

residents on the Mendenhall Wetlands (Fig 7.16). In winter and early spring, the number of crows using the wetlands has been in the hundreds. We suspect these are aggregations of several flocks that gather together after the breeding season. We observed nesting crows in smaller groups during our 2002-2003 study on some of the spruce-covered islands on the wetlands.

Map 7.7 is based on a fairly low number of crow records gathered during full surveys ($n = 49$) and may not fully reflect the importance of different hotspots to crows. The largest dot at Vanderbilt Creek, for example, is based on a single record, and we never saw crows there again in large numbers.

Two other corvids - Common Raven and Black-billed Magpie - were occasionally recorded in small groups on the wetlands but our data were insufficient to plot phenologies or to create distribution maps.

Other songbirds

A number of species of songbirds other than corvids utilize the Mendenhall Wetlands in large flocks for feeding. Tree Swallows, Violet-green Swallows, and Bank Swallows sometimes occur in the hundreds, hawking for insects from late April through July (Appendix C). A colony of Bank Swallows has existed along Mendenhall River in Brotherhood Park for a number of years. The wetlands appear to be an important feeding area for flocks of American Robin, American Pipit, Savannah Sparrow and Lapland Longspur during spring and fall migration, when these birds may occur in the hundreds. Flocks of Pine Siskins and Common Redpolls, numbering in hundreds of individuals, have also

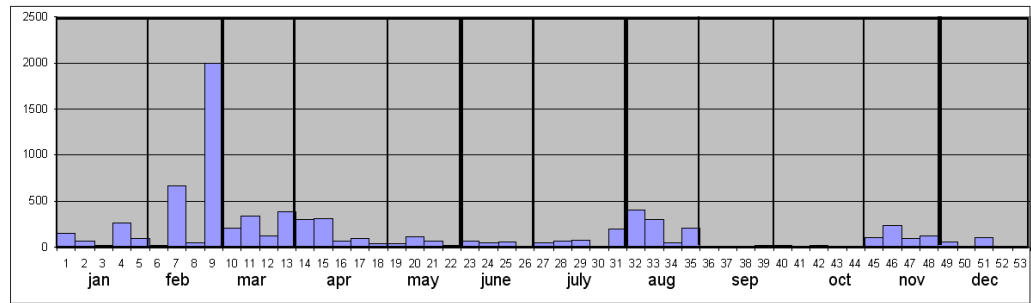


Fig 7.16 Highest number of Northwestern Crows seen by week, 1986 through May 2003.

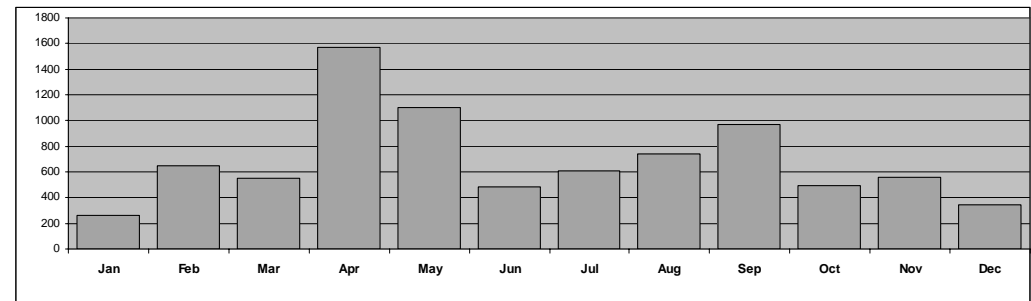


Fig 7.17 Highest number of songbirds other than corvids (crow, raven, magpie) seen by month, 1986 through May 2003.



Fig 7.18 Crows digging for sand lance near Fish Creek.

Map 7.7 Ranking of hotspots for Northwestern Crow. Largest dot - L03 - had the highest number of crows (314) counted throughout the study period during full surveys (49 records for the species). Remaining dots are scaled proportionately.



been seen using the wetlands, often in late fall and early spring.

