

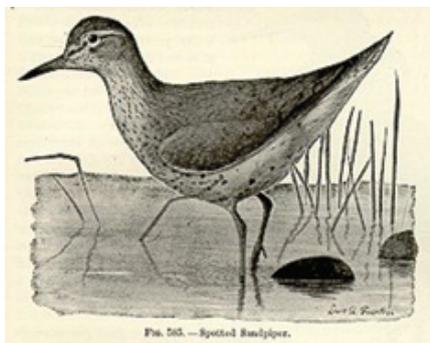
Importance of Willamette Valley Farmlands to Wintering Shorebirds



Flooded farmland in Willamette Valley of Oregon

Introduction

North American bird conservation plans have identified the Willamette Valley in western Oregon as an important wintering area for wetland birds such as waterfowl and shorebirds. Unfortunately, many aspects of shorebird and waterfowl use of this agriculturally dominated landscape are not well understood. In 1998, we initiated a 3-year study to increase awareness about the importance of flooded habitat on farmlands (agricultural wetlands) for shorebirds and to develop science-based management options to benefit wintering and migratory shorebirds. Specifically, we: 1) studied the historic and current distribution of Willamette Valley wetlands, and 2) determined how two species of shorebirds (Dunlin and Killdeer) currently use agricultural wetlands.



Historical rendition of a Spotted Sandpiper, from Coues 1874

The historical Willamette Valley was a mix of riverine wetlands and wetland prairies

We synthesized historical accounts from early explorers, travelers, settlers, and farmers to understand the nature of Willamette Valley wetlands and their use by nonbreeding waterbirds circa 1840. In fall, winter, and spring, waterbirds used riverine wetlands on the floodplain or wetland prairies of the upland terraces. Fall burning by native Kalapuya coupled with winter rainfall turned wetland prairie into prime open flooded foraging habitat for waterbirds. Because observations focused on large, hunted species, historical accounts of shorebirds are less common than waterfowl. While we know that waterfowl were more abundant than they are today (terms used to describe their abundance were “abundant,” “numerous,” “millions”), we know relatively little about shorebird abundance, only that shorebirds were fairly common. Evidence suggests, however, that all waterbirds, including shorebirds, relied heavily on both riverine wetlands and flooded wetland prairies managed with fire.

Many Willamette Valley wetlands have been lost

Willamette Valley wetlands have undergone significant changes since the region was first settled by Euro-Americans. Channelization of the Willamette River for travel and commerce, dam construction, and drainage of wetland prairie for farming have all contributed to loss and conversion of wetlands. Only 1 percent of native prairie remains. Today, most Willamette Valley lowland is farmland, primarily for grass seed and vegetables. However, there are many regions where native hydric soils still pond with rainfall on agricultural land, what we call “agricultural wetlands.” Such wetlands are highly suitable candidates for enhancement given their historical importance and potential for benefiting wintering waterbirds, many of which are undergoing population declines.



Flooded harvested cornfield with foraging Dunlin flock

Agricultural wetlands are widespread today

For two winters, we used a combination of satellite radar data (RADARSAT) and ground surveys to map the distribution and abundance of open ($\leq 50\%$ cover by vegetation), flooded, and/or saturated agricultural land in the Willamette Valley. In an average year for rainfall, this “shorebird habitat” is abundant and evenly distributed across the Willamette Valley. In dry years; however, it is less abundant and more spatially aggregated. On a landscape scale, habitat tends to peak in abundance in mid-winter (January/February) after the rains have established and before agricultural vegetation has grown to fully cover fields.



Aquatic oligochaete worm

Invertebrate foods preferred by shorebirds are abundant in agricultural wetlands

We quantified the community composition and abundance of invertebrates available to birds at a sample of agricultural sites in the Willamette Valley. Sites were dominated numerically by aquatic oligochaetes (worms). Earthworms and midge larvae were also prevalent at most sites. Abundance of these invertebrates were fairly high, similar to other important wetlands in North America.



Radio-tagged Dunlin

Shorebirds rely on multiple wetlands during their winter residence

From radio-telemetry work on individual Dunlin and Killdeer, we discovered that wintering populations of Dunlin and Killdeer remain within the Willamette Valley for the winter. Data suggest that individuals may sometimes relocate to the coast during storm events when temperatures are low enough to impede foraging in fields. Dunlin repeatedly visit multiple (10 or more) sites. Agricultural wetlands account for the majority of sites used, but U.S. Fish and Wildlife Service National Wildlife Refuge impoundments are also important, primarily for roosting. Moreover, as habitat becomes less available across the landscape, Dunlin home ranges increase. These data imply that access to only a few sites in the Willamette Valley is not enough to support most individuals throughout the winter. Wintering shorebirds rely on multiple wetlands.

