

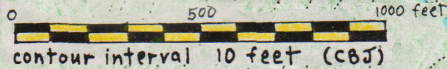
Nature near the schools

Auke Bay Elementary • 1991

Richard Carstensen, Catherine Pohl

Gretchen Bishop

DISCOVERY
SOUTHEAST



Auke Bay School

Richard Carstensen
DISCOVERY FOUNDATION
3/2/91

NORTH

SPAULDING TRAIL

BAY CREEK

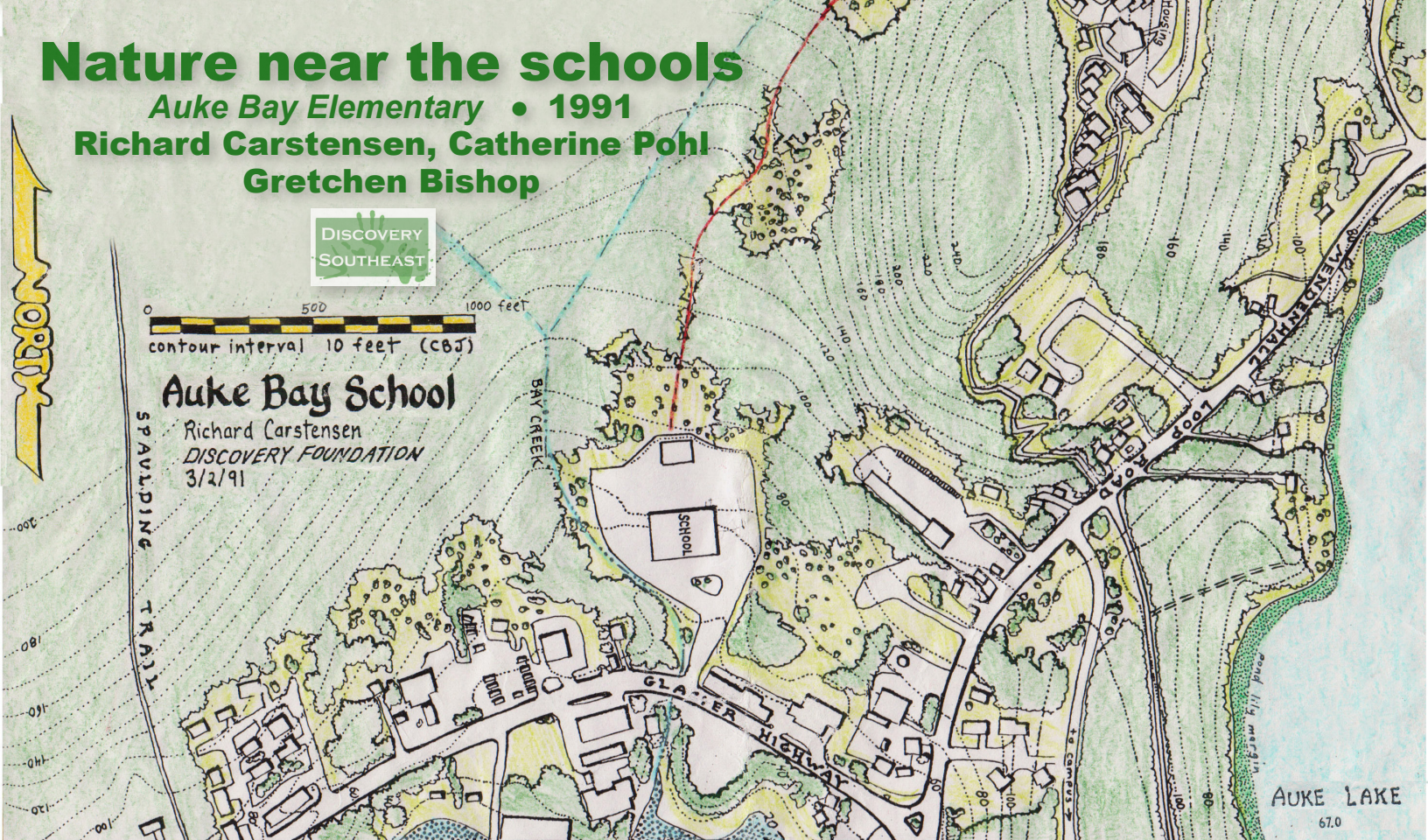
SCHOOL

GLACIER HIGHWAY

MENDENHALL

AUKE LAKE

67.0



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Jack Hermle, late 1970s?

Cover: Discovery map of Auke Bay Elementary School

Preface 2021

In the early 1990s, when Discovery Southeast was still called Discovery *Foundation*, Greg Streveler, Cathy Pohl and I—along with a rotating team of naturalists and biologists with deep local knowledge—offered site-based teacher-recertification workshops throughout the Juneau School District.

We thoroughly documented these classes. In the following decade—until onset of the digital age at turn-of-millennium—all school libraries housed 3-ring Discovery binders with printed text, maps and graphics, along with 35mm slide pages, color stereogram sheets for classroom use in sets of 15 (students paired), and a stereoscope for 3D viewing. Today of course, this stuff is easier to share online, and to distribute in the form of pdfs, powerpoints and student tablet/chromebook resources.

We've of course learned a trick or two over the course of our subsequent decades in support of place-based education. Areas of fastest growth over are, not surprisingly, those where technological advances sharpened our observational abilities. Cartography is the best example. I've (mostly!) resisted adding post-90s maps or photography to this collection, so that it remains fairly faithful to the original product. *JuneauNature* is full of hot-off-the-laptop digital mapping resources for the schools, if you want that.