The floatplane basin woodland north of the Dike Trail is a magnet for migrating songbirds. Most of these woodland species tend not to occur in the large flocks that we targeted in our hotspots survey. Nevertheless, there is a strong migratory movement through this little woodland that is well known to Juneau birders, who consider the Dike Trail one of the best places to see northbound warblers, thrushes and sparrows throughout April and May.

There are two explanations for this phenomenon. The first is related to the character of the habitat and the second to its location. The floatplane woodland has a rich mix of coniferous and deciduous trees and shrubs. Deciduous habitat is much less common in Southeast Alaska than is coniferous forest. While deciduous belts are common along Juneau's coastlines, development has removed most of those patches large enough to attract large numbers of stopover migrants. The floatplane woodland is outstanding in this regard.

The second reason that songbirds are drawn to the floatplane woodland is its "island" character. Birders refer to the phenomenon as the Central Park effect, named for the concentration of migrating songbirds in New York City's only large undeveloped space. Migrants through Southeast Alaska follow straits and channels like Gastineau, especially in spring when uplands are still snowy. Songbirds of deciduous affiliation, passing northwestward over the Mendenhall Wetlands, naturally gravitate to the floatplane basin's wooded "island" surrounded by coverless salt marsh on one side and intensive development on the other.

Other than corvids, the only true year-round resident songbird on the Mendenhall Wetlands is the Song Sparrow. A number of them nest on the fringes and stay throughout the year.

8 Connections with the rest of the world

Of the 230 species of birds that have been seen on the Mendenhall Wetlands, only 16% are considered to be resident in Southeast Alaska. All of the rest are migratory, coming from various parts of the world. Figure 8.1 shows where we think the majority of birds are coming from.

Neotropical migrants Some 60 species, about one-fourth of the bird species recorded for the wetlands, are neotropical migrants; that is, they breed nearby or migrate through the wetlands, then head for Mexico, Central America, or South America to spend the winter. Greater Yellowlegs may fly more than 9,000 miles from Tierra del Fuego at the southern tip of South America. Other neotropical migrants include Cinnamon Teal, American

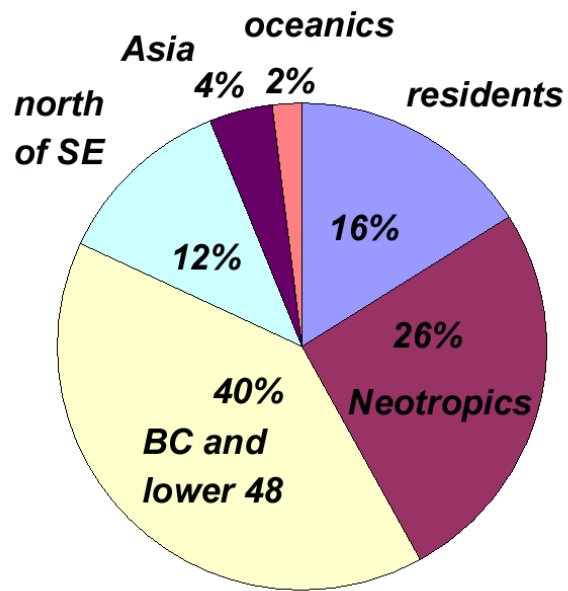


Fig 8.1 Percentage of "our" bird species shared with other parts of the world

The fact that 84% of the species seen on Mendenhall Wetlands have come from elsewhere highlights our shared responsibility for bird conservation efforts throughout the world.

Golden Plover, Hudsonian Godwit, Rufous Hummingbird, Olive-sided Flycatcher, and Yellow Warbler, to name a few.

Birds from British Columbia and the Lower 48

About 40% of the bird species seen on the Mendenhall Wetlands have wintered in British Columbia and/or within the Lower Forty-eight states. Swans and several species of dabbling ducks migrate only as far as farmers' fields, productive marshes, and national wildlife refuges to the south. Northern Pintails have strong ties to California, where it's estimated that about 85 percent of the pintails that breed in Alaska overwinter (Armstrong 1994). Other birds that may migrate only to B.C. or the Lower Forty-eight include many of the sparrows and blackbirds.

