



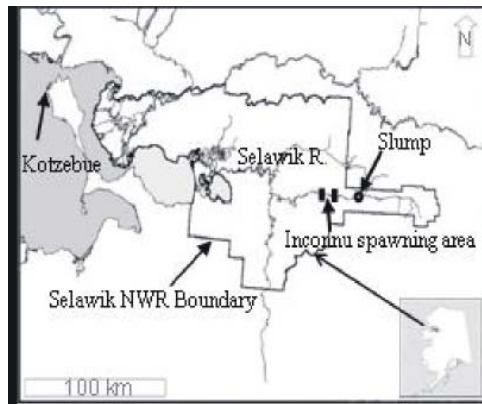
U.S. Fish & Wildlife Service

Preliminary Studies of a Permafrost Thaw Slump Impacting Sheefish Spawning Habitat in the Selawik River

Fairbanks Fish & Wildlife Field Office

One of the most dramatic changes and concerns of climate warming is the increased rate of thawing permafrost and its related environmental shifting, such as changing the hydrological regime of river systems. The Kotzebue Sound area of northwestern Alaska is widely recognized as one of the most ice-rich and thaw-sensitive areas in Alaska. In particular, glaciated areas are prone to develop retrogressive thaw slumps (RTS) by the thawing of buried glacial ice bodies.

In the spring of 2004, a large RTS occurred in the upper Selawik River drainage above important sheefish *Stenodus leucichthys* spawning habitat within the Selawik National Wildlife Refuge (Refuge). This event changed the water from a clear to a glacial-colored river that was noticed by Refuge personnel and persons from Selawik. The Selawik River is habitat for a number of whitefish species, including sheefish that support an important subsistence fishery and occupy an important ecological role in the Kotzebue, Alaska area.



Little is known about the physical spawning habitat requirements for sheefish, especially sensitivity to the accretion of sediments. There is potential that sediment could fill interstitial spaces between the gravel and cobble substrate where fertilized eggs need to settle, overwinter, and mature.

Since 2004, the RTS has continued to erode and influence the river with no apparent end in sight. The RTS is caused by ice-rich permafrost degradation resulting in slope failure. Also, increasing thermokarst activity has been identified by the National Park Service in a 5,000 km² survey area in the adjacent Noatak National Preserve.

Recently the U.S. Fish and Wildlife Service and the University of Alaska have collaborated to attain preliminary data about the RTS progress. Attempts were made to provide an estimate of the volume of sediment/ground ice that has eroded into the Selawik River from the RTS since

2004 using stereophotogrammetric analysis methods of aerial remote sensed imagery

This analysis indicated that approximately 25,000,000 to 60,000,000 kg of sediment were released from the RTS in the 2007 melting season. Since 2004, the RTS was discharging 267g/L of suspended sediments and discharging more than 100 L/sec from thawing permafrost during the melting season. At the sheefish spawning area in August 2007, deposited sediment was observed and



suspended sediments were measured to be at least 375mg/L. Impacts to the Selawik River sheefish population may not be known until the age cohorts from eggs deposited during sediment discharge years reach maturity and return to spawn in about 8 to 12 years. Pilot work in 2008 is planned to assess the spawning habitat area for silt accretion on the spawning ground. Also, assessment of sheefish egg distribution relative to stream substrate characteristics will be explored in 2008 by U.S. Geological Survey fishery scientists to gain an understanding of specific habitat(s) where eggs reside for overwintering and maturation.

Monitoring the output of the RTS and its effects on sheefish production will provide insights about responses by other fish species and other areas as climate warming occurs.