

Towards an Ecosystem Approach for Management of Bristol Bay Estuaries

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Bristol Bay is a large sub-Arctic water body covering over 110 thousand km² in southwest Alaska. It is relatively shallow and coupled to the Bering Sea to the north and west. Along its shoreline there are six large estuaries that receive the inflow from watersheds including the Cinder, Egegik, Igushik, Kvichak, Meshik, Nushagak, Naknek, Togiak, and Ugashik rivers. Each summer millions of migrating Pacific salmon (5 different species) use these estuaries as a staging and physiological transition area. Juvenile smolt transition from freshwater to marine systems foraging on their way to the north Pacific, while adult salmon enter freshwater watersheds on their way up to stream or lake spawning grounds. The associated salmon fishery, among the world's largest, is prized both for its subsistence and commercial value. To maintain a sustainable fishery, salmon escapement goals are stringently managed so adult salmon enter pristine watersheds to breed. However, the ecological function and the full range of services of Bristol Bay's estuaries have not yet been extensively studied or monitored (e.g. nutrient cycling, diversifying wildlife habitats, and distributing and cleaning fish waste).

Estuaries found in lower latitudes have been cited as some of the world's most productive ecosystems. The dynamics studied in these lower latitude models, however, may not apply to the northern salmon dominated ecosystems of Bristol Bay. Important ecological data gaps include: influences of summer fish processing waste on food webs, seasonal population changes of biota, winter ecology of resident species, and primary productivity vs. marine derived nourishment. The limited data on the ecological dynamics of Bristol Bay ecosystems is further compounded by the underlying influences such as rapid climate change and human altered nutrient cycling. We need a more robust understanding of how Bristol Bay estuaries function as part of an expanding sub-Arctic ecosystems so that scientists and policy makers can better manage for their ecological health.

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