Birds from the north About 12% of the bird species we see on the wetlands breed in areas north of Southeast and migrate here to spend the winter. Examples of these include several of the diving ducks such as Buffleheads, Long-tailed Duck, Common and Barrow's Goldeneye and White-winged Scoters, and perhaps Snow Buntings and the occasional Snowy Owl or Gyrfalcon that visits the wetlands.

Oceanics A small number (2%) of the species seen on the wetlands come from or across the open ocean, often from islands and distant continents. The most notable of these would be the Arctic Tern, which may come from as far as Antarctica.

Asiatics Only 9 of the 230 species seen on Mendenhall Wetlands come from Asia, but these are the species that serious birdwatchers may find most exciting.



Fig 8.2 Banded Snow Goose from Wrangel Island. Mendenhall Refuge, south of the golf course, May 5, 2003.

Though many species of Asiatics occur regularly in western Alaska, most of the ones seen on the wetlands are vagrants. They have probably come quite by accident—perhaps because they were lost or blown off course by a storm. However, at least one, the Eurasian Wigeon, seems to occur every year on the wetlands in small numbers.

Residents About 37 species or 16% of the birds seen on the wetlands live nearby year-round. These include several Bald Eagles, Northwestern Crows, Common Ravens, Glaucous-winged Gulls, Marbled Murrelets, American Dippers, and Song Sparrows.

Further Evidence of Connections

The occurrence of birds banded elsewhere is further evidence of geographical connections between the wetland and the rest of the world:

- A male Snow Goose seen on Mendenhall Wetlands May 3, 2002 had been banded on 14 July 2001, and had hatched in the summer of 2000, on Wrangel Island, at 72°N in Russia's Chukchi Sea (Fig 8.2).
- A male Brant seen on the Mendenhall Wetlands May 14-21, 2003 had been banded on Banks Island (Canada) on August 1, 1992. It had previously been sighted during the 1997 spring migration in Nanvak Bay, Alaska, and during the winter in Baja California in 1998.

- Two White-winged Scoters were captured in the Juneau area and tagged with satellite transmitters in February 2001. One was captured at Middle Point and the other at Spuhn Island. They were then tracked inland to various locations in Yukon Territory Canada. One returned to Juneau on August 3 and the other October 2, 2001.

- A hatch-year female Western Sandpiper that was color-banded in La Paz, Southern Baja, Mexico, in September 2001 by a Mexican university biologist, Daniel Galindo Espinosa, was seen by Paul Suchanek on April 30, 2002 at Mendenhall Wetlands.

- A radio-tagged Short-billed Dowitcher, initially tagged at San Francisco Bay by USGS biologists (John Takekawa et al.), was relocated at Gray's Harbor in Washington State on May 9, 2001, and then relocated 8 days later at Mendenhall wetlands on May 17, 2001 by Gwen Baluss.

- A Red Crossbill, banded by Ralph W. Williams near the Mendenhall wetlands on May 13, 1991, was recovered in St. Albert, Alberta, Canada on May 9, 1992 (Canadian Atlas of Bird Banding, Volume I), approximately 825 miles away.

- An after-hatch-year male Golden-crowned Sparrow, banded by Ralph W. Williams near Mendenhall wetlands on April 18, 1990, was recovered in Victoria, B.C., on November 2, 1992. (Canadian Atlas of Bird Banding, Volume I).

9 Animal food resources on the wetlands

Plant foods for birds have been described in the preceding section called *Glacial rebound, vegetation and birds*. Here we describe fish and (briefly) invertebrate prey that attract birds to Mendenhall Wetlands.

Fish

A number of fish species spawn, feed and rear on and adjacent to the Mendenhall Wetlands. These fish attract and provide food for a variety of fish-eating birds including Bald Eagles, Belted Kingfishers, Arctic Terns, Bonaparte's Gulls, Mew Gulls, Herring Gulls, Glaucous-winged Gulls, Great Blue Herons, Red-breasted Mergansers, Common Mergansers, Northwestern Crows, and Common Ravens.

