Future population trends and drivers of change for Alexander Archipelago wolves on and near Prince of Wales Island, Alaska

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Background. The Alexander Archipelago wolf, inhabiting the coastal temperate rainforest of North America, was recently evaluated for protection under the U.S. Endangered Species Act, but ultimately was not listed. Stressors thought to be impacting the population include about habitat alteration from industrial timber harvest and subsequent declines in prey (deer), increased human-caused mortality, and climate change.

Methods. To evaluate how these factors likely will affect future abundance of wolves and deer, we constructed a model linking wolf and deer population dynamics to environmental conditions and management regulations. We restricted our model to Prince of Wales and outlying islands, because this area is partially isolated, is the focus of timber harvest in the region, and has the most empirical data available for model parameterization. We examined 6 combinations of future timber harvest, winter severity, wolf harvest regulations, and roads on population dynamics of deer and wolves, developed by a panel of experts.

Results. Outcomes across scenarios after 30 years varied, with changes in wolf abundance ranging from a 156% increase to a 41% decline, whereas deer abundance declined from 10−37% after 30 years. Mean percentage of the 31 pack areas that were vacant after 30 years ranged from 0 to 67%, indicating that environmental conditions strongly affected pack success. Variation in wolf abundance was driven primarily by changes in harvest regulations, with smaller contributions from road density, forest succession, and severe-winter frequency. Given current low estimated wolf numbers and

continued legal and illegal harvest, this raises conservation concerns for the future of wolves in our study area. In addition, we found that wolf declines could be greater if wolves rely more heavily on deer in the future, for instance if salmon availability declines under future climate change, but also that reduction of deer hunting could increase wolf abundance.

Discussion. The potential importance of illegal harvest in wolf population dynamics needs further acknowledgement and treatment. However, changes to harvest regulations, which would not reduce unreported harvest, could still be a powerful tool for management of this small, declining, and insular population. Nevertheless, maximum abundance of wolves appears to be curtailed by the steady decline in carrying capacity forecast across all timber management plans currently under consideration. Although we evaluated factors affecting wolf abundance individually, we encourage a holistic approach to management of this predator-prey system in an altered ecosystem.