

Appendix A: Narrative Species Profiles

Pacific Brant (*Branta bernicla*)

General Description, Habitat, and Range

Brant are a small, darkly colored goose. Brant breed primarily in arctic regions of Alaska, Canada and eastern Russia, with the largest concentrations found on the Yukon-Kuskokwim Delta, Alaska. Brant winter range is along the Pacific Coast, primarily in bays from the Alaska Peninsula to the Baja California Peninsula in Mexico. Brant are considered a ‘sea goose’ and ‘seagrass-obligate’ meaning they are highly dependent upon eelgrass estuaries as well as low disturbance sandbars to ingest grit, small rock and sand fragments.

Conservation Status

Range wide (IUCN): Least Concern

North America (NABC): Moderate Concern

The population status of Brant is stable. However, long-term declines in regional breeding and wintering sites have been documented, and both regions are vulnerable to threats such as sea-level rise impacts to nest sites and eelgrass conditions across the Pacific Coast.

Occurrence in Puget Sound

Rare during fall migration, common during winter, and increasing numbers and distribution during spring migration

During winter they are most abundant in Padilla, Samish, Lummi, and Dungeness bays accounting for 10,000 – 20,000 individuals. During spring, other regions of the Puget Sound, like the Nisqually Reach, provide additional suitable habitat as the relationship between tide and eelgrass beds become more favorable to access food.

Integrating Model Results with Life History

Habitat suitability model results re-enforced this species’ unique environmental constraints, while highlighting the need to better describe these relationships, especially the need for spring survey data. Sand/gravel beach was a strong environmental predictor of occurrence during spring and winter abundance. This habitat type is not well mapped in Puget Sound, though is likely limited in abundance, or constrained by activities not conducive to Brant (e.g. recreation activities), across the landscape.

Implications for Management

Harvest management objectives are based on winter status, though status during spring may be more important to regional planning, as food quality has been linked to future nesting success. Spring models emphasized the difference between native (*Zostera marina*) and non-native (*Z. japonica*) eelgrass. Understanding future conditions and the interaction between these two types could be significant in understanding site suitability and anticipated shifts or declines in occurrence, under sea-level rise scenarios.



Dunlin (*Calidrus alpina*)

General Description, Habitat, and Range

Dunlin are a small, chunky shorebird with a distinctly drooped bill. Dunlin breed in arctic and subarctic regions around the world. In North America, Dunlin breed in Alaska and Canada and winter along the coastlines and. The Pacific Flyway population (*C. a. pacifica*) winters along the Pacific Coast from SW British Columbia to northern Mexico. During migration and the nonbreeding season they are often found in large aggregations (>5,000), primarily using coastal mudflats. Other coastal and non-tidal habitats, including adjacent agricultural lands, are also used when mudflats are inaccessible.

Conservation Status

Range wide (IUCN): Least Concern

North America (NABCI): Moderate Concern

There is no range-wide program to estimate population size and trends for the Pacific Flyway population, although there is anecdotal evidence that populations have declined in recent decades. In North America breeding and non-breeding habitat conditions are vulnerable to future threats, such as sea level rise.

Occurrence in Puget Sound

Common during spring and fall migration and winter

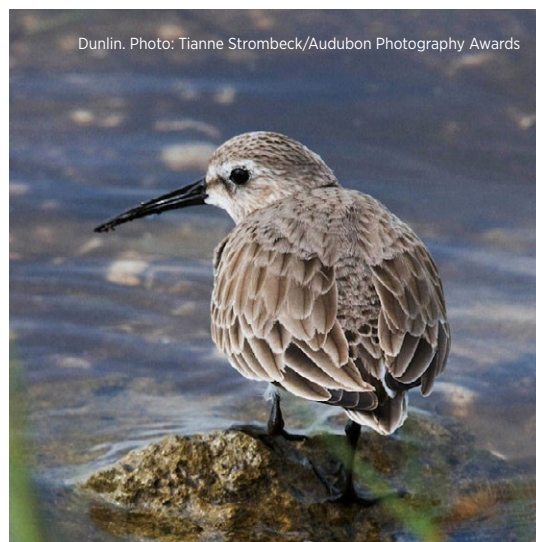
During winter, Dunlin are the most abundant shorebird species in Puget Sound, with the largest numbers of individuals occurring in the bays of North Puget Sound (Evenson and Buchanan 1997). Padilla, Skagit, and Port Susan Bays all have counts of >30,000, likely due to extensive areas of both estuarine emergent wetlands and adjacent agricultural lands. Throughout the rest of Puget Sound, they are found in smaller numbers (<1, 000) and are patchily distributed.

Integrating Model Results with Life History

The habitat suitability models for Dunlin during wintering and spring migration periods correctly predicted the center of abundance in North Puget Sound estuaries and bays. In both periods, models showed a strong association with estuarine emergent wetlands and mudflats. In the winter, Dunlin occupancy was associated with agricultural lands, a habitat they often use for high-tide roosts.

Implications for Management

Climate change threats are a significant concern for Dunlin populations. Sea level rise may decrease the amount of available mudflat habitat and may affect the estuarine food web. Estuarine restoration is likely to benefit Dunlin in the face of climate change by allowing habitat migration and increasing resilience of its preferred habitat. The consequence of continued human development in agricultural landscapes is unclear on Dunlin populations.



Greater Yellowlegs (*Tringa melanoleuca*)

General Description, Habitat, and Range

The Greater Yellowlegs is a relatively large migratory North American shorebird with long legs, neck, and bill. The species breeds in the boreal forest region of Canada and Alaska. In migration and winter, they use a wide variety of fresh- and saltwater wetland habitats (flooded tidal flats and agricultural fields, emergent wetlands, lake and river margins, sewage ponds) throughout North America. These birds forage in shallow water, where they eat insects, other invertebrates, and small fish.