Another area of substantial content expansion has been less dependent on technology than on abiding interests of Discovery naturalists, and a swelling movement within Borough, State and National educational communities. This of course is CRE (culturally responsive education). While Discovery doesn't presume to speak for Tlingit culture in the schools, we strongly support those who do. One practice we've helped to pioneer is Lingít place names in writing and cartography (*Place names*

convention, below) Note, however, that in this 'historical document,' I haven't retroactively demoted all Euro-style place names. In some ways, it's good to be reminded of how we used to write and think.

As schools reopen in fall, 2020, physically & virtually (online), Discovery is striving to support the District with resources for place-based, culturally responsive education. I'm adding new 'wings & feathers' to [JuneauNature>SCHOOLS](#).

This manual for Auke Bay School is one of that wing's primaries. I hope it brings fond memories to older teachers, and inspiration to younger ones. A broader [Overview](#) of the workshop series—and supplementary materials not specific to any particular school—can be found at the link above.

Place names convention: In my writing & cartography since publication of *Haa L'éełk'w Hás Aani Saax'ú: Our grandparents' names on the land* (Thornton & Martin eds 2012: abbreviated "T&M12"), I've used Lingít place names whenever available, followed by translation *in italic*, and IWGN (important white guy) in parentheses. Example: Kadi-ooni X'áat', *island with spring water* (Spuhn Island). Where Lingít went unrecorded I default to IWGN, and may acknowledge its inadequacy with "(noTN?)"

Auke Bay School Site Interpretation Workshop

3/8/91

Instructors: Richard Carstensen, Gretchen Bishop
and Catherine Pohl

Teacher Representative: Judy Maier

Introduction

This collection of school resources from the early 1990s was developed in conjunction with a workshop given for Auke Bay Elementary School. After the workshop, they were provided to the school library in a 3-ring binder containing text, 35mm slides, and stereogram sheets. More than 30 years later, I'm scanning and reformatting the collection for easier dissemination through [JuneauNature>SCHOOLS>Schools of Áak'w & T'aakú Aani>Auke Bay Elementary](#).

Gunlch'éesh to the L'eenéidí clan of Áak'w Kwáan, on whose homeland Auke Bay School resides.

Auke Bay 3/8/91 Instructors: Richard Carstensen, Gretchen Bishop and Catherine Pohl

Teacher Representative: Judy Maier

Name	school	grade
Marcia Liliedahl	ab	K
Julie Norton	ab	1
Kathy Hansa	ab	1
Amy Jo Meinen	ab	1
Loni Wetternell	ab	2
Sara Jean Fujioika	ab	3
Judy Maier	ab	5
Nancy Lehinant	ab	g/t
Sue Oliphant	ab	rally
Lorrie Wright	ab	speech
Laurie Selvensberger	ab	reading
Margie Beedie	ab	stud teach
Jane Ann Twilker	ab	mr
Judy Haydesh	mr	speech
Judy Jones	jdh	curr

Sherry Carson	parent
Dave Lubin	vol

Course outline

AUKE BAY SCHOOL
Site-Interpretation Workshop

March 8-11, 1991

Instructors: Richard Carstensen, Gretchen Bishop
and Catherine Pohl

FRIDAY 8th- Natural History of Bay Creek Watershed

Registration

Intro What the Foundation is up to, how will participants use info? Class schedule.
What is known about the Auke Bay area? history of research
Intro to stereograms the watershed in 3-D
Bedrock Geology from Ford and Brew map
The last 20,000 years: ice ages, landforms, forest and wetland succession, blowdown, human history,
Critters mammals and birds of the area
What is special about the Bay Creek Watershed?
The Creek hydrology, fish, aquatic insects (Gretchen Bishop)

SATURDAY 9th - Field

Morning Bishop Trail and immediate vicinity of school grounds

Lunch indoors, more study of maps and stereograms, prep for afternoon walks

Afternoon hike up skiers' trail, and over bedrock knob

MONDAY - 9th

Summarize field work, ideas for teaching local natural history

Peab Creech - director, UAS physical plant - info on plans for new gym behind Auke Bay School

Reviews

Bedrock - RC
Fish - GB
Bog plant adaptations - CP
Coring results - RC

How do we teach this stuff? Discussion

Evaluations

Natural history of Auke Bay School area

A Discovery site interpretation workshop

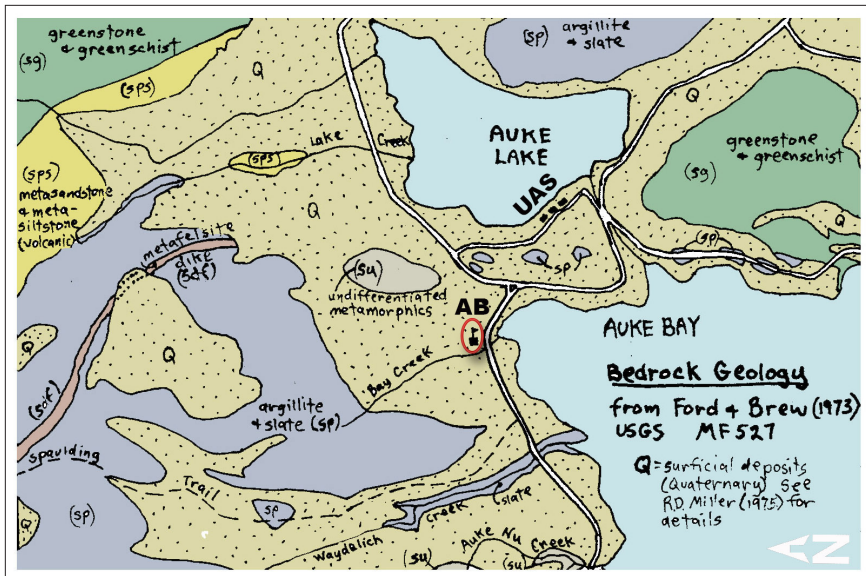
Natural history studies encompass everything from 'bedrock to beavers'—obviously more than we can cover in a week-end workshop. But we do hope to impart some of the naturalist's excitement over *interrelationships* between these disciplines. How do marine sediments under Bay Creek watershed explain present plant communities arrayed across the delightful forest-bog complex behind the school?

