

Citation for Rachel Carson Scientific Excellence – Group Award

Kenai National Wildlife Refuge Biology Program

Kenai National Wildlife Refuge's (Refuge) eight biologists have consistently "led from the field" in developing a scientific approach that will direct the Refuge's strategic response to climate change. Concurrently, they have made significant contributions to Departmental and U.S. Fish and Wildlife Service (Service) climate change initiatives at both regional and national levels.

A key aspect of the Refuge climate change strategy is the spatially-explicit Long Term Ecological Monitoring Program (LTEMP), a landscape-level approach to inventorying and monitoring biodiversity. To date, 1069 species have been documented on the Refuge, including one insect family and five insect species new to Alaska, two new sedges for the Refuge, and a range expansion for Hammond's flycatcher. Staff are also pioneering the use of DNA barcoding to help inventory and monitor arthropods. Data generated by the LTEMP have been used to accurately document current baselines for Refuge biodiversity and have provided a scientific basis for modeling probable future conditions. Bioclimatic models have been used to build predictive models of current and future landcover and future distributions of avian species. Future monitoring will be focused on detecting change signals, reducing uncertainty and refining predictive models.

Refuge scientists have also conducted research to document impacts of climate change, resulting in publications on treeline rise, drying wetlands, and woody shrub encroachment into peatlands. In total, Refuge scientists have authored or co-authored 30 scientific articles published in peer-reviewed scientific journals or symposium and conference proceedings in the last five years, including twelve publications directly related to climate change.

LTEMP data and directed research are also contributing to the development of management strategies for reducing non-climate stressors as part of the Refuge's climate change approach, specifically in managing invasive species and addressing impacts of land use changes on fish and wildlife resources within and beyond Refuge boundaries.

The Refuge's leadership in addressing climate change on the Kenai Peninsula has provided impetus for new partnerships with the U.S. Forest Service, the National Park Service, academic institutions and conservation organizations. These include collaborative efforts to assess the vulnerability of fish and wildlife species and habitats and to begin strategic landscape scale climate adaptation planning.

Refuge scientists have also represented the Service in the GAO's investigation of climate change impacts on Federal lands (2006) and on the DOI Climate Change Task Force (2007), represented the Alaska Region on the USFWS Climate Change Strategic Planning Team (2008), co-led an interagency team that produced *Connecting Alaska Landscapes into the Future: Results from an interagency climate modeling, land management and conservation project* (2009), co-led a team that developed the *Strategic Plan for Inventories and Monitoring on National Wildlife Refuges: Adapting to Environmental Change*, contributed to the *National Fish, Wildlife & Plants Climate Adaptation Strategy* (2011), and have assisted the standing up of Landscape Conservation Cooperatives in the Alaska Region.