11WD West Douglas

Wetlands we were asked to assess on the West Douglas map page fall within 2 very large Priority Areas. One (PA 2.27) is the 1,372-acre Eaglecrest ski area, in the headwaters of Fish Creek. The other (PA 1.17) contains 2,064 acres, extending southward almost 5 miles from False Outer Point, up into the Peterson Creek subsheds and beyond to Middle Point.

These areas are so different in terms of geology, ecology and human history that it's best to describe them separately.

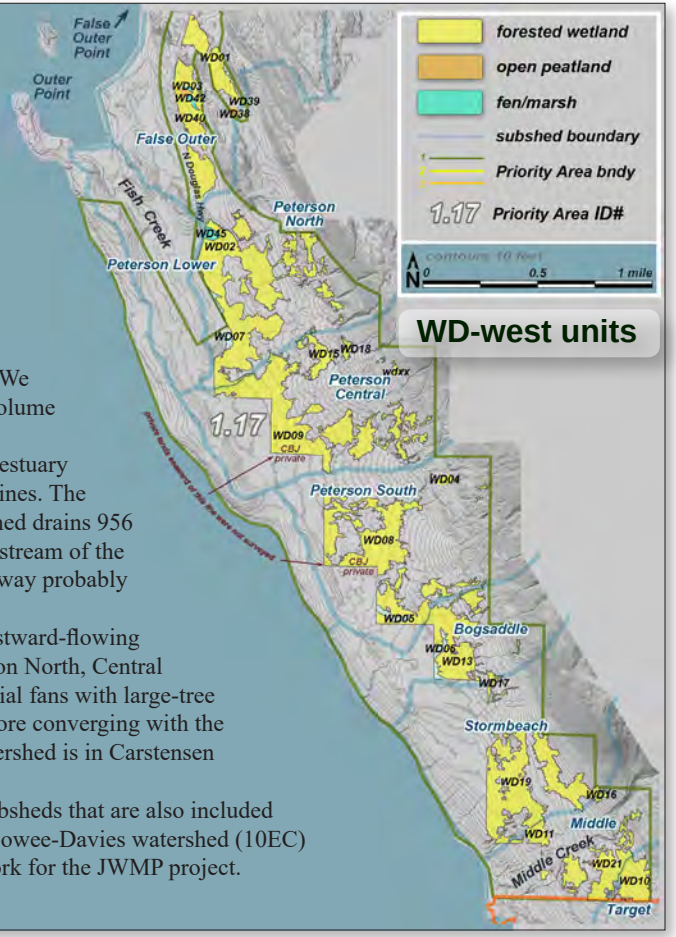
BACK DOUGLAS

Geography, subsheds, ownership In studying the map on right, it should be recognised that forested wetlands, coded yellow, typically extend much farther than shown toward the beach. We did no field work on that coastal property. A speculative "offsite" assessment is described in Volume 2 of the final report. This *Supplement* deals only with AAs we actually visited.

The greater Peterson Creek watershed drains about 4.6 square miles northwestward into an estuary enclosed by Outer Point. We divided this watershed into 4 'subsheds,' shown here with blue lines. The 194-acre Peterson Lower subshed frames the lower reaches of the creek. Peterson North subshed drains 956 acres southward—almost 180° against the watershed's overall northwestward flow—a mile upstream of the estuary. Notice on the unit map for WD02, 07 and 45 that construction of North Douglas highway probably 'robbed' parts of this subshed that once flowed more directly to Peterson mainstem.