How far do mink run up Bay Creek? How frequently do catastrophic blowdowns occur in the watershed, and what is their effect on animal residents? A naturalist asks questions like these.

Conclusive answers are few and far between, but the result of our vigorous curiosity is a deepened sense of place, and an appreciation for the ancient workings of the land. Teaching children to ask these questions is more rewarding than reciting the answers.

A typical natural history proceeds 'from the ground up'. It begins with the underlying bedrock 'skeleton,' which is then 'fleshed out' with surficial deposits like glacial and river sediments. These are covered with the 'skin' of organic soils, and a 'coat' of vegetation. (Should probably terminate our analogy at this point, before likening the area's fauna to fleas or lice.) And many natural history descriptions end with a chapter on people.

This is not the order in which most of us learn about the land. As children we're first attracted to the doings of our fellow and sister human beings, then to those beings who most resemble people, like mammals and birds, then to fish, bugs, and only later to plants, and still later to rocks and other inanimate objects. But just as we can guide childrens' interest to hydrology via mink, we can lead them back into



PS 2012: In the slide show for Auke Bay Elementary, I've replaced this hand-drawn tracing from Ford & Brew's bedrock geology, but not the following excerpt from Miller's surficial geology. In both cases I rotated north up, for consistency with other maps and aerials in that 'projectable' presentation.

on glacio-marine sediments underlying the rest of the drainage? Why did Auke Bay School 'sink' just after it was built?

Bedrock Geology

Our bedrock map of Mendenhall Valley is a simplified tracing from Ford A., and D. Brew. (1973) *Preliminary geologic and metamorphic isograd map of the Juneau B-2 Quadrangle*. US Geological Survey Miscellaneous Field Studies Map MF-S27.

Q SURFICIAL DEPOSITS Undifferentiated glacial, alluvial, colluvial, marine, and glaciomarine materials; see Miller, below.

su METAMORPHIC ROCKS, UNDIFFERENTIATED Ford and Brew's "wastebasket" term, mostly for outcrops they didn't field check.

sdf METAFELSITE Dike and sill-like bodies

sg GREENSTONE AND GREENSCHIST Chiefly augite-rich metatuff, originally basaltic to andesitic; in places mixed with metagraywacke, argillite, slate. Cliff former.

sp PELITIC ROCKS Mostly argillite and slate, locally phyllite.

spS PELITIC ROCKS, METASANDSTONE AND METASILTSTONE Chiefly dark, volcanic-derived metasedimentary rocks, mixed and undifferentiated.

geological time through their natural fascination with the changes of the past few decades.

In our work at Harborview School ' we've been delighted at students' reactions to air photo historical sequences. It's hard to keep them in their seats as they search for their houses in 1962 or 1929. And human developments lead easily to consideration of natural change. Why was the first extensive clearing in the Bay Creek watershed (just east of the Spaulding Trail on the 1962 photos, over 5, up 2.3) on a landform that R.D. Miller typed as ancient raised pebble cobble beach? Why not

1 PS 2021: Discovery piloted Nature Studies at Harborview in 1989-1992. From there it eventually spread to every public elementary school in the District. These Eisenhauer M&S teachers' workshops were our first outreach to the broader community.

advance was peaking, all of Southeast Alaska was covered by ice, except for the highest peaks, which protruded like islands through a sea of ice. In the Juneau area, land was uncovered by the Wisconsin ice roughly 12,000 years ago.

By 10,000 years ago, the Mendenhall Glacier may have receded farther back up the valley than we find it today. For the next 5,000 years, the climate was mild, maybe warmer on average than today's. But the land was still slowly recovering from having been pressed down hundreds of feet under the weight of glacial ice. What is now Mendenhall Valley was at that time Mendenhall Bay, with probably about 400 feet of salt water. The first human inhabitants of what is now the Visitor Center area may have been hunting seals there!

Gradually the valley floor emerged above sea level, partly as a result of glacial rebound, and partly from being filled with glacial and marine sediments. Then, about 3,000 years ago, another glacial advance began, minor compared with the Wisconsin, but destined to totally rearrange the surface of Mendenhall Valley. This advance we call the Little Ice Age. It's best known in Glacier Bay, where ice moved about 60 miles down bay, then receded the same distance over the last two centuries. At the same time, the Mendenhall Glacier advanced and receded about 3 miles. As recently as 1765 AD, the Glacier snout spanned the valley just below the back loop road. Ice covered the Mendenhall River School site, but did not quite reach Floyd Dryden.