There are 15 fish-producing streams that empty out onto the wetlands. Considering their tributaries as well, there are 28 anadromous streams that fish access through the wetlands. Most of the fish (salmonids) using these streams also probably use the wetlands for feeding and



Fig 9.1 Gulls feeding in the middle of Gastineau Channel on ground-up salmon from DIPAC hatchery.



Fig 9.2 Pink and chum salmon at the DIPAC hatchery are collected and ground-up for disposal into Gastineau Channel.

short-term rearing. In addition the wetlands appear to be an important rearing and possible spawning area for a number of other anadromous and marine fish that are eaten by birds – eulachon, capelin, Pacific herring, Pacific sand lance, Pacific staghorn sculpin, starry flounder and other flounders, and threespine stickleback.

The Douglas Island Pink and Chum hatchery (DIPAC) is located adjacent to the Mendenhall Wetlands near Salmon Creek. This hatchery releases millions of salmon per year, many of which rear for a period within the wetlands, and many of the returning adults stray into adjacent streams.

Salmonids provide food for a variety of birds. Thirty-one bird species in southeastern Alaska feed on adult salmon and their eggs and young (Willson and Halupka 1995). In addition to the direct benefits salmon provide to these birds, nutrients from their carcasses help sustain productivity of stream and lake communities (Kline et al. 1990, Gende et al. 2002), which can further translate to plants and invertebrates used by birds.

Most or all of the salmonid species (coho, chum and pink salmon and cutthroat trout and Dolly Varden) use the floatplane lake and Duck, Jordan and Pederson Hill creeks on the wetlands near the Juneau airport (Bethers et al. 1995). All of these species use the freshwater and intertidal



Fig 9.3 Eulachon schooling in shallows.

portions of these systems during certain life history stages. In the past, some of these systems have been stocked with hatchery fish – floatplane lake: 182,601 coho salmon in 1984; Jordan Creek: 3,000 brook trout in 1953 and 4,800 coho in 1970; Duck Creek: numerous stockings of coho, brook trout, and rainbow trout between 1919 and 1984 (Bethers et al. 1995).

The Mendenhall River, the Lake, and their tributaries provide a considerable amount of spawning and rearing habitat for salmonids. All of the above species have been documented for this watershed (Bethers et al. 1995). In addition, various Mendenhall Ponds have been stocked in the past with brook trout, rainbow trout, cutthroat trout, king salmon, coho salmon, and Arctic grayling (Bethers et al. 1995). All of the sea-going species pass through the Mendenhall Wetlands during out- migration periods.

Mendenhall Lake is a major overwintering area for the Dolly Varden of the Juneau area (Schmidt et al. 1973). Large numbers of smolt, subadult and adult Dolly Varden leave the lake in spring, migrating down the Mendenhall River and out to sea. During this migration we have observed numerous Bonaparte's gulls feeding on the smolt and concentrations of subadult Dolly Varden near the northwestern end of the Juneau Airport runway.

Chum, coho, pink, and chinook salmon young and adults from DIPAC's Macaulay Salmon Hatchery no doubt use tidal sloughs and streams around the Mendenhall Wetlands for early marine rearing and spawning. Last year (2003), the hatchery released over 35 million salmon young into Gastineau Channel. Some of the returning adults will likely stray into and spawn in streams associated with the wetlands.

Eulachon (*Thaleichthyes pacificus*) often spawn in the lower reaches of Mendenhall River during spring. Eulachon are unusually high in lipid content and attract numerous predators at a time when the predator energy demands are high (Marston et al. 2002). At Berners Bay,

35 miles north of the Juneau Airport, average daily counts of 40,000 gulls and 600 Bald Eagles have been observed feeding on eulachon in the lower reaches of the rivers (Marston et al. 2002). In pre-settlement times, the Mendenhall estuary may have attracted similar bird concentrations. We have observed up to 125 bald eagles feeding on the spawning eulachon in the Mendenhall River.

