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Shorebird Monitoring in the Salish Sea

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SSEC Proceedings – Session: Shorebird Monitoring in the Salish Sea

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Estuarine bird monitoring in the Salish Sea: prospects for launching a shared, scalable and integrative currency of habitat value from hectare to hemisphere.

Bayard (Audubon Washington) and co-authors summarized a recent evaluation of bird monitoring efforts associated with the largest estuary restoration projects in Puget Sound over the past two decades which revealed that no systematic approaches or common monitoring goals for birds have been identified—let alone adopted. By contrast, the effectiveness of estuarine restoration projects for salmon recovery can often be measured and assessed by the number of additional salmon smolts they produce. Although many qualitative ecological benefits of tidal marshes and mudflats have been described for waterbirds and shorebirds, there are scant data sources in Puget Sound that can be rolled up—quantitatively at the meso- or macro-scale—to provide regional population or habitat information that can inform conservation and management.

This deficit is especially distressing, because individually and collectively, various estuaries within the Salish Sea (e.g., Fraser River, Skagit River Delta, Drayton Harbor/Semiahmoo, etc.) are recognized as sites of regional to hemispheric level importance to imperiled shorebirds whose migrations and critical 'fueling stops' span the Americas. While some shorebirds' use of relatively large, open and prey-rich areas has been consistent over time, in recent years their use of smaller potentially prey-rich foraging areas appears to have declined. Emerging evidence suggests that rebounding populations of predators like Peregrine Falcons and dwindling "safety-in-numbers" may reduce the attractiveness of smaller, or less-open sites for shorebirds.

To bridge these gaps and challenges, our session at the 2018 Salish Sea Ecosystem Conference brought together estuarine ecologists and bird monitoring experts—locally and internationally—to outline considerations for building a systematic and streamlined framework for future avian monitoring that: builds on the body of monitoring work in the Salish Sea; accounts for temporal and area-dependent tradeoffs in habitat quality and predator pressure; is scalable and compatible with peer programs along the Pacific flyway; and establishes common and reciprocal monitoring goals for estuaries and birds.

Presentations and discussions from the conference session revealed that from a bird-counting standpoint, the ephemeral, patchy distribution and abundance of shorebirds (even relatively common candidates for monitoring like wintering Dunlins and migrating Western Sandpipers), call for repeated sampling to adequately detect and assess patterns of use, especially at the smallest restoration sites. Given the challenges—tidal cycles, weather conditions, vegetation cover, walkable substrate—of accessing the mosaic of tidally inundated mudflat habitat sites that have been restored across Puget Sound, the physical conditions favoring a satisfactory level of survey effort by volunteers or biologists are thought to be rather limited.

To overcome such limitations, David Hope (Simon Fraser University) described the use of Christmas Bird Count (CBC) data to put local counts at restoration sites into a regional and flyway context. He and collaborators examined CBC circles that overlap large restoration sites as a preliminary assessment of response to estuary restoration. Their analysis across four sites revealed consistent patterns in pre-, during- and post-restoration use by Dunlins that differed markedly from trends in Dunlin abundance across the wider Puget Sound region across those periods. Specifically, the relative proportion of Dunlins

counted at restoration sites generally declined prior to the initiation of restoration. During restoration work, Dunlin abundance increased in the CBC circles that included the restoration sites, with the peak abundance observed in the first-year post-restoration. In the sites with sufficient post-restoration data to analyze, the regional Dunlin abundance decreased sharply across the post-restoration period. In contrast, regional Puget Sound CBC trends were relatively stable.

Citing sampling results from the Nisqually delta (one of the region's largest estuary restoration sites), De la Cruz (US Geological Service) and co-authors emphasized the use of grid-based sampling of both small shorebirds and their prey before and after restoration to more fully understand avian response. While Rourke (Hemmera) and co-authors also emphasized the value of sampling both shorebirds and prey, they also demonstrated the need to integrate the relative safety (i.e., predator exposure) of different areas to accurately characterize "foraging opportunity." In a separate presentation, Hope (Simon Fraser University) and co-authors used long-term data collected at a flyway scale to illustrate how the timing of peak Western Sandpiper migration appears to have shifted three days earlier in southern sites with extended stopovers at northern sites. They also showed that wintering Dunlins are showing increasing aggregating increasingly at large Salish Sea sites. Despite such differences in approach and emphasis, researchers in the session generally agreed that the responses to restoration by the shorebird "guild" are not expected to be uniform across broad temporal and spatial scales—and will depend highly on the tidal elevation, distance to terrestrial cover and specific estuarine microhabitats present at individual sites.

In contrast, the prospects for successful monitoring of estuarine waterfowl pre- and post-restoration seem more suitable for systematic sampling across the Salish Sea. Due to easier and more consistent habitat access by surveyors, and greater site-fidelity and predictability in time and space, estuarine waterfowl appear to be a practical guild for volunteers and biologists to monitor. Moreover, waterfowl may show more linear use of habitat patches from small to large—with predators, site openness and tides having less influence on their numbers. Christensen (Ducks Unlimited Canada) and co-authors applied a bioenergetics model to forecast how trends in the conversion of agricultural lands near estuaries may affect waterfowl. They compared two categorizes of agricultural habitat: croplands compatible for waterfowl foraging and those used in a non-compatible manner (greenhouses, berry farms, etc.). Their model shows that the changing patterns in agricultural use near the Fraser River delta appear insufficient to meet the current and future energetic demands of wintering dabbling and grazing duck populations, respectively, without intervention. Of course the northern Salish Sea is not a closed system, allowing waterfowl to move to other areas. However, conversion of agricultural habitat is not restricted to the Fraser area, and similar monitoring/modeling in Whatcom and Skagit Counties appears warranted to help meet regional waterfowl management goals. In addition to the need for continued monitoring of habitat change in agricultural lands, Harrison encouraged waterfowl monitoring in intertidal habitat in anticipation of future changes and management challenges due to sea level rise.

As a result of these and related discussions, several authors and attendees from the workshop proposed a "Near Term Action" (NTA) for the 2018-2022 Action Agenda for Puget Sound. Following a planned set of stakeholder workshops in 2018 to identify priority monitoring objectives for a range of avian taxa, the goal of the NTA is to produce a scientific framework to enable the region to identify the monitoring needs that can: (1) reduce uncertainty about the likely impacts of estuarine restoration on bird communities, and (2) promote short and long-term adaptive management of estuary restoration for same.