



Map 4.3 Salt marsh vegetation based on 1979 NASA color infrared (CIR) imagery (here converted to B&W). A quarter century ago, sedge-dominated low marsh covered extensive areas west of the river and northeast of the runway near Miller-Honsinger Pond.

Map 4.4 Salt marsh re-mapped based on several sources: 1996 B&W digital orthophotos, 2001 low elevation CIRs commissioned by SWCA and CBJ, and 26 images from the Oct 10, 2002 flight with USFWS. Compared to Map 4.2 (1979), this map shows major expansion of high marsh grasses into former low marsh sedges. Largest beds of the barnacle/mussel/rockweed community are shown.

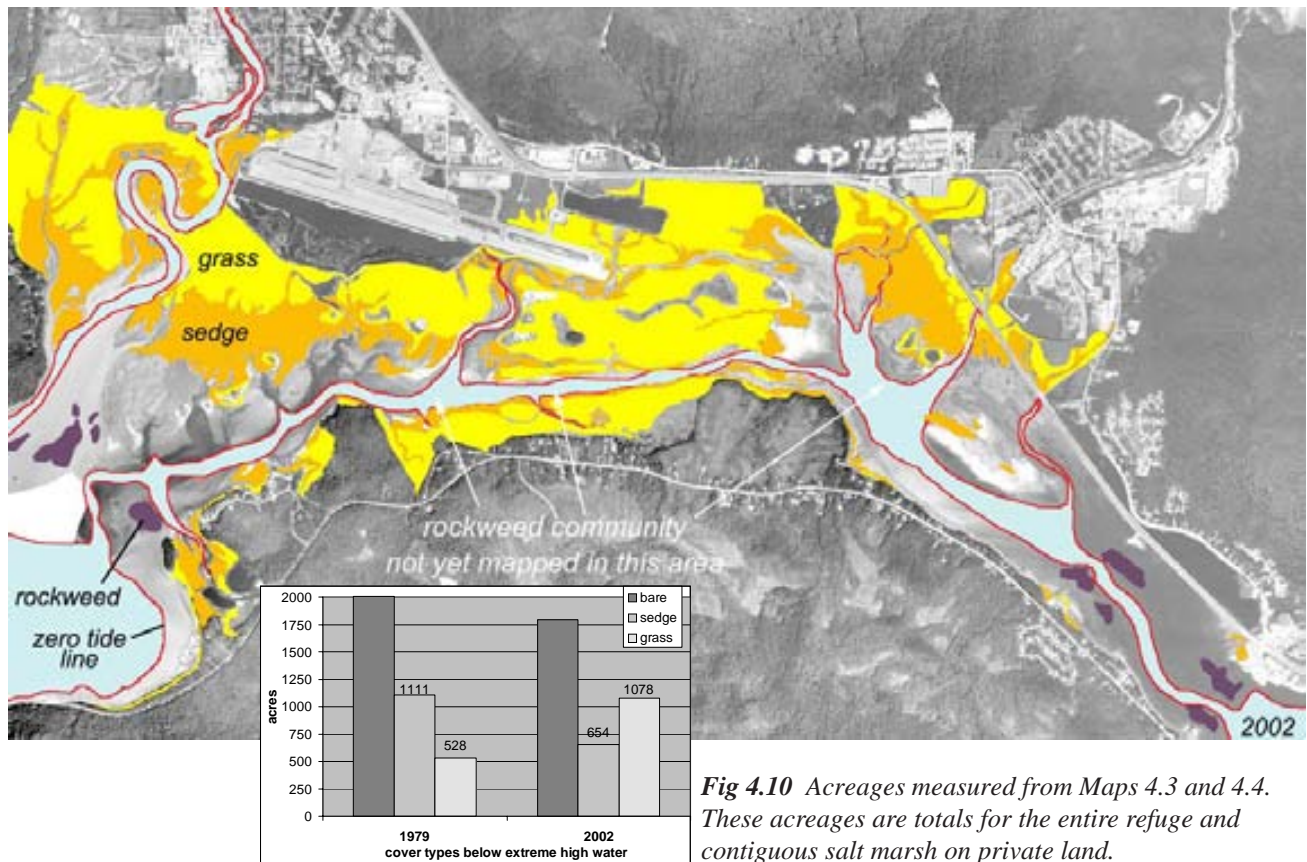


Fig 4.10 Acreages measured from Maps 4.3 and 4.4. These acreages are totals for the entire refuge and contiguous salt marsh on private land.



