An Indigenous Model of a Contested Pacific Herring Fishery in Sitka, Alaska

Thomas F. Thornton, School of Geography and the Environment, University of Oxford, Oxford, UK
Harvey Kitka, Sitka Tribe of Alaska Herring Committee, Sitka, AK, USA

INTRODUCTION: MEASURING SUCCESS IN ALASKA HERRING FISHERIES MANAGEMENT

When combined with historical ecological analyses of the co-evolution of human societies and ecosystems, the application of GIS and use of spatial analysis has the potential to reveal long-term dynamics and vulnerabilities in key species populations. To date the potential to combine the integration, visualisation and analysis capabilities of GIS with traditional ecological knowledge to improve management of and decision making processes related to marine resources has been limited (cf. Aswani &
Pacific herring (*Clupea pallasii*) is a biological and cultural keystone species (Garibaldi and Turner, 2004; Paine, 1995) for Southeast Alaskan Indigenous marine ecosystems. As forage fish and prey for many species, herring play a foundational role in the marine food web. Herring support large populations of predatory fish, mammals, and seabirds, especially during their spring spawning aggregations in protected coastal areas of Southeast Alaska, of which Sitka Sound (Figure 1) is the most productive by far. As a cultural keystone species among the Tlingit, Haida, and Tsimshian peoples of Alaska, herring are considered a highly significant component of subsistence production, trade, ritual and expressive culture. Among Sitka Natives, they figure prominently in oral history, names, songs, dances, regalia and other *at.óow*, or sacred property.

Significant declines in herring abundance occurred as a result of heavy commercial herring reduction fishing (1882-1966) to produce industrial oil, livestock feed, and fertilizer (Hebert, 2012; Rounsefell, 1930, 1931; Thornton et al., 2010a; Woodby et al., 2005). Many Natives believe that local spawning populations of herring have never fully recovered from the heavy reduction fishing era, and thus remain vulnerable to the newer, intensive commercial sac roe fisheries which now dominate production, yielding salted roe, or *kozunoko*, for Japanese markets. The sac roe seine fishery, which kills herring at the cusp of spawning in order to harvest the roe skeins from pregnant females, commenced in the late 1970s and has grown significantly to serve the international market. Fishing quotas in Sitka Sound alone climbed to more than 28,000 tons in 2012, more than 50 times those set in 1976, when the first herring...
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