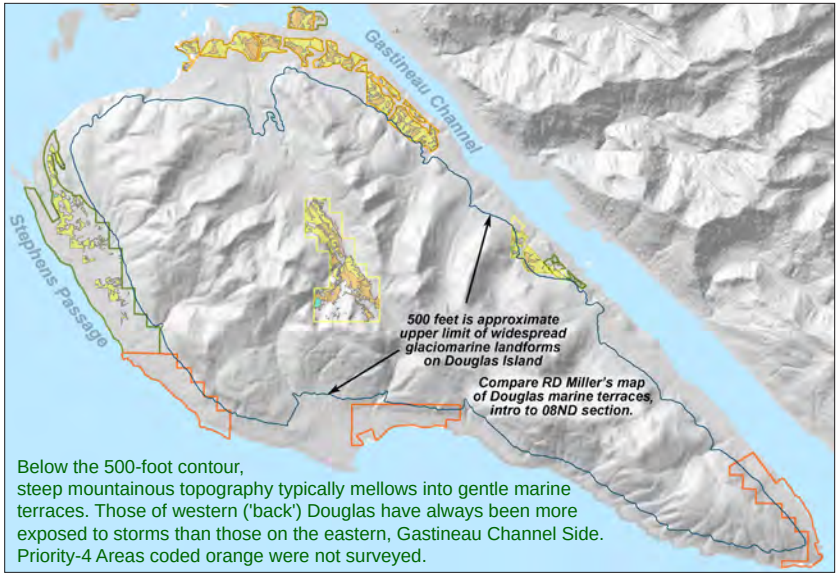
Peterson Central subshed drains 962 acres into converging tributaries that feed the northwestward-flowing mainstem. And Peterson South subshed is the system's headwaters, draining 864 acres. Peterson North, Central and South subsheds originate on the island's crest, descending steep bedrock slopes onto alluvial fans with large-tree forest, then, as gradient decreases, trickling over marine fines with scrubby wetland forest before converging with the fault-controlled mainstem. A comprehensive overview of the geology and ecology of this watershed is in Carstensen (2014) page 62-63.

Beyond the greater Peterson Creek watershed are a series of simpler, southwest-draining subsheds that are also included in the 4.6-mile-long Priority Area 1.17. Along with some of the more remote portions of the Cowee-Davies watershed (10EC) these unroaded 'back-Douglas' subsheds were the most logistically challenging of our field work for the JWMP project.



Here, we defined 4 subsheds. In the absence of published or informal stream names, we designated them by descriptive landscape features. All of these more southerly subsheds drain directly WSW into Stephens Passage, unlike the Peterson units that are 'trapped' behind a long, low, coastal ridge that deflects them northwestward toward Outer Point.

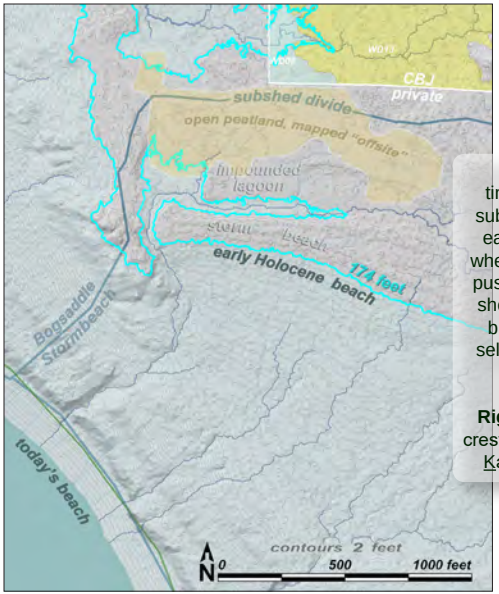
Bogsaddle subshed drains 310 acres through a 'pinched' waist formed by ancient marine landforms. Stormbeach subshed, 480 acres, is named for a prominent berm at the 174-foot elevation that could never have been recognised without the CBJ LiDAR hillshade, which strips away forest cover to show underlying topography. Rather than converging into a single, deeply incised, dominant channel, Stormbeach subshed has a dozen lightly trenched outlets to the sea. Middle subshed, 3.0 square miles, collects from a large basin directed through the constriction of a fault controlled ridge. On release, it gouges a 60-foot-deep canyon into soft marine sediments on its final course to the beach. Target subshed drains 3.3 square miles to Stephens Passage through dozens of non-converging channels. Only 20 acres of this subshed lap into Priority area 1.17, but the divide breaks out a separate AA, #WD10.



Below the 500-foot contour, steep mountainous topography typically mellows into gentle marine terraces. Those of western ('back') Douglas have always been more exposed to storms than those on the eastern, Gastineau Channel Side. Priority-4 Areas coded orange were not surveyed.