Capelin (*Mallotus villosus*), like sand lance, eulachon and herring, are considered to be an important forage fish in Alaska, although the role that capelin play as food for birds of the Mendenhall Wetlands is not known. On occasion, both juveniles and adults have been observed trapped in tidal sloughs near the Juneau airport (Bishop et al. 1987).

Pacific herring (*Clupea pallasii*) are an important food for Bald Eagles in the Juneau area, as they were often found cached at their nests (Scott Gende, pers. comm.). Bald Eagles often concentrate to feed on spawning herring elsewhere in Southeast Alaska (Hodges et al. 1979), including Berners Bay (MFW pers. obs.). Both juvenile and adult herring have been observed trapped in small tidal ponds near the Juneau airport (Bishop et al. 1987).

Pacific sand lance (*Ammodytes hexapterus*) are small (6-8 inches as adults), thin, silver-sided forage fish. They typically form dense schools along tidal channels and also burrow in sand (Dick and Warner 1982, Yamazaki 1995). They are extremely important in the diet of Marbled Murrelets, kittiwakes, murrets and puffins and constitute a major prey for at least some populations of 40 species of birds (Willson et al. 1999).

On the Mendenhall Wetlands, at least two areas of sand lance burrowing activity have been noted, one straight out from the mouth of Fish Creek near channel marker 19A and the other up the channel near marker 18. In the area near marker 19A we have observed numerous gulls, ravens, crows, and up to 85 bald eagles feeding on the sand lance during low tides (Fig 7.12) (Willson and Armstrong 1998). We have also observed Arctic Terns bringing sand lance to their young at the colony that once existed on the wetlands.

Pacific staghorn sculpin (*Leptocottus armatus*) are abundant in shallow intertidal areas and are easy prey for Greater Yellowlegs, Great Blue Herons, Arctic Terns, Common Mergansers, and Belted Kingfishers (Bishop et al. 1987; our pers. obs.). Staghorn sculpins have been obtained in intertidal channels on the wetlands, sometimes up to 200 per seine haul, on all sampling dates from early April to mid-July (Bishop et al. 1987).

Starry flounder (*Platichthys stellatus*) was the most common flounder captured on the Mendenhall Wetlands during a study in 2002 by Lynn Mattes. They were also numerous within the intertidal channels near the airport in 1986 (Bishop et al. 1987). We have observed Great Blue Herons feeding on them and they were



Fig 9.4 Buried Pacific sand lance.



Fig 9.5 Juvenile Pacific staghorn sculpin



Fig 9.6 Juvenile starry flounder



Fig 9.7 Three-spined sticklebacks stranded during "drought" on margins of finger ponds in floatplane basin.

common prey items brought to eaglets in one Southeast study (Ofelt 1975).

Threespine stickleback (*Gasterosteus aculeatus*) provide a source of food for Arctic Terns, mergansers, diving ducks and Great Blue Herons (O'Clair et al. 1997). We have observed Great Blue Herons, Arctic Terns and Greater Yellowlegs feeding on stickleback at the wetlands. Two forms of threespine stickleback occur in southeastern Alaska – a marine form and a freshwater form. Both forms occur within the streams and sloughs on the wetlands adjacent to the Juneau Airport (Bishop et al. 1987). In Jordan Creek an estimated 10,000 stickleback were observed in decreasing numbers from the mouth to headwaters during a survey in 1970 (Reed and Armstrong 1971).

Great blue heron prey more successfully on sticklebacks than on juvenile salmonids (Butler, 1997). Altering a stream in ways that favor salmonids over sticklebacks (increased flow and shade, reduced backwatering) could reduce activity by herons.

Mammals

Few mammals other than long-tailed voles provide significant prey for birds on the refuge.

The long-tailed vole (*Microtus longicaudus*) is a common year-round resident on the Mendenhall Wetlands. They inhabit the sedge and grass areas and eat the tender stem bases, roots and seeds. They are excellent swimmers so the tidal sloughs do not necessarily restrict their movements. We have observed a number of raptors hunting for and feeding on voles within the wetlands.