Most Juneau area schools sit on landforms that were drastically changed by the Little Ice Age, but not Auke Bay School. Bay Creek watershed has probably changed very little except for occasional blowdowns during the past 6000 years.

History of Auke Bay research

This annotated bibliography is arranged chronologically, rather than alphabetized by author. It includes research papers, maps and air photos.

1912 Knopf, A. Eagle River Region. US Geological Survey Bulletin 502. • *Includes the first detailed map of the Auke Bay area. Beautifully color-coded for bedrock type, with 50 foot contours! Extremely accurate considering that it pre-dated any aerial photography. Trail shown to Dull and Stephens Prospect appears identical to the present skiers trail through lower, middle and upper bogs.*

1929 US Navy air photos • *First systematic photo coverage in Southeast Alaska. Unfortunately the Auke Bay area was only included as random shots, taken obliquely out the plane window.*

1948 SEA air photos • *First mapping-quality B&W photography, taken mid August Lawrence (next citation) couldn't have done his moraine research without these photos. Until the recent metric USGS topographical maps of the Juneau area became available, all topos were based on this series.*

1950 Lawrence, D. Correspondence with Frank Heintzleman • *FH was Regional Forester, Juneau. Includes reply to Lawrence from R. Taylor, Forester in Charge. Lawrence explained his methods and findings (described below) to local foresters, who wrote back asking why, in their timber cruises they had found no old trees between the Glacier and Gastineau Channel.*

1950 Lawrence, D. Glacier fluctuations for six centuries in southeast Alaska and its relation to sunspot activity. American Geographical Review. XL:191-223. • *Lawrence was from Minnesota, but he disproved the assumption held by local foresters that the Mendenhall Glacier had advanced to tidewater in recent centuries. Mendenhall Valley was his "Rosetta Stone"; tree colonization patterns on moraines of known age in the upper valley enabled him to use growth-rings to date older moraines in many of our local glacial valleys. His site 13 was on a boggy forest near Montana Bill's, probably a similar habitat to the Bay Creek watershed, and included a 630-year-old tree.*

1960 Heusser, C. Late Pleistocene Environments of North Pacific North America. American Geographical Society, New York. • *First comprehensive synthesis of plant recolonization of Southeast Alaska after the great ice departed about 13,000 years ago. Some of his radiocarbon dates were from bogs near Montana Creek.*

1962 EKX air photos • *Taken July 4th. B&W. Excellent quality and larger scale than the 1948's*

1968 Barnwell, W., and C. Boning. Water resources and surficial geology of the Mendenhall Valley, Alaska. US Geological Survey Hydrologic Investigations Atlas HA-259. • *Beautiful color maps of soils and water info. Paper explains glacial history. The Auke Bay School area is just included on the edge of this map.*

1968 Bishop, D. Auke Lake Community College; Land-Water Investigation. ENVIRONAID report to the fledgling UAS campus. • *Includes forest type info, sketch map of alignment of 1883 blowdown trees, and water quality data.*

1972 Miller, R. Surficial geology of the Juneau urban area and vicinity, with emphasis on earthquake and other hazards. US Geological Survey open-file report. 108 p. • *Most comprehensive description to date of the surficial landforms of the Juneau road system. Accompanies 1975 map.*

1973 Ford A., and D. Brew. Preliminary geologic and metamorphic isograd map of the Juneau B-2 Quadrangle. US Geological Survey Miscellaneous Field Studies Map MF-527. • *Most current bedrock information for the Mendenhall Valley.*

1975 Miller, R. Surficial geology map of the Juneau urban area and vicinity. US Geological Survey Misc. Investigations Series Map 1-885. • *Lovely color-coded landforms map. Gives radiocarbon dates for buried wood (from preglacial forests), peat (ancient muskegs), and shells (ancient raised beaches).*

1979 NASA air photos • *High elevation color infra red, at one inch = one mile. Best coverage to date for the "big picture". 1984 USFS air photos Taken August 14th. True Color. One inch = 1000 feet. Best photos presently available for vegetation and landform interpretation.*

1986 USGS metric topographic maps • *Done from the 1984*

USFS photos. Larger scale and finer contour interval (20 meters) than the old topos.

1988 R&M low elevation air photos • First photography to show new UAS library and student housing

1991 Carstensen, R. stereograms and sketch map for Auke Bay School • 3-D viewing pairs of the school area, historical sequence, etc