Fig 4.11 View north over Lemon (right) and Switzer Creek estuaries, Apr 29, 2002. Spoil islands from channel dredging in foreground. Yellow line shows extent of a recent 16.5-foot high tide. In this area, grass high marsh is confined to a narrow band along Egan Drive, and most of the flats are still sedge low marsh (compare Map 4.1). This area will become increasingly important to waterfowl as low marsh elsewhere is lost to glacial rebound. It may also be deemed far enough from the runway to qualify for mitigation measures that could enhance habitat for wetland birds. (See mitigation measures, section 10)

NASA distinguish high and low marsh much more clearly than do subsequent CIR photos (Map 4.2). Map 4.3 was based on this imagery. Comparison of maps 4.3 and 4.4 shows dramatic changes in extent of these marsh communities, supporting claims by longtime wetland residents like Jim and Mary Lou King that major loss of Lyngbye sedge has taken place over the last several decades. In a mere quarter century we have lost about half of our low marsh community (Fig. 4.10)

Maps 4.3 and 4.4 are fairly coarse-scale and should be considered an interim product. On much of the wetlands, shifting of the grass-sedge boundary takes place at much finer scales. For example in many locations where sedges used to occur as community dominants on multi-acre patches, they are now restricted to narrow inner terraces beside sloughs, inset a meter or two below the regional surface (Figs 4.8 and 4.9). These remnant linear strips of Lyngbye sedge need to be mapped and understood, because with continuing uplift, in another quarter century they could be all that remains to us.

The proportional changes in extent of high and low marsh are quite different when compared across 6 different subunits of the refuge. In some areas, low marsh may soon be “pinched off” by advancing grasses. Elsewhere, in places such as the mouths of Lemon and Switzer Creeks, there appears to be extensive mudflat that may allow sedge colonization, counterbalancing the loss of sedges to grasses at higher elevation. If sedge change continues to be disproportional on different refuge subunits, that will cause grazing birds to shift locations over time. Airport managers concerned with bird strike hazards and biologists regulating waterfowl hunting both need to understand these salt marsh successional trajectories.

The “succulent marsh” (Fig 4.2, Map 4.1), positioned between bare mudflat and low marsh sedges, is also extremely important to birds, but has not yet been mapped. Because the distribution of this community is patchier than that of low or high marsh, and strongly dependent on substrate coarseness and tidal flow dynamics, changes in location and extent will be harder to predict.

5 Hotspot descriptions

In this section we describe three types of hotspots:

Top hotspots are those areas that produced the greatest amount of bird activity over the entire year.

Occasional hotspots are areas that may be impor-

tant in only one season and/or for only one purpose - for example a resting area for Mallards.

Nearby hotspots are areas outside, but near to the Mendenhall Wetlands and Refuge, in which there is an obvious connection and value to birds using the wetlands i.e. Auke Lake.

Mendenhall River mouth (r05) – top hotspot

- **The mouth of the Mendenhall River is probably the most important feeding habitat for ducks and shorebirds on the wetlands.** At times Western Sandpipers have been seen here in the thousands. Surfbirds, Ruddy Turnstones, Semipalmated Sandpipers and Dunlins often occur in the hundreds. We have counted up to 800 Northern Shovelers (May 14, 2002), 350 Mallards (Feb 18, 2003), and 300 American Wigeon (May 10, 2003) feeding in the sloughs and amongst the fucus beds of this area.



Fig 5.1 View north over river mouth to Mendenhall Peninsula at a zero-foot tide, Oct 8, 2002

- It also appears to be an important feeding area for Bald Eagles (often we counted 10 to 20 per survey), a loafing area for Canada Geese (up to 400 counted), and a feeding area for seaducks including scaups, scoters, and goldeneyes. About 200 Sandhill Cranes were sighted in the area on Sept 18, 2002.

- The river mouth is the premier spot to look for the

less common shorebirds such as American Golden-Plover, Pacific Golden-Plover, Whimbrel, Hudsonian Godwit, Bar-tailed Godwit, Marbled Godwit, Red Knot, and Baird's Sandpiper.

Fig 5.2 Surfbirds and Ruddy Turnstones at river mouth.



Fig 5.3 The mouth of the Mendenhall River offers a variety of habitat for birds including sand, mud, barnacle/mussel/rockweed beds, algal mat communities, and a mix of freshwater and saltwater.