At the higher tides of the year voles are often forced to swim during daylight hours. We have observed both Bald Eagles and Short-eared Owls taking advantage of their vulnerability during these times. At other times, long-tailed voles are the major food of Northern Harriers, American

Kestrels and Short-eared Owls on the wetlands. Over the years we have examined hundreds of owl pellets collected from the wetlands and found the long-tailed vole to be the major, and sometimes only, prey consumed.

Invertebrates

Intertidal invertebrates are important foods for wetland birds. The Mendenhall Refuge's large expanse of visually barren sand and mudflat is in fact a treasure-field of buried (benthic) marine invertebrates like crustaceans, bivalves and worms. Invertebrates even provide the physical structure for some habitats in the case of the barnacle/mussel/rockweed community (Figs 4.4, 9.9)

Intertidal invertebrates of mudflats and the barnacle/mussel/rockweed communities were sampled on the wetland (Willson and Baldwin, 2003). Here we present only a few photographs of the most significant bird prey items. Among them are: amphipods, isopods, snails (*Littorina*), clams (*Macoma*), and polychaete worms.



Fig 9.8 Dead long-tailed vole in uplift meadow, Dike south of Miller/Honsinger Pond, Apr 4, 2002. These voles are considered "irruptive:" every 5 to 10 years they reach very high densities on the upper perimeter of the Mendenhall Wetlands. In these years we see larger numbers of raptors.



Fig 9.9 Barnacles and mussels are “keystone invertebrates.” Mussels directly feed the huge staging rafts of scoters at the river mouth. And by turning mud and sandflats into more structurally complex habitat, barnacles and mussels provide home for more invertebrate bird food. Here Aaron Baldwin hunts for amphipods and isopods.



Fig 9.12 Americorophium amphipods live in tubes on the substrate. This is a female out of her tube. These amphipods are important shorebird food.



Fig 9.10 Amphipods are often found in great swarms by gulls and shorebirds turning over rockweed fronds.

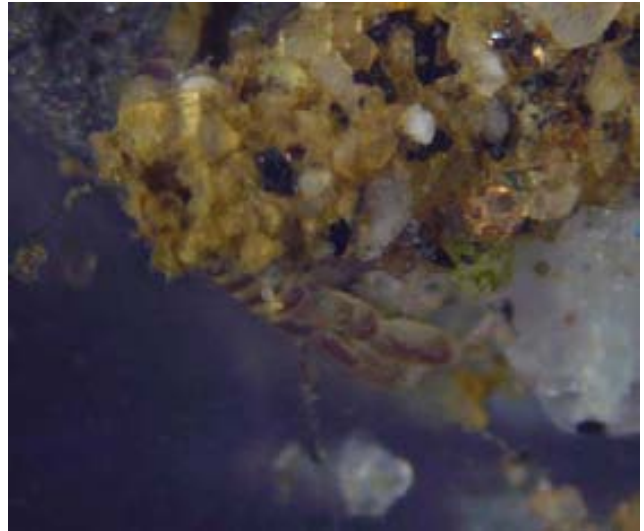


Fig 9.13 Single tube of Americorophium magnified.



Fig 9.11 Eogammarus confervicolus is a very common amphipod on the refuge



Fig 9.14 Americorophium colonies form fuzzy mats in low salinity sloughs such as Junk Car and Phalarope.



Fig 9.15 Baby *Macoma balthaca* clams sometimes occur in the 1000s per m², important for mud probing shorebirds. Adult macomas rarely exceed 1.5 cm and live in muddy sand close to the surface, where they are eaten by gulls and sea ducks. See also Fig 5.31



Fig 9.16 *Littorina* sp. – an important food of Harlequin Ducks and probably other diving ducks. A barnacle is riding on this one's shell.



Fig 9.17 Isopods like *Gnorimosphaeroma* sp. wedge in among the mussels. See Fig 9.9



Fig 9.18 Isopod, *Pentidotea* sp. lives among the rockweed fronds.



Fig 9.19 Lugworms, *Arenicola* sp. live in the sediments. They make distinctive coiled castings of digested dirt.



Fig 9.20 *Nephthys* sp. shorebirds pull these out of the sediments.