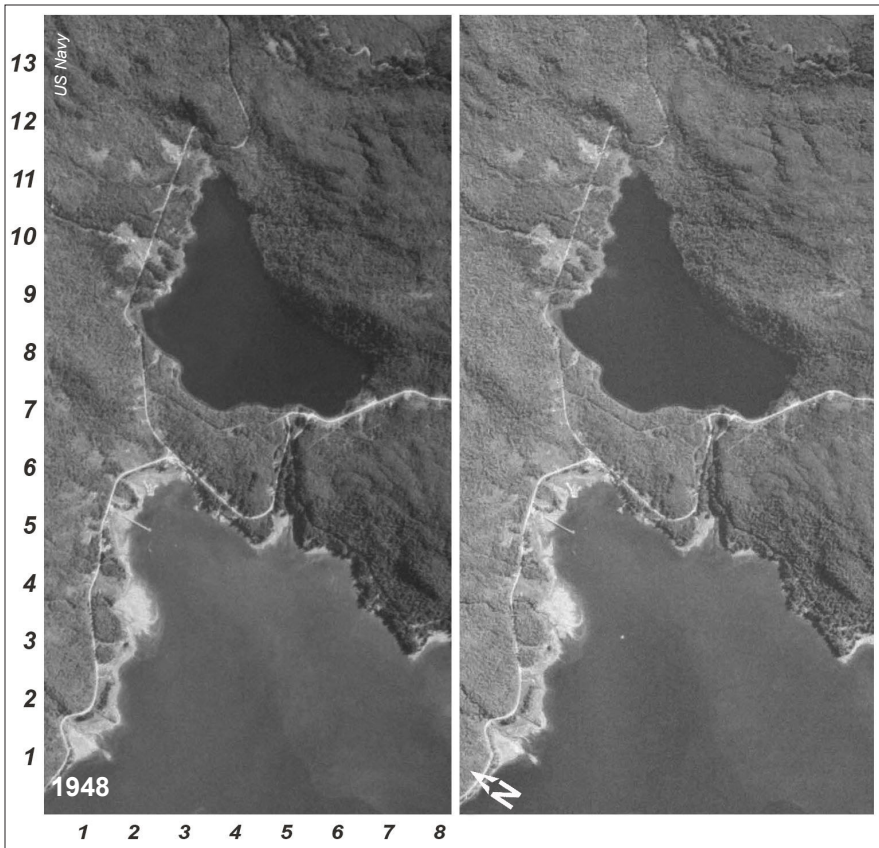
PS, 2021: More current resources can be found as links from JuneauNature's [page for Auke Bay school](#).

Apparently the US Navy's cartographic (nadir or downward-facing) aerials taken elsewhere throughout SE Alaska in 1926 and 29 did not extend northwest to Auke Bay.

But we do have some wonderful obliques taken in June 1929. Bay Creek emptied into a broad mudflat. Bog above road was future site of Auke Bay School.

Remnants persist behind today's playground, but originally it extended all the way down to tidewater.





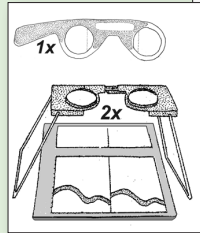
Stereograms for Auke Bay For instructions, see *Using the stereoscopes and stereograms* in my [Overview](#) document for this workshop series. Viewing options:

1) Print one set of these stereogram pages/puzzlers and leave em out with a stereoscope where students can check them out during free-time. Several of our 1990s-workshop teachers reported this was popular. .

2) scale the stereograms on a monitor and hold a cheap plastic 1x viewer about 9 inches from the screen.

3) Best viewing is with 2x pocket stereoscope over a tablet, large phone, or any high-res LCD. **chromebooks that lie flat? needs more research . . .** Methods 2 & 3 allow limited zooming, as far as human eye-separation permits. They can also be used in zoom screensharing, when instructor's cursor is visible to all participants, pointing out features on one of the images.

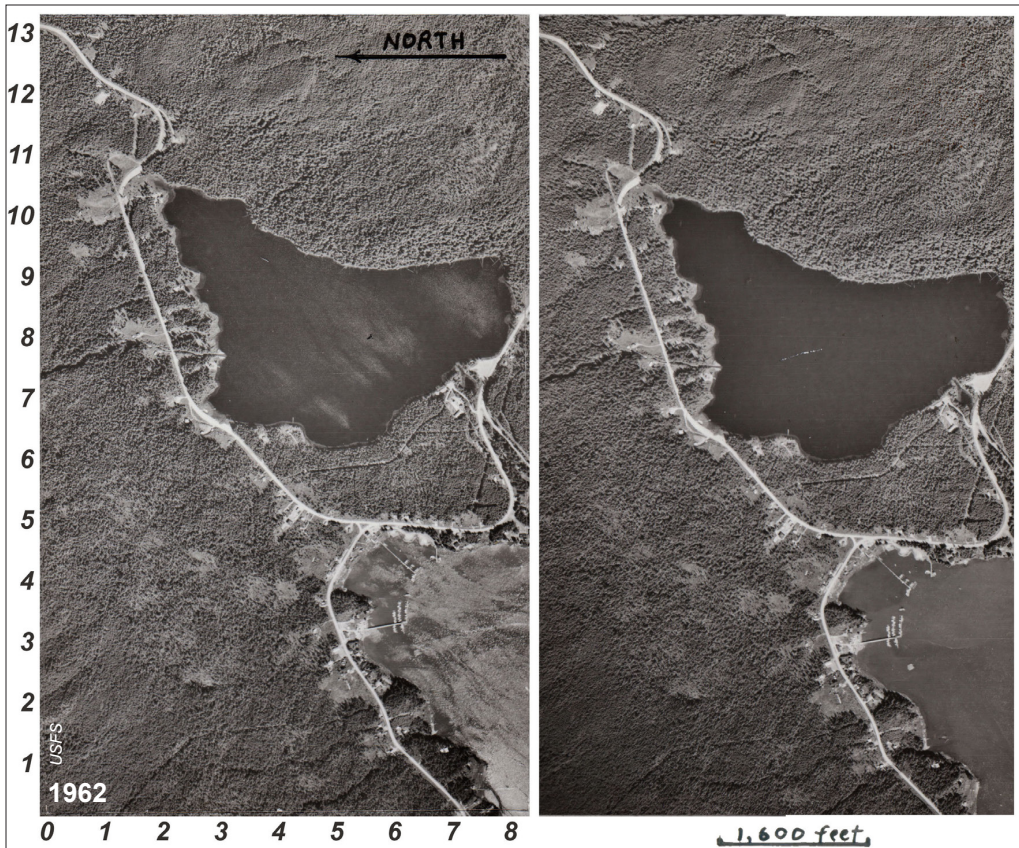
One more tip for digital viewing. When perusing stereopairs in pdf format, you can flip pages without taking your eyes from stereoscope or handheld viewer. Your eyes are 'pre-focused' for 3D, and the 'model' pops up instantly.



