

An Ecological Production Function (EPF) is a quantitative model describing how the provisioning of an ecosystem service is linked to ecological structure or function. A habitat-based framework is a practical method for developing EPFs that describe the spatial variation of ecosystem services. We compare bird utilization patterns among the intertidal habitats within Yaquina estuary, Oregon, USA, to generate EPFs for this estuarine system. Visual censuses were used to quantify abundance of bird groups and general species richness in: *Zostera marina* (eelgrass), *Upogebia* (mud shrimp)/mudflat, *Neotrypaea* (ghost shrimp)/sandflat, *Zostera japonica* (Japanese eelgrass), and low marsh estuarine habitats. Also assessed were (1) spatial variation within a habitat along the estuary gradient (4 sectors of the estuary), and, (2) temporal variation based on bi-monthly samples over a year (6 periods) at five tidal ranges. *Z. marina* was an important estuarine habitat based on nearly all metrics of bird use, except for shorebird densities. This suggests that reductions in native eelgrass habitat may reduce the abundance and diversity of birds in Yaquina estuary. The habitat formed by the introduced Japanese eelgrass appeared to have comparable bird use to unvegetated habitat at equivalent height on the intertidal gradient. Bird usage within a habitat type was not constant across the spatial extent of the estuary, and thus location should be considered in ecosystem services assessments. For example, in comparison to the embayments in the lower Yaquina estuary, the upriver areas had lower densities of birds but relatively high species diversity. Seasonal and Tidal effects strongly affected bird distribution across intertidal habitats and should be controlled for when comparing habitats. Our results suggest that a habitat based assessment approach is generally feasible for use in developing relative EPFs related to the presence of birds within estuarine systems.