MAPPING BALD EAGLE COMMUNAL NIGHT ROOST HABITAT IN NORTHWEST WASHINGTON USING SATELLITE IMAGERY

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Abstract

Bald eagles (*Haliaeetus leucocephalus*) in the contiguous United States have experienced a gradual population decline over the last two centuries due to persecution and habitat loss. The rapid bald eagle population decline in the 1940's-1960's stemming from DDT use, which prompted listing of the species as endangered under the Endangered Species Act in 1978, appears to have ended. While the population has recovered substantially, leading to a proposed delisting, continued habitat loss associated with human population growth and land development will probably result in bald eagle population declines again in the near future.

The Pacific Northwest attracts large congregations of wintering bald eagles on its major river systems, with some of the largest gatherings occurring on the Skagit, Nooksack, Sauk, and North Fork Stillaguamish Rivers. Eagles migrate to these rivers from breeding territories in Canada and Alaska to feed on the notable accumulation of spawned-out chum salmon (*Onchorynchus keta*) carcasses on river bars and in side channels between November and February. While in the area, bald eagles use communal night roosts in forest stands that are close to key foraging areas, provide thermal cover, and are shielded from human disturbance. Daytime foraging surveys have documented up to several hundred eagles using each of these major rivers, but only 25 to 30 percent of these birds have been accounted for in the known night roosts.

I developed a set of forward step-wise logistic regression models, using Akaike's Information Criterion, to predict the spatial distribution of additional bald eagle night roost habitat for these four watersheds. I used 50 known night roost locations from Washington Department of Fish and Wildlife databases and a set of 200 random sites in the logistic regression modeling. Predictor variables included topographic attributes such as elevation, slope, and aspect. I also used distance to salmon-bearing streams, road density, and a variety of vegetation parameters as predictors. I modeled the potential night roost habitat at four spatial scales, 10, 40, 70, and 100 ha, to approximate the range of known roost sizes.

The best predictors of potential bald eagle night roost habitat included mean elevation, road density, mode of Quadratic Mean Diameter (tree size class), mean slope, mean distance to salmon-bearing streams, and standard deviation of aspect. I assessed model classification accuracy using a jackknife procedure. The model had an overall classification accuracy of 83.2%, with roosts correctly classified at 82.0% and random sites at 83.5%. I then used the model to estimate both current potential habitat and potential habitat for 1973. Over 50% of current potential roost habitat is located on private land, and another 20% and 16% are located on Washington Department of Natural Resources (DNR) and United States Forest Service lands, respectively. I detected a net loss of roughly 2,000 ha of night roost habitat between 1973 and 2000, the bulk of which occurred on DNR and private lands.

My map of potential bald eagle habitat in the study area will be useful for directing future roost survey efforts as well as for providing managers with guidance in decision-making and conservation organizations with identification of critical areas for land acquisition efforts. Current potential habitat occupies 66,000 ha of the study area and should be more than adequate to accommodate the “missing” roosts, used by the other 70-75% of the wintering bald eagle population.