Auke Bay School stereogram puzzlers

Before we begin, first locate the north arrows on all 3 stereo pairs, as well as the surficial geology map. They're not all pointing in the same direction, and this can lead to confusion. On the 1962 and 1984 pairs, on the right side of the page, north is to the left. In contrast, on the geology map and color infra-red 1979 aerials, north is at about 10-o'clock.

1) Find Auke Bay School on the 1984 color stereograms (several pages down). For coordinates, begin in lower left corner, and



count over 5, then up 5.5. We write that as 5—5.5.

a) On the 1962 stereogram, find the future site of Auke Bay School. What are its coordinates? On what kind of surface was the school built?

b) Few of the buildings present on the 1984 photos were there in 1962. What buildings do you recognize in the 1962s?

2) On the 1984s find the oval of densely packed, slightly darker green trees centered at 2.5—7.

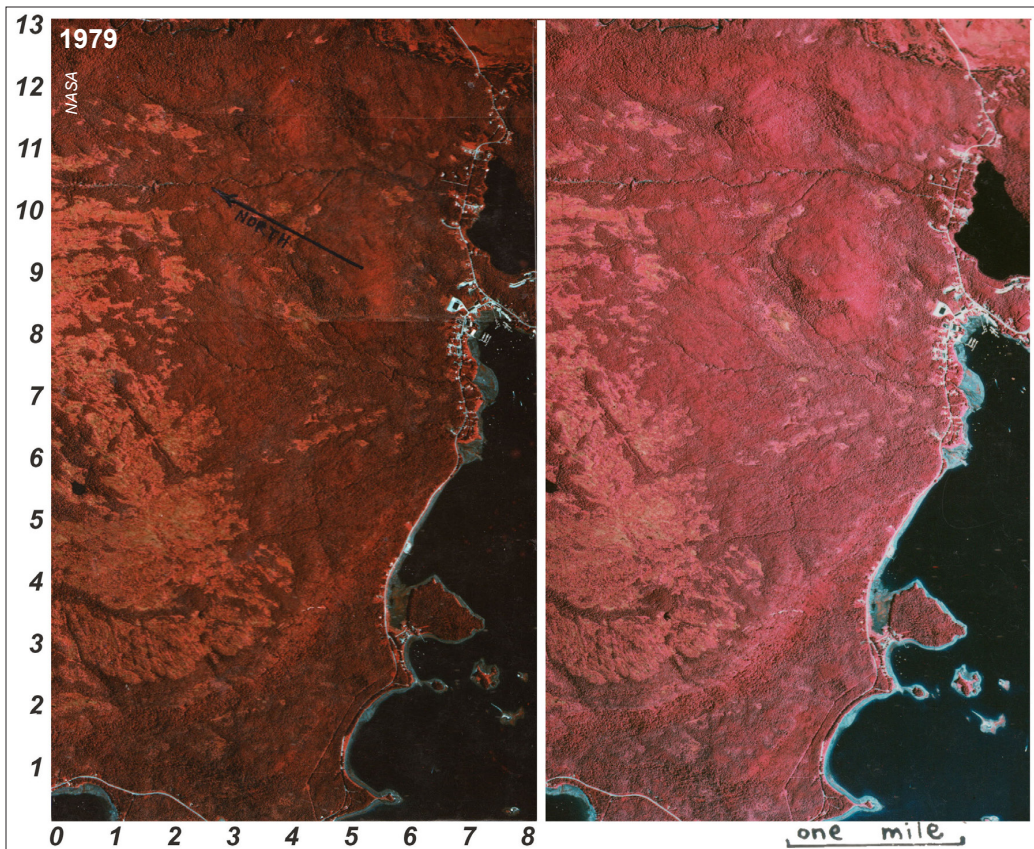
a) Are trees mostly the same size or many different sizes? Close together or far apart? Same age or different ages?

b) This is definitely not an old-growth forest, which has a mix of big and small trees. What could have happened to start all of the trees on this hill growing at once?

3) Find the Spaulding Trail. It cuts across the bottom of both the 1962 and 1984 stereograms. Find where it meets the highway, just east of Waydelich Creek.

Now find the trail on the 1979 color infra-red. (Recall that the north arrow is not exactly the same as on the 62's and 84's!) Spaulding Meadows are paler than the conifer forest. Find the small lake (black) at 0.3—5. The Muir Cabin is on the ridge just above this lake, at 1—5.5.

a) How far is it, as raven flies, from the small



lake near Muir Cabin to Auke Bay School? One way to increase your accuracy is to lay a piece of paper across the photo. Mark the distance on the edge of the paper, and then move it down to the scale bar. Estimating is fine, though.

