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Title: *Identifying Important Ecological Areas in the U.S. Chukchi and Beaufort Seas*

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Practical approaches are needed to preserve the health, biodiversity, and resilience of marine ecosystems. Identification of Important Ecological Areas (IEAs) provides a systematic way to prioritize spatial conservation, response, and restoration efforts. We present an analytical method for identifying IEAs and results for an analysis of a 400,000 square kilometer area in the Beaufort and Chukchi seas off the north slope of Alaska. Once identified, IEAs should be incorporated into management efforts to avoid unnecessary impacts associated with expansion of industrial activities, such as commercial fishing, shipping, and oil and gas exploration and development.

We define Important Ecological Areas as geographically delineated areas which by themselves or in a network have distinguishing ecological characteristics, are important for maintaining habitat heterogeneity or the viability of a species, or contribute disproportionately to an ecosystem's health, including its productivity, biodiversity, functioning, structure, or resilience. For example, areas that are migration routes, subsistence areas, sensitive seafloor habitats, breeding and spawning areas, foraging areas, and areas of high primary productivity. As an exercise in valuation, determining "relative importance" requires a process for establishing and comparing values of individual or multiple ecological features on a similar scale, which is accomplished using standard deviates.

Ecological features used include primary productivity, benthic biomass, sea ice, seabirds, marine mammals, and subsistence for which datasets were available or could be compiled. The study region was divided into a 10x10 km grid of study units. Spatial data for each ecological feature were overlaid on the grid and values for each study unit calculated. This created a distribution of study unit values for an ecological feature and values were then converted to standard deviates. Positive standard deviates from the different ecological features were added to provide a landscape of relative importance. Variability in the relative importance of planning units was found across the study region with coastal areas near communities being particularly important.