Shorebirds are attracted to areas where agricultural wetlands are clustered

We conducted weekly ground surveys for shorebirds within regions that differed in the amount and spatial configuration of wetland habitat. During the dry winter of our study, Dunlin used regions with the most collective coverage of shorebird habitat and sites with greatest area of surrounding habitat. However, during the wetter winter, habitat was so abundant and evenly distributed that its spatial patterning was of little importance to Dunlin. Being habitat generalists, Killdeer were not as influenced by the distribution of wet, unvegetated habitat.

Wet, exposed farmland with high invertebrate abundance is most attractive

We assessed the degree to which site use by Dunlin and Killdeer was related to: 1) area (ha) of wet habitat; 2) percent of open, exposed soil; and 3) abundance of invertebrates. Dunlin abundance was positively correlated with wet habitat and exposed soil during the wet and dry winter. In addition, during the dry winter, Dunlin abundance was correlated positively with invertebrate abundance at sites, suggesting it is more important for birds to find the most productive sites in drier years than in wet years. Killdeer abundance was unrelated to all three measures, which is not surprising given their ability to use all kinds of farmland habitats.

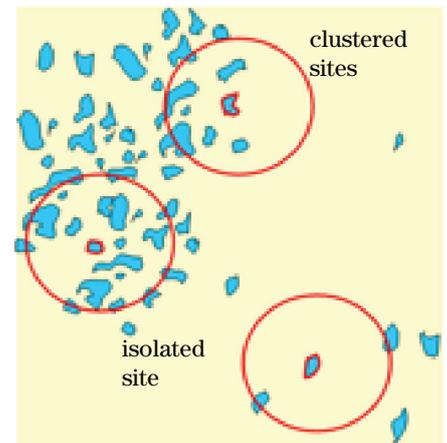


Foraging shorebirds

Shorebird-friendly management considerations

The Willamette Valley is an important wintering region for shorebirds and has great potential to benefit waterbirds. The following is a list of features of agricultural wetlands that are “shorebird-friendly.” These will most benefit wintering Dunlin and other similar shorebirds (sandpipers, dowitchers, yellowlegs species). Moreover, waterfowl, especially dabbling ducks, should also benefit from activities that enhance farmland habitat for shorebirds.

- ***Groups of agricultural wetland sites that tend to pond together are especially valuable.*** Flooded sites are most consistently available where hydric soils predominate and on refuges that are assured managed water each year. Because shorebirds are attracted to clusters of wetlands, Willamette Valley sites that are located nearby such sites may be most valuable for enhancement.



Schematic of isolated vs. clustered sites

- ***Farming practices that allow wet habitat will most directly benefit shorebirds.*** Improving surface drainage and installing new tile drains will deter the majority of shorebird species. Farmers interested in enhancing land for shorebirds might consider the following actions when the economic cost of reduced crop yield from wet fields is too high:
 - enlist in USDA conservation programs (Wildlife Habitat Incentives Program, WHIP; Environmental Quality Incentives Program, EQIP) designed to provide financial help for management practices that enhance wildlife habitat
 - take field portions with greatest reduced yield due to flooding out of production and receive compensation for enrolling these lands as easements in the Wetlands Reserve Program

- ***Shorebirds prefer foraging substrates that are exposed.***

Newly-planted perennial ryegrass and fallow vegetable fields provide exposed foraging substrates throughout the winter period. However, conventional tillage and residual straw removal practices that expose soil (for example, plowing and disking the soil, bailing the straw) are known in many agricultural systems to adversely affect water quality of adjacent streams through erosion and runoff from fields. Conservation tillage combined with straw remaining in fields are practices that have been recommended in the Willamette Valley and elsewhere to lessen these effects. Although conservation tillage practices will likely provide some exposed soil for birds by winter, large amounts of residual straw from previous growing seasons will likely deter shorebirds by limiting their access to invertebrates. Many of the flooded regions within fields used by shorebirds are depressional, posing little risk of erosion and runoff. For these we suggest leaving minimal straw on the interior of the field and maintaining vegetation and/or leaving most residual straw only along field borders.



Grass field with valuable shorebird habitat

- ***Moist soils, moderate amounts of plant detritus, and shallow standing water will boost the production of benthic aquatic invertebrates.*** Plant debris or litter can come from decaying crop vegetation or residual straw. When soils are saturated, fungi, bacteria and microinvertebrates will accelerate litter decomposition, in turn providing resources for aquatic invertebrates eaten by shorebirds. If allowed to pond, such fields can become highly productive for reproducing aquatic invertebrates. Moreover, by leaving moderate amounts of plant debris on fields (not so much as to restrict access, see above), conservation tillage and straw removal practices are likely to further increase abundance of shorebird foods in the Willamette Valley.

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