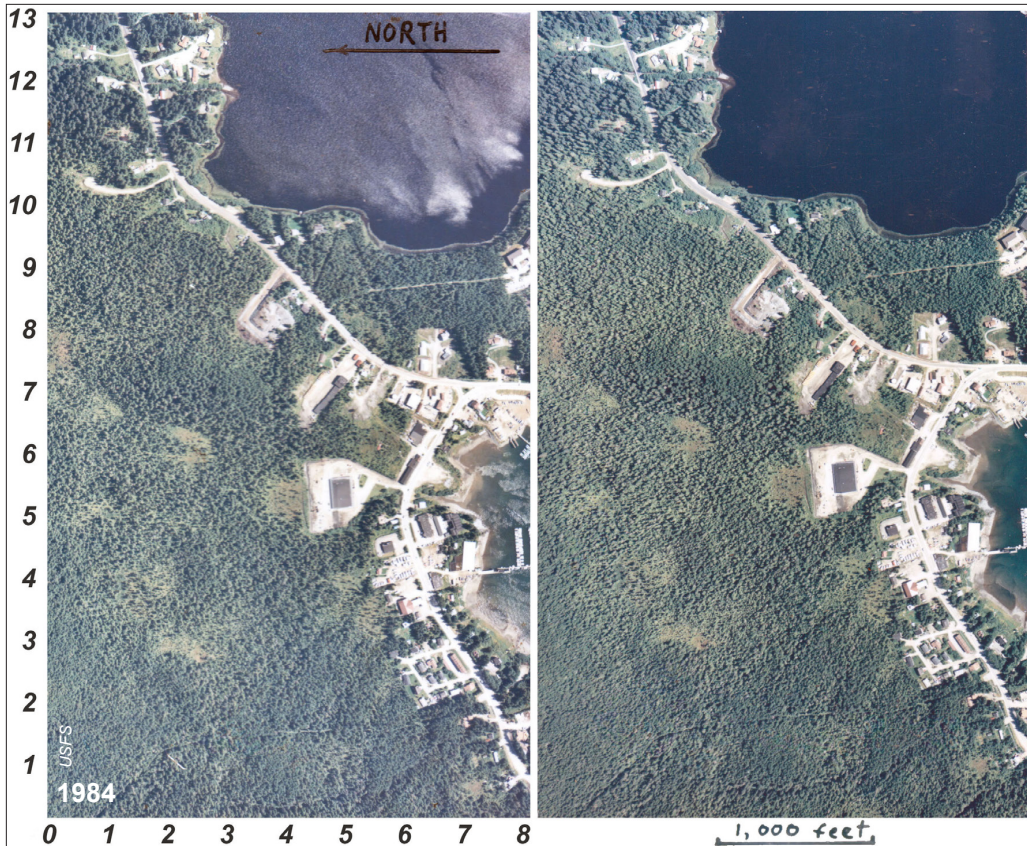
4) On the 1984's, find the mouth of Bay Creek, at 6—5.5. Now find the small peninsula of land just east of (up from) the creek. It's directly across from Squire's Rest, and has a parking area on it.

- a) Where is this peninsula on the 1962's. (trick question!)
- b) So what's going on?

5) Study the surficial geology map [p5]. The greenish colors (g and gs) show ancient marine terraces, land which was under sea 9,000 to 12,000 years ago. Often the sea deposits are fine sands and silts, which are poorly drained, and now covered with muskeg, or wet scrubby forest.¹

- a) On the 1984's, where are the tallest trees?
- b) Find these large trees on the surficial geology map. A rectangle has been drawn to show you the area covered by the 1984's. What surface type are they growing on?

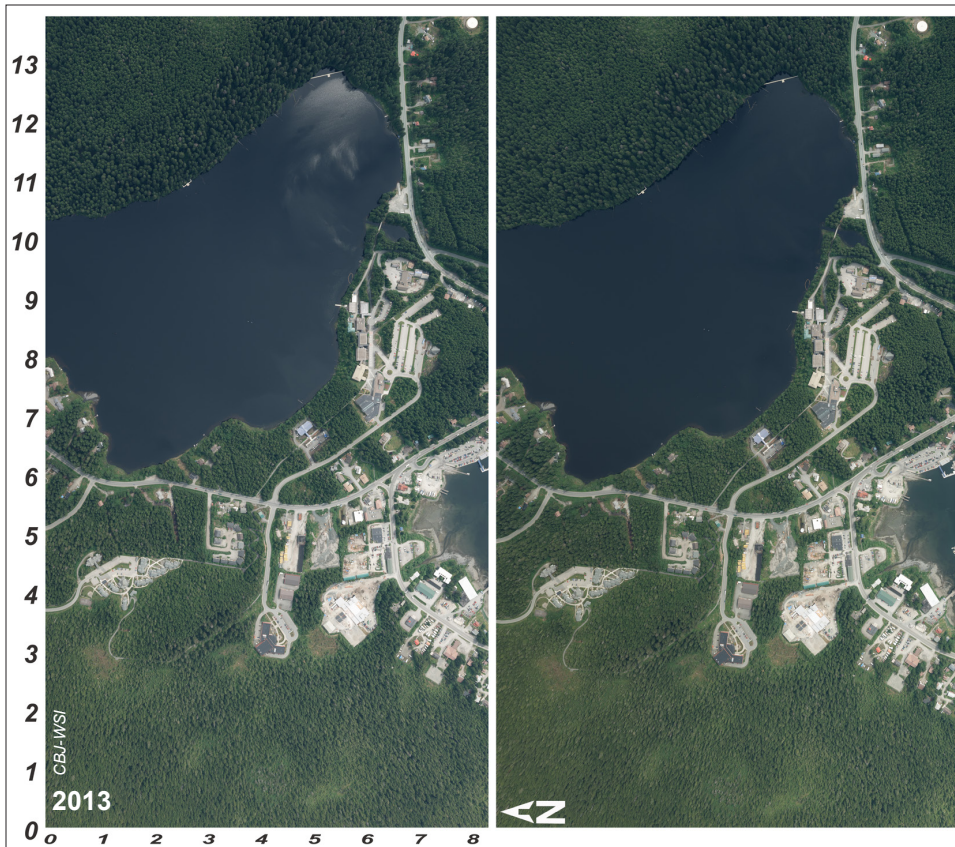
¹ As noted previously on the Miller map, "muskeg" is a term best replaced by *peatland*. Definitions may be found on JuneauNature>nature>habitats>terrestrial/wetlands.



