

#### **Shoreline changes**

Intensive use (red bars) and residential housing (orange bars) reached a plateau in the 1980s. The most significant recent change is loss of wild, little-traveled lake shore (green bars), critical for easily displaced wildlife such as mink, otter and shore-nesting waterbirds. In concert with development of the terrestrial shoreline, the lake has seen increased activity from motorized watercraft, and ORVs on ice in winter.

Aerial photography, June 9, 2006, City and Borough of Juneau. Terrestrial contours 50 feet. Lake contours 1 meter. Canopy texture is indicative of forest age and structure, as described under station 3, flip side. Yellow numbers show interpretive stations on the Auke Lake Trail.

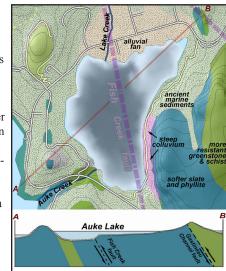
## **Evolution of the Auke Lake Trail**

Completed in 2009, this state-of-the-art lakeshore trail resulted from a collaborative fundraising campaign by the University of Alaska Southeast, CBJ Parks & Recreation and Trail Mix. Long-term plans include a connection to campus via footbridge across the outlet lagoon, where the old highway once crossed (see historical photo, station 1).

Thanks to: Robert Armstrong, Gretchen Bishop, Cathy Connor, Jim Geraghty, Adam Moles, Dan Montieth, Marie Olson, Bruce Simonson, Greg Streveler, Jerry Taylor and Mary Willson for information about Auke Lake and Auke Bay.

## Geology

Solid colors on this map represent bedrock-cored hills only thinly blanketed with glacial deposits. Stippled colors show thicker surficial deposits in the lowlands. Pale green stipple represents fine marine sediment from times of higher sea level more than 10,000 years ago. Tan stipple shows the gravel-cobble fan (alluvium).



created where Lake Creek meets the northern shoreline. Pink stipple is steep *colluvium*—rocks moved downslope by gravity.

Surficial geology helps to explain the array of vegetation types surrounding Auke Lake. Poorly-drained marine fines underlie small-tree forest and bog. Better-drained gravel/cobble/boulder deposits on the Lake Creek fan and east-shore colluvium support larger trees. Composition of the "parent material" (bedrock source) in these deposits is also important. Many of Juneau's largest trees—such as the giant spruce on this brochure cover—are rooted in platey chips of limey slate and phyllite.

Wind exposure is as important as substrate to forest development. The large-tree forest on the southern half of the trail is sheltered from prevailing southeast storms, while windward forests periodically suffer stand-replacing blowdown. See comments on wind forest at station 3

This trail guide is part of a series of interpretive products created in 2010 for trails on CBJ lands by Discovery Southeast. Other creations include natural history signs, a summary guide to CBJ trails and free web products.

# **Discovery Southeast**

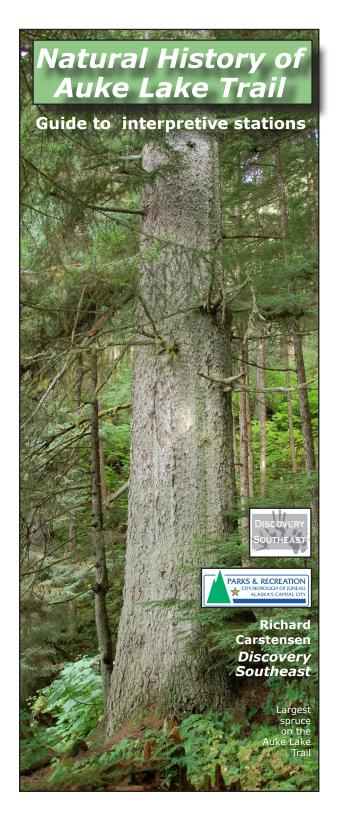
Founded in 1989, DSE is a nonprofit organization promoting direct, hands-on learning from nature through natural science and outdoor education for youth, adults, and teachers. Discovery naturalists deepen the bonds between people & nature.

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## **CBJ Parks & Recreation**

The City and Borough of Juneau/Parks & Recreation welcomes you. Parks & Recreation manages 50 miles of trails and fosters innovative stewardship of its diverse resources. Collectively, along with our partners Alaska State Parks, the U.S. Forest Service, Trail Mix and SAGA, 135 miles of trails are managed--connecting our community with Juneau's magnificent landscape.

We hope you have a great experience on your trails. Take only memories, leave only footprints. Call Parks & Recreation at 586-5226. • www.juneau.org/parksrec



#### Numbered stations

Interpretive stations are marked by numbered posts along the trail, and by yellow numbers on the flip side aerial photo.

**1** Outlet lagoon A lake's most critical habitats are generally at its inlet and outlet. Auke Lake's outlet lagoon not only has excellent forage and cover for rearing salmonids; it's also the conduit through which all anadromous fish must pass, along with mink and otter ranging between fresh and salt water.

The undated photo below was taken sometime between 1918—when the road from Juneau reached Auke Bay—and 1951, when the Auke Creek crossing was moved downstream 130 yards to its current location. The Mendenhall Glacier, right distance, has since downwasted out of sight from Auke Lake.