Fritz Cove (r06) - top hotspot

- **Fritz Cove is an important feeding and probable staging area for a variety of sea ducks and other water birds.** We observed 3,000-4000 Surf Scoters in early May, 2002 and up to 600 White-winged Scoters on May 14, 2002. Other birds that we have seen in significant numbers (20-100) include Bufflehead, Barrow's Goldeneye, Common Goldeneye, Long-tailed Duck and scaup. Marbled Murrelets, Horned Grebes, Red-necked Grebes, and Red-breasted Mergansers also gather and feed within Fritz Cove.

- On occasion we observed the bird concentrations being disturbed by jet skiers and guided kayak parties – especially during April and May.



Fig 5.4 In late April and early May (Appendix C) one can see thousands of Surf Scoters in Fritz Cove.

Fig 5.5 View northeast over Fritz cove to Juneau Airport and Mendenhall Refuge. 3D image generated in ArcScene from 1996 digital orthoquads. Lines show refuge boundary. Arrow shows North Douglas boat launch. On low tides, mudflats are exposed out to r05



Western Mudflat sand lance area (r08) - top hotspot



Fig 5.6 On May 29, 2002 we counted 250 Bonaparte's Gulls feeding in area r08. View north to Mendenhall Peninsula.



Fig5.7 About 80 Bald Eagles feeding on Pacific sand lance at r08. View south to North Douglas boat launch.

- **The Western Mudflat is one of the top hotspots of bird activity for the entire wetlands.** Several species of birds feed within this area including hundreds of Western Sandpipers, Dunlins, Ruddy Turnstones, American Wigeon, Mallards, scaup, Lapland Longspurs and American Pipits.
- We have recorded high numbers (hundreds, some-

times thousands) of birds using this area in every season of the year.

- This is also a burrowing area for Pacific sand lance, which attracts Bald Eagles, gulls, crows, and ravens that congregate here to feed on these fish.

Lower Fish Creek estuary (f08) - top hotspot



Fig 5.8 Aaron Baldwin (left) and Mary Willson conduct a timed sample for invertebrate species and abundance in barnacle/mussel/rockweed beds at the mouth of Fish Creek.

- **The mouth of Fish Creek, at low tide, is an important feeding area for American Wigeon, Green-winged Teal, and Mallard.** We have observed Mallards feeding in this area in the hundreds and close to a hundred wigeon and teal during winter and spring.
- Fish Creek may be an important feeding area for swallows. Up to 150 Barn Swallows and 100 Violet-green Swallows were reported hawking for insects here in July 2002. This is one of the best places in Juneau to observe Vaux's Swifts.
- The estuary is often used by gulls for resting – 350 Mew Gulls and 120 Glaucous-winged Gulls observed on Mar 20, 2003 and 80 Bonaparte's Gulls seen on May 5, 2002.
- The area is popular for feeding Northwestern Crows – 200 observed on Jan 21, 2003.



Fig 5.9 Lower Fish Creek, Oct 8, 2002. Dark patches at bottom are the rockweed beds in Fig 5.8 above. Forested "island" at right is bedrock-cored, connected by a raised storm berm to the mainland (compare Fig 5.11).

Upper Fish Creek estuary (f01) – top hotspot



Fig 5.10 Fish Creek upper intertidal area at high tide on April 9, 2002 when we counted 540 resting Mallards.



Fig 5.11 Upper Fish Creek. Zero-foot tide on Oct 8, 2002. Gulls, corvids and eagles feed on salmon in the upper estuary.

- **Upper Fish Creek estuary is a resting area for Mallards and other ducks at high tide.** Ducks commonly feed in the lower estuary (f08) during low tides and rest in the upper area (f01) at high tides. We have also observed American Wigeon, Gadwall, and Northern Pintail using this area in smaller numbers (10-30).

- Dowitchers, Dunlin and Lesser Yellowlegs often feed in this area in groups of 10-50 individuals.

- The ducks that rest in this area are occasionally disrupted by uncontrolled dogs. On one occasion we observed one dog completely chase out hundreds of Mallards that were resting in the area. Trail and access improvement in this area - under discussion by CBJ Parks and Recreation - could be further disruptive to resting waterfowl. At present the area has a rather muddy access trail that probably limits human use.

- Because of pre-existing human disturbances (dredge ponds at right) and distance from the airport, Fish Creek has been proposed as a potential enhancement (mitigation) site for waterbirds.

Salmon Creek estuary (s01) – top hotspot



Fig 5.12 Mouth of Salmon Creek at high tide, April 29, 2002. Lower Twin Lake at top left.