Conservation Status

Range wide (IUCN): Least Concern

North America (NABC): Moderate Concern

There is no range-wide program to estimate population size and trends for the Pacific Flyway population of Greater Yellowlegs.

Occurrence in Puget Sound

Common during spring and fall migration, uncommon during winter

Greater Yellowlegs is one of the most ubiquitous shorebirds in the region. In coastal estuaries, they commonly use low-stature estuarine emergent wetland habitats, including channels, as well as the ecotone between mudflat and marsh. However, they can also be found during spring and fall migration using many freshwater habitats, including rivers.

Integrating Model Results with Life History

Results from the habitat suitability model predicted the broad distribution of Greater Yellowlegs across Puget Sound and their use of both estuarine and inland habitats. Across all season, models affirmed their strong positive association with estuarine emergent wetland and mudflat habitats, but also highlighted their plasticity in habitat use as agriculture, estuarine scrub-shrub wetlands, and palustrine wetlands were all associated with either abundance or occurrence.

Implications for Management

With its strong positive relationship to estuarine emergent wetland habitat and mudflats, this species has likely been severely impacted by the loss of estuarine habitat throughout Puget Sound. Indeed, the restoration scenario modeling analysis indicated yellowleg abundance would increase by ~20% if wetlands were restored to their original extent in Puget Sound. Estuarine restoration would increase habitat availability for this species.



Northern Pintail (*Anas acuta*)

General Description, Habitat, and Range

Northern Pintail are a dabbling duck with a long slender neck. They are strongly associated with shallow-water emergent wetland habitats where they seek seeds, plant material, and small invertebrates by skimming the water surface, sifting through sediment, or tipping to reach underwater. They breed in Alaska and regions of Alberta, Canada. During migration and winter months, they can be found in coastal and inland marshes between Alaska and Mexico.

Conservation Status

Range wide (IUCN): Least Concern

North America (NABCI): Moderate Concern

The North American population of Northern Pintail are considered below population objective, with long-term counts from aerial breeding surveys conducted since 1955 consistently below long-term averages. Due to this status, Northern Pintail are the most restricted dabbling duck in annual waterfowl regulations and pose a management challenge and conservation priority.



Occurrence in Puget Sound

Common during spring and fall migration, and winter

During winter, the largest concentrations are found in the North Puget Lowlands, but Northern Pintail can be found anywhere that shallow water provides opportunities to find food. The proximity of estuarine wetlands and mudflats to inland freshwater wetlands determines how long Northern Pintail are able to forage in a given area, and how many individuals the area can support. During spring, Northern Pintail passing through from southern wintering areas are highly associated with the Alaska breeding segment, and require more energy-rich prey than other seasons to fuel their migration and breed successfully.

Integrating Model Results with Life History

Results from the habitat suitability model predicted persistent concentrations in the North Puget Lowlands with smaller scattered concentrations in other areas. Models during all periods affirmed their strong positive association with estuarine emergent wetlands, with other wetland types shifting in importance across seasons, e.g., mudflats in winter and spring, and estuarine forested wetlands in the fall. These shifts are likely due to seasonal changes in diet requirements and shallow water availability across the landscape. Information on the seasonal occurrence of water and proximity between the network of estuarine and palustrine wetlands would likely improve model predictions, emphasizing the need for repeated assessments of habitat and Northern Pintail abundance, particularly during spring months.

Implications for Management

With its strong positive relationship to emergent wetland (both estuarine and palustrine) Northern Pintail has likely been severely impacted by the loss of a diverse wetland complex. Estuarine restoration may increase habitat for this species at certain times of the year, but this relationship is likely dependent upon the surrounding landscape. They would benefit from a comprehensive approach to wetland restoration. Understanding the linkage between Northern Pintail and seasonally-influenced habitat attributes would be significant in understanding site suitability under anticipated changes in precipitation and runoff during spring. Additionally, insights into sites providing resting versus feeding habitat are important to differentiate. In particular, adequate feeding habitat during spring would have direct implications for female body condition and reproduction.

Marsh Wren (*Cistothorus palustris*)

General Description, Habitat, and Range

The Marsh Wren is a small, round-bodied member of the wren family that is ubiquitous throughout North American marshes, both fresh- and saltwater. It breeds in dense patches of cattails, bulrushes, and other marsh vegetation; typically 1-3 feet over water.

Conservation Status

Range wide (IUCN): Least Concern

North America (NABC): Low Concern

Although this species has undoubtedly declined due to the loss coastal and freshwater marshes, it is considered widespread and common. Breeding Bird Survey results indicate Marsh Wrens with stable to increasing trends across North America since 1966.

Occurrence in Puget Sound

Year round resident

Marsh Wrens use coastal areas, particularly marshes higher in the tidal gradient where tall cattails and bulrushes occur. A variety of shrubby habitats, especially along unmaintained dikes adjacent to estuaries and freshwater wetlands further inland, are also used.

Integrating Model Results with Life History

The habitat suitability model highlighted the Marsh Wren generalist habitat needs. It was strongly associated with estuarine emergent wetland and palustrine wetlands, which included a diverse array of wetland types including emergent, forested, and scrub/shrub wetland

Implications for Management

With its strong positive relationship to emergent and non-tidal wetlands, this species has likely been severely impacted by the loss of all wetland types throughout the region. Although estuarine restoration will increase habitat availability for this species, it would also benefit from a more comprehensive approach to wetland restoration including palustrine wetlands that may or may not be connected to river floodplains.