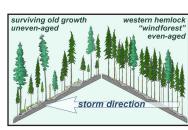
**2** Willow fringe Between Glacier Highway and the lake shore, soils are mucky and few tall trees can grow. More tolerant are skunk cabbages (*Lysichiton americanum*) and willows. Both Barclay and Sitka willows (*Salix barclayi*, *S. sitchensis*) fringe the trail. You can easily tell



them apart by the undersides of their leaves. Sitkas have fine, silky hairs, while Barclays are hairless and waxy.

**3** Discovery sign, forest structure This 3-panel interpretive sign is a good place to get oriented to Auke Lake's broader geographic and historical context. For millennia before Euro-American colonization, Auke Bay was the cultural hub of Southern Lynn Canal. For centuries it was home to the Auk Kwáan, who take their name from Aak'w—"Little Lake."

Also at this location, you can look to the southeast (right)



On slopes exposed to prevailing storm winds, entire forests are periodically blown down. Surviving understory hemlocks grow densely, contrasting with more dispersed, uneven-aged old growth on protected



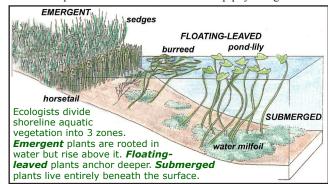
and northeast (left) and see a fundamental contrast in forest structure. These forest types are identified on the aerial photo, flip side. Scan the photo for tightly packed, small-diameter tree crowns, resulting in relatively smooth texture. These even-aged "wind forests" with same-sized trees came back after a major gale in February, 1883. Wind forest constitutes 40% of the forest on the aerial.

As you walk north from the Discovery sign, examine the change in forest structure. The largest trees can be 500 years old or more. On the aerial this forest type is signalled by a coarser textured canopy with dark shadows indicating gaps where trees fell. Notice that this forest conforms closely to the steep, lee hill-side where trees have been protected from stand-replacing gales. Trees also grow larger on the substrate of nutrient-rich, well-drained colluvium (pink stipple on flip-side geology map).

**4** Floating boardwalk, pond-lily fringe This floating portion of the trail offers shoreline perspectives normally available only to boaters. Look up to the highest tree crowns. Some of the tallest spruce, such as the giant on this brochure cover, reach 170 feet.

The belt of aquatic plants fringing the lakeshore provides food and cover for every local fish species, and for aquatic birds and mammals. The profile below shows a gently shoaling shore; on steeper sections there's less room for emergent species.

Aquatic plants buffer water temperature, filter pollutants, oxygenate the water, and reduce wave action on the lakeshore. Vascular aquatics are coated with a film of epiphytic algae that

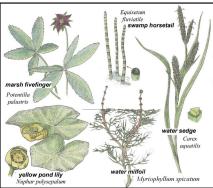




feeds invertebrates who in turn feed rearing cohos, sockeyes, Dolly Varden, and cutthroat trout. Before the collapse of Auke Lake's once-thriving western toad population, millions of tadpoles sheltered within the lush aquatic vegetation.

Long-time lake residents have noted that cover of swamp horsetail is increasing, while yellow pond-lily is declining.

Causes may include increased wake from motorized recreation, and consumption by beaver, whose numbers are growing throughout the CBJ. "Classic" beaver habitat is in early successional communities (e.g. glacial forelands, big-river flood plains) with lots of willow and

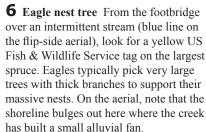


cottonwood (*Populus trichocarpa*) for winter food. Auke Lake, in contrast, is surrounded mostly by ancient conifer forest. In this suboptimal environment, the thick runners of pond-lily are staple winter forage, supporting a moderate beaver population.

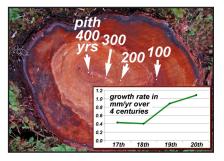
**5** Lake Creek fan Halfway to Mendenhall Loop Road, the Auke Lake Trail again veers out onto the water. This floating platform offers an expansive view across the lake to the toe of the broad Lake Creek alluvial fan (panorama above). Like colluvium, the well-drained stream sediments—rich in slate and phyllite—support large-tree forest. *Unlike* the colluvial forest dominated by massive, old hemlocks, Sitka spruce dominate the fan. The original old-growth was mostly logged, but second-growth spruce have already grown tall on this nutrient-rich surface.

Sockeye salmon spawn in the gravelly lower reaches of Lake Creek, but in sadly lowered numbers. Several factors contribute to the decline, but one cause is gradual build-up of alluvium leading to dewatering of the stream bed, restricted spawning windows, and winter egg mortality. On undeveloped alluvial fans where streams migrate freely across the surface, this doesn't happen. But Lake Creek has been pinned in one place for nearly a century by the Back Loop bridge, focusing alluvial deposition.

Sockeyes also spawn down to 20 feet deep along the lake shore, in places where groundwater emergence flushes the otherwise thick flocculent away from the gravels.



**7** Mucky soil, slow tree growth Trees here are mostly less than a foot in diameter. Thin crowns indicate wet soils on ancient marine sediments. A recently cut hemlock only 16 by 18 inches is 400 years old! At age 200 it was only 6 inches in diameter—a suppressed understory sapling. As it reached the upper canopy in its third century, growth rate doubled. But trees on this site will never achieve the size of their neighbors on alluvium or colluvium.



**8** Wild lakeshore The trail leaves the shoreline here, to give aquatic wildlife some "breathing room." Note on the 2009 *Shoreline changes* map, flip side, that only two green (*i.e.* wild) segments remain: here and just north of the UAS campus.

Mink are among the species most sensitive to displacement by increased recreational