• **The Salmon Creek estuary is an important feeding and resting area for ducks, shorebirds and gulls.** We recorded about 300 Mallards feeding in the area in May, January and February. We counted up to 600 scoters (Surf and White-winged on May 5, 2003) and 90 American Wigeon on Apr 5, 2002. Dunlin feed in the area in winter and spring in numbers up to 200 (Apr 2, 2002). We often see impressive numbers of gulls, especially in fall when the salmon are in – 1,000 Mew Gulls, 700 Glaucous-winged Gulls, 500

Bonaparte's Gulls, and 100 Herring Gulls all on Aug 12, 2002.

• Bald Eagles frequent the area in small numbers – we have observed up to 16 (Sept 25, 2002) – usually feeding on salmon carcasses.



Fig 5.13 Bonaparte's Gulls wheel over Salmon Creek, dipping for salmon eggs. Glaucous-winged gulls stand in the shallows



Fig 5.14 Dunlin and Mew Gulls often feed among the rockweed for invertebrates.

Otter Pond (a01) top hotspot

- **Otter Pond is an important feeding and resting area for waterfowl.** We have observed up to 530 geese resting on the pond and up to 120 feeding among the nearby sedges. Mallards also use the area for both feeding and resting, sometimes in the hundreds (up to 360 counted).

- A variety of both dabbling and diving duck species can also be seen feeding and resting on Otter Pond. We have seen Green-winged Teal, American Wigeon, Northern Shoveler, Northern Pintail, Blue-winged Teal, Bufflehead, Common Goldeneye, Canvasback, Scaup and Red-breasted Mergansers usually in small numbers, but occasionally in groups of 10-30 per species.



Fig 5.15 Dike Trail, Oct 8, 2002. a01 = Otter Pond.

- Otter Pond is frequently used as a feeding area for shorebirds, particularly Greater and Lesser Yellowlegs and dowitchers. We have often counted 10-40 individuals and up to 142 (Lesser Yellowlegs) using the pond. This is a good area to observe Greater Yellowlegs catching and eating staghorn sculpins.

- On occasion we recorded high numbers of other birds using this area. We saw about 50 Horned Larks on April 27, 2002 and 235 Northwestern Crows on November 22, 2002.

- Otter Pond is one of the best birdwatching areas on the Dike Trail. There is always something to see. An observation bench with cover (Gazebo) is positioned at the NE end of the pond.

- Dogs often disturb birds at the pond. A trail parallels Otter Pond closer and below the Dike Trail where people often walk their dogs.



Fig 5.16 A Greater Yellowlegs catches a juvenile staghorn sculpin at Otter Pond. Yellowlegs are the only Alaskan shorebird known to prey heavily on fish.



Fig 5.17 On January 28, 2003 we estimated 530 Canada Geese landed on Otter Pond to rest and feed.

Sedge flats west of Otter Pond (a08) - top hotspot



Fig 5.18 View north to dike trail from a08

- These sedge flats are a very important feeding area for Canada Geese especially in winter and spring. On several occasions we have counted over 100 Canada Geese (up to 685) feeding here during this time. The area also occasionally attracts Northwestern Crows (up to 60) and Western Sandpipers (up to 50 counted) feeding within the intertwining muddy areas.

- Dogs often chase feeding and resting geese in this area.

- Grazing concentrations will be displaced southward over the coming decades as the land rises and grasses replace the favored Lyngbye sedges. Compare Maps 4.3 and 4.4.



Fig 5.19 Resident geese feeding at a08, Jan 30, 2003



Fig 5.20 View south to a08 flats, Apr 29, 2002. Line shows recent 16.5-foot tide.

ERA heliport (e02) —top hotspot



Fig 5.21 The area around Era Heliport includes a mudflat and salmon stream (Neilson Creek).



Fig 5.22 ERA heliport at zero-foot tide, Oct 8, 2002. Delta of Neilson Creek pushes into Gastineau Channel here, constricting it to a very narrow width at low tide. Dark patches on mudflats are barnacle/mussel/rockweed beds that help to account for scoter concentrations here

- **Neilson Creek mouth is an important feeding area for waterfowl and gulls.** We counted up to 1,000 Surf Scoters (May 14, 2002), 200 Mallards (Jan 21, 2003), 500 Mew Gulls (Aug 12, 2002), 130 Bonaparte's Gulls (May 14, 2002) and 100 Glaucous-winged Gulls (Aug 12, 2002) feeding in the channel or on the flats in front of ERA heliport.

- The ERA site is also used for feeding by a variety of other ducks, but in smaller numbers (10-20 per observation) – American Wigeon, Bufflehead, Common Goldeneye, Green-winged Teal, and Northern Shoveler.