6) On the 1984's, find the several blocks of houses centered at 6.5—2.5. Now on the 1962's, find the recent clearing on which these houses were built.

a) What are the coordinates of the clearing? This is not a boggy opening like the other clearings. How can you tell?

b) On the surficial geology map, find the surface type for this area. Refer to the rectangle showing coverage of 1984 photos. The clearing is just to the east of the Spaulding Trail. Does Miller's map explain why this was one of the first parts of the drainage to experience dense housing development?



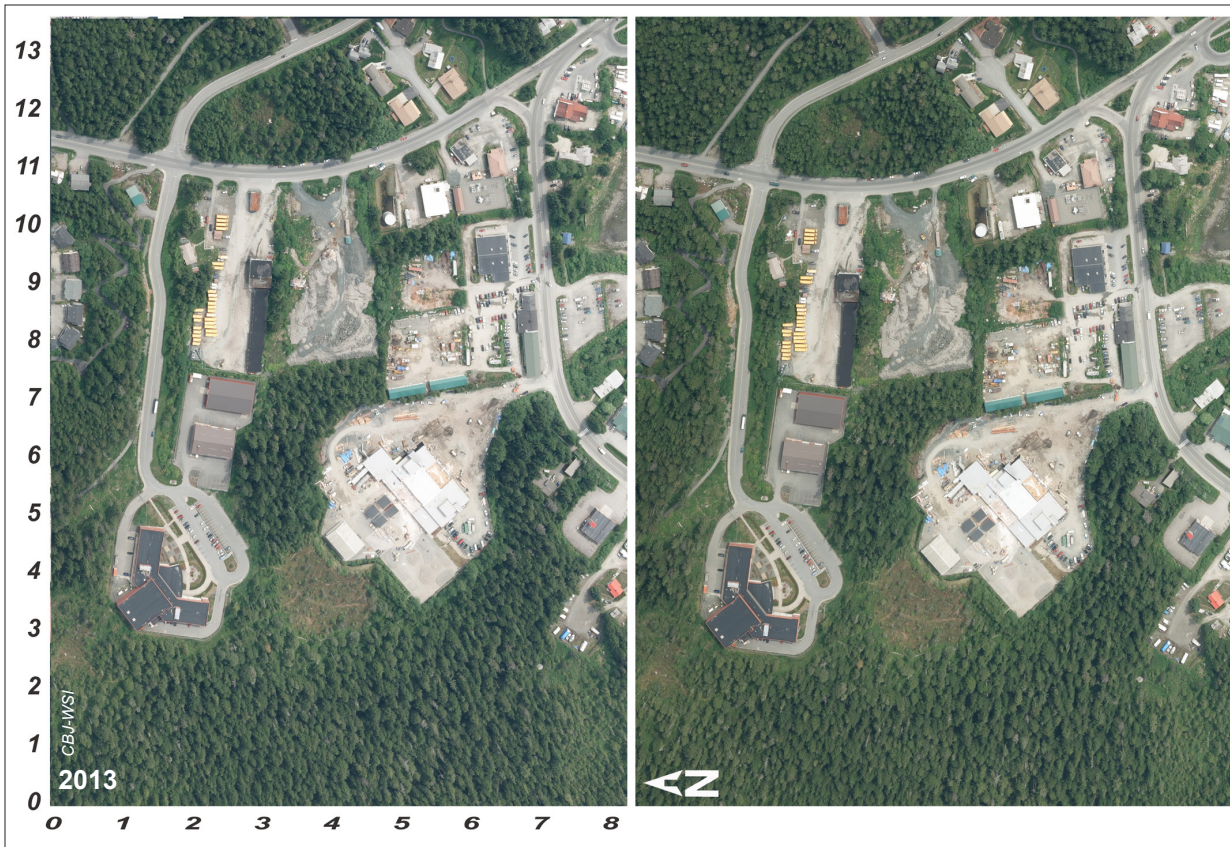
PS 2021: these last 2 stereograms were obviously not part of the early-1990s package, and in general I've tried to retain the 'historical flavor' of this document by inclusion of materials not available at that time. But in the case of stereopairs, it probably makes best sense to group them in one easy-to-compare collection.

And hey, as noted in the previous viewing options, since your eyes are already in 3D configuration, simply toggle from 1984 to 2013, without even losing your stereo 'pop-up!'

7) 2013 scaled-out The City's 6-inch-pixel June-2013 imagery gives details not available from prior aerial missions. A cropped view for the school, next page, shows off this great resolution.

a) On this pair, though, where are the largest trees? Coordinates? In addition to height differences, which stereo is great for, look for fattest crowns and deepest, shadowiest forest gaps.

b) What accounts for this surface growing giant spruces? Check the surficial geology map on page 12, and also page 1 of the school-history pageflipper.



8) 2013 zoomed-in Most of the forest and peatland a class can explore within a few hours of the school is included on this pair.

a) Trees appear