of the non-refuge portion of the river and use of the river have steadily increased along with the population of Anchorage.

Why Are So Many Fish in the Kenai River?

The Kenai River supports all 5 species of North American Pacific salmon and 29 other species of fish. It provides a source of chinook, coho, pink, and sockeye salmon for recreational and commercial fisheries. Fishery biologists believe that some of the reasons why the river may be one of the most productive salmon rivers

in the world are linked to the following unique features:

- (1) The river has sustained high flows for extended periods of time providing salmon adequate periods to spawn and migrate in the river.
- (2) Two large lakes along the river, Kenai and Skilak Lakes, regulate streamflow variations, reduce sediment movement, and provide salmon with rearing and over-wintering habitat.
- (3) Much of the Kenai River channel is stable, which helps maintain adequate spawning and rearing sites.
- (4) Historically, development in the river's watershed has been sparse and sources of water pollution have been few.

Fair Regulation and Proper Restoration Depend on Sound Research

Salmon return and harvest numbers have been increasing in recent years. However, regulations restrict development in the river's flood plain and close other

areas to fishing. Many damaged streamside areas on the river are being restored, yet little monitoring of the performance of these restoration projects or research towards improving restoration designs has been accomplished. The role of the U.S. Geological Survey and other Federal and State agencies is to complete high-quality scientific research to help develop fair regulations and proper restoration designs for the preservation of the Kenai River fisheries.

How Development Can Affect Fish Habitat

Developed areas of the Kenai River watershed are concentrated near the communities of Kenai, Soldotna, Sterling, and Cooper Landing and within a narrow corridor along both banks of the river downstream from the Kenai National Wildlife Refuge. Many aspects of this development increase erosion and sedimentation along the

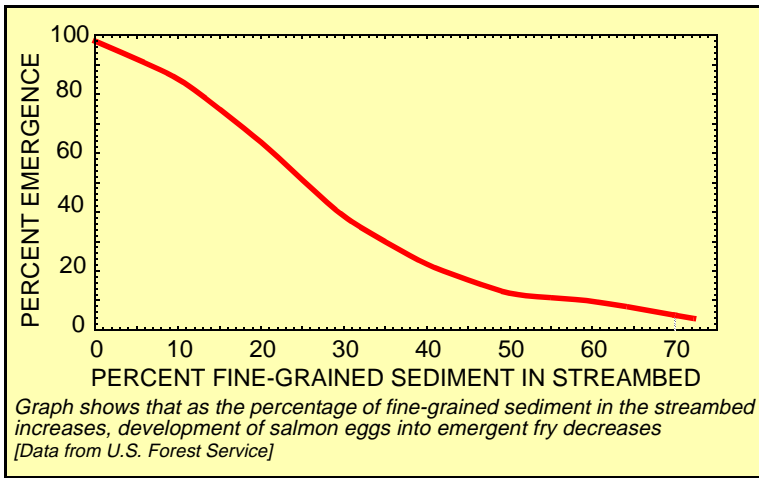


Kenai River watershed (green area) and U.S. Geological Survey stream-gaging stations (red dots) in Soldotna and Cooper Landing

river. For example, vegetation is removed from riverbanks to obtain access to the river, structures are built into the river, and river uses—such as boating—are increasing.

Erosion and sedimentation can have significant effects on salmon populations. Material eroded from the riverbanks and the river bottom moves downstream and is deposited in other areas that may be important spawning or rearing habitat. Young salmon have difficulty developing properly with increases in sediment concentrations and may not emerge from their spawning beds if fine-grained-sized sediment deposition occurs over them (see graph to the right). In the Kenai River, habitat for juvenile salmon is already in short supply; increased erosion caused by development can further reduce this critical habitat. Structures such as docks, jetties, and retaining walls modify the channel and alter fish habitat. Selection of the appropriate streamside structure requires knowledge of the potential effects on fish habitat.

Developed areas along the river were significantly affected by the flood of September 1995. After the flood, the U.S. Geological Survey found that as much as 25 feet of bank was eroded landward during the flooding in a developed section of the lower river; only 8 feet of bank eroded in a heavily vegetated undeveloped section of the upper river. Accelerated erosion of the riverbanks caused by removal of streamside vegetation and changes in the stream channel may continue until a new post-flood equilibrium is reached, which may take years. Research is currently being planned to



quantify and understand the potential habitat effects of severe flooding

In addition to the fall 1995 flooding on the Kenai River, below-average snow accumulation in southcentral Alaska in 1995-96 resulted in low springtime snowmelt flow in the river. U.S. Geological Survey data show that the Kenai River was as much as 35 percent below mean daily flow during May and June 1996 (see graph below). This low flow causes potentially dangerous boating conditions, delays the returns of salmon, dries out spawning grounds, and reduces food sources for young fish. The numerous potentially detrimental effects of low-flow conditions on the salmon fishery are cause for concern.

Ongoing Efforts Help Define Fish Habitat Relations

Cooperative efforts currently being undertaken to understand the complex relations between the river and its fish habitat include:

- Stream-gaging stations at Cooper Landing and Soldotna operated by the U.S. Geological Survey (see map)
- Regulation of streamside development by the Kenai Peninsula Borough
- Identification and restoration of fish habitat along the river by the Alaska Department of Fish and Game
- Revision of the “Comprehensive Management Plan for the Kenai River Special Management Area” by Alaska State Parks
- Investigation of boat-wake-induced streambank erosion by the National Marine Fisheries Service, the Alaska Department of Fish and Game, and the U.S. Geological Survey

Additional information that would complement these efforts and help to balance the regulation, research, and restoration of the Kenai River includes:

- Real-time streamflow and water-quality data at Soldotna for flood forecasting and river management
- Detailed river channel geometry data for flood and fish habitat modeling and for geomorphic investigations
- Digital watershed land-use information to evaluate changes and trends in the physical, chemical, and biological characteristics of the river
- Monitoring of restoration project performance to evaluate future designs
- Records of commercial and private boat activity on the river
- Determining historical and present rates of streambank erosion

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