Effects of Climate Change, Glacial Retreat, and Snowfield Loss on Habitat Condition and the Affect on Wild Sheep Populations and Distribution in Polar and High Mountain Ecosystems in Alaska and Mid-Asia – A Comparative Study

Edwin (Ed) L. Pfeifer, Chief, Southwest Geographic Science Team, Western Region Geography, U.S. Geological Survey, epfeifer@usgs.gov

The U.S. Geological Survey, Southwest Geographic Science Team, in partnership with New Mexico State University, the Foundation for North American Wild Sheep, International Sheep Hunters Association, Institute of Zoology, Kazakhstan, and the University of Alaska, propose to study, analyze, and model the long-term effects of glacial and snowfield retreat in polar, sub-polar, and high mountain areas of Alaska and mid-Asia. With the purpose of determining how these land-surface changes impact wild sheep and goat distribution, population, changes in favored habitat, and overall habitat health and carrying capacity. We propose to conduct this research utilizing a variety of remotely sensed data including some collected using the Landsat, Moderate Resolution Imaging Spectroradiometer (MODIS), and Quickbird satellite imaging systems to assess the phenology and extent of the habitat as it currently exists and the status and extent over the last several decades in the study areas. It will include looking at the dynamics of the landscape and changes in glaciers, snowfield and vegetation phenology. The Global Land Ice Measurements form Space (GLIMS) database and historic maps will be utilized to estimate glacial and snowfield margins predating Landsat. Remotely sensed image data and the GLIMS database will be coupled with on the ground animal surveys to determined favored habitat and current populations. Interviews will be conducted with locals and individuals familiar with the past state of the habitat, favored animal locations, and populations to provide a historic perspective on populations and favored habitat. Wild sheep and goats are extremely important to the economies of various mid-Asian countries, in that considerable revenue is generated from hunting activities. In Alaska, revenues generated through hunting wild sheep play an important role in providing funding for wildlife management administered by the Alaska Department of Fish and Game. In the case of Asia, these revenues are specifically re-invested in the overall management of wild sheep and goats. Several of the Asian Argali are listed as threatened or endangered, requiring long-term effective management to maintain sustainability. Results of the study will be delivered to the wildlife management agency in Kazakhstan and the Alaska Fish and Game Department so that science based management plans can be developed to provide sustainable populations of wild sheep and goats.