Geomorphology, glacial history The history of isostatic changes to sea level on Douglas Island—and wave exposure at time of landform creation—has been introduced in map-page sections 08ND and 09WJ. This wave exposure explains differences in wetland character on 'back Douglas,' (our WD units) as compared with the Gastineau Channel side (ND & WJ). With glacial rebound, as formerly subtidal surfaces passed through the tidal zone, they were subjected to violent storm waves that never lashed the beaches of Gastineau Channel.

The constructional berm at 174 feet for which Stormbeach subshed is named faces SSW, suggesting waves arriving from the southeast and driving sediment obliquely, creating a longshore spit that briefly impounded a lagoon. In contrast with the more common erosional escarpments that can develop through many iterative carvings at high tide, constructional spits often date to a single event—a 'storm-of-the-century.' Naturalist Greg Streveler conjectures that one such event during the recent Little Ice age created analogous berms throughout Cross Sound and Icy Strait, subsequently uplifted 10 feet or so above today's Extreme High Water.



Left: Area tinted blue was submerged in the early Holocene, when storm waves pushed up a long-shore spit. Bright blue line is the selected 174-foot contour.

Right: SE to the crest of Sayéik, over Kaalahéenak'u.

Ecology The wave built spit in Stormbeach subshed has well-drained sand and gravel that now supports large-tree forest. But most marine deposits include enough fine silt and even clay to constrain tree growth. On the Gastineau Channel side (08ND & 09WJ) the resulting wetlands include large components of open peatland (50% & 15%, respectively). On back-Douglas, in contrast, there are only a few pockets of open peatland. The largest, shown above, straddles the Bogsaddle-Stormbeach divide and was mapped "offsite" at about 7 acres. It's no accident that this pocket of exceptionally poor drainage developed in the protection of the wave-built spit.

On the CBJ portion of PA 1.17 only one of the open peatlands surveyed—WD03, 1.04 acres—exceeded the 1-acre threshold required for a valid Assessment Area.

Culture George Vancouver named this island for John Douglas, Bishop of Salisbury, who like Vancouver himself, never saw, nor likely cared about it. The island's precontact name is Sayéik, translated as *spirit helper*, or *voice of the spirit*. Back-Douglas' dominant stream is Kaalahéenak'u, *inside a person's mouth* (Peterson Creek). High rocky bluffs extending south from Outer Point

held defensive fortifications from which enemies could be spied approaching. Today, the coastal portion of Priority Area 1.17 is owned by Goldbelt Inc. and was selectively logged by helicopter. Stumps from this logging extend to the CBJ parcel boundary in all sections we walked.

EAGLECREST

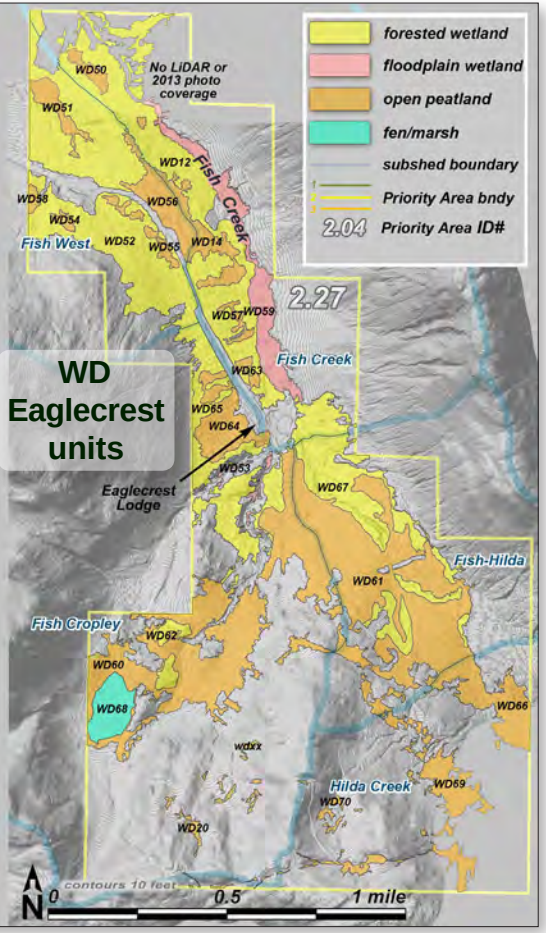
Geography, subsheds, ownership Priority Area 2.27 was not initially among the PAs delineated by CBJ cartographic staff for the JWMP project. But in August of the 2014 field season, it was decided to add the CBJ-owned lands surrounding upper Fish Creek. We then created PA 2.27 (yellow border, map on right) from the CBJ parcels layer. It's enclosed by the Tongass National Forest. Including Eaglecrest in the JWMP not only provides information of use to ski-area managers, but also substantially increases the diversity of wetland habitats mapped and described during this otherwise fairly low-elevation project.

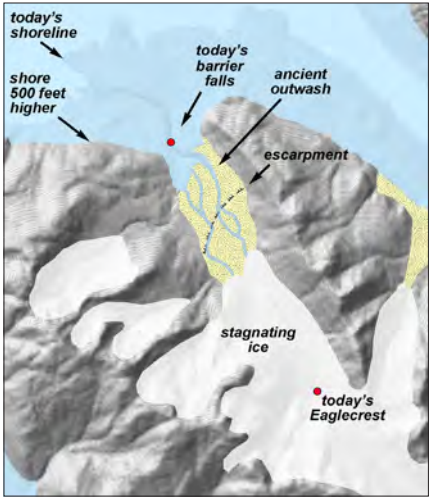
The greater Fish Creek watershed drains about 13 square miles northwestward into Fritz Cove. We've divided that watershed into 4 'subsheds,' shown here with blue lines. Unlike most Priority Areas, where upper elevational limits were determined by slope breaks, PA 2.27 extends in several places all the way to the ridge crest, enabling us to map wetlands as high as 2,660 feet.

Fish Creek subshed spans the entire lower watershed, all the way up to Eaglecrest Lodge. It drains 7.5 square miles (as well as the upper-basin subsheds) into the estuary, which is mapped and described in the 09ND map page introduction and several unit narratives. Fish West subshed drains a 3.8-square-mile basin that shares a ridgecrest divide with Middle Creek subshed on Back Douglas. One lobe of this subshed meets the Fish Creek subshed on a low, visually subtle but significant divide that meanders through the crosscountry ski loop bogs, splitting several of our open peatland units. Fish Cropley subshed drains a well-defined 1.7-square-mile basin centering around Cropley Lake. And Fish Hilda subshed drains 0.7 square miles NNW from the Hilda Creek divide.

The southeastern corner of Priority Area 2.27 falls within the 8.7-square-mile Hilda Creek subshed. The portion of that subshed lying within CBJ land occupies 0.4 square miles.

Geomorphology, glacial history Although Eaglecrest basin lies well above our highest marine landforms, its deep-sphagnum peatlands resemble those forming on the early Holocene terraces described for map pages 08ND, 09WJ and 11WD. Poorly drained substrate in the crosscountry bogs area was





Left: Fish Creek watershed in the early Holocene, when sea level was 500 feet higher than today. Outwash and deltaic landforms from Miller (1975b). As the great ice melted, a remnant, stagnating glacier occupied upper Fish Creek valley for a time. Its migrating meltwater channels built up an outwash plan (yellow) in the middle valley.

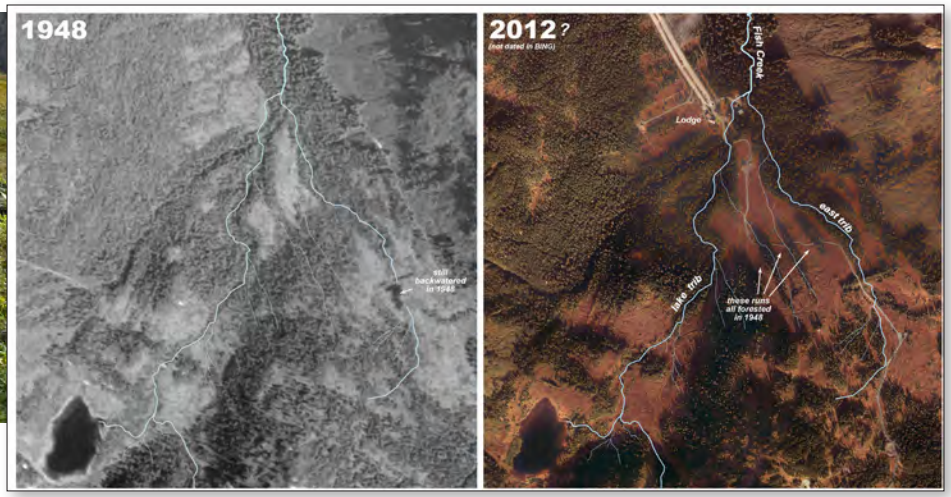
Right: Aerial photography has been challenging in the Eaglecrest PA. WSI's June imagey is mostly snow covered, and the northern portion of the PA wasn't shot at all. I used the meter-pixel 2009 USFS orthos for fieldmap exports, but even these have a lot of snow at high elevation. BING's Juneau coverage (*www.bing.com/mapspreview?FORM=Z9LH2*) was collected sometime in September (date unspecified but cottonwoods are golden). These 32 screenshots are tiled for a late-season overlay into the JWMP arc project.

Limitations of the LiDAR in snow: For the same reason that the JWMP air photos are of limited utility, the LiDAR-based DEM is misleading. Contours show snow surface, not actual ground, and the predicted streams model becomes crudely "vectorized." An example is on the map-pair for WD20.

described by RD Miller (1972) as densely compacted ground moraine, plastered down under a glacial remnant that lingered in the north-facing headwaters long after the great fiord-carving Wisconsin-age ice had receded.

Ecology Eaglecrest lodge is at 1,130 feet in a north-facing bowl—ideal for winter-long skiing until the recent series of record-warm seasons. Regardless of overall trend, the snow-free period remains much shorter at Eaglecrest than at sea level where most of our wetland surveys have concentrated. Even so, dome bogs framing the crosscountry ski trails have deep peat, not obviously different from the above-mentioned North Douglas bogs on coastal marine terraces. In contrast, higher on the slopes, peat is shallower and stiffer, perhaps due in part to greater admixture of fine inorganics. They also have much less sphagnum and support a higher diversity of vascular plants—especially

Above left: Probing for peat depth in unit WD61, just off the new Dick's Lake road. Only 9 inches of fairly fiberous but mucky peat. Lots of small alpine sedge mixed with heather-family species.



Above right: Historical comparison shows which of the runs were originally forested. This pair also confirms that the linear berm on the

crowberry and ericaceous (heather family) species. Root-density in this peat is therefore greater, contributing to stiffness. These valley-wall peatlands include more downslope strips of shrubby fen. Only in a few pockets does peat depth exceed our 4-foot probe. It should also be noted that many of our "open peatland" units were actually forested wetland before tree removal.

Eaglecrest's forests are also different from forested wetlands we surveyed and described near sea level. On average, they occupy steeper slopes, subject to snowcreep in late winter,[1] leading to basal snowcrook in stunted, extremely slow-growing mountain hemlocks, and greater heterogeneity of both topography and vegetation mosaic. Deer tend not to winter in these deep-snow areas, leading to thick brush where short, widely-spaced conifers admit plentiful sunlight. Soils can be extremely shallow. Willow ptarmigan inhabit these subalpine forest parklands, and olive-sided flycatchers breed here.

Culture In 1974 Juneau voters approved spending on road access and ski lift development in the Fish Creek headwaters. By the winter of 1976-77, Eaglecrest Ski Area was operating with a day lodge, chairlift and surface lift, initially under a Forest Service special use permit. In

1 Subalpine mountain hemlock forest, and the role of snowcreep, is described on pages 54-55 of Carstensen *et al* (2014)

Northeast over open peatland unit WD60. Flume in mid-distance. Heavy erosion from ORV mars soft peat in distance. In high-elevation bogs, such scars may take centuries to heal.

1983, Juneau selected the land we've shown (previous page) as Priority Area 2.27 under an entitlement program dating back to statehood in 1959. By 2006, Eaglecrest had 31 alpine runs, and 5 miles of Nordic trails, with more planned. These dates for resort establishment and expansion help explain the relatively recent disturbance and successional recovery—in some cases lack thereof—that makes Eaglecrest somewhat unusual compared to the large majority of Southeast's high-country wetland, almost none of which has been made so accessible by road.

Severe erosion is widespread in parts of the ski area. In many of the runs, vegetation removal, foot and vehicular traffic, and long-lasting compacted snow induce denudation, peat oxidation, and downslope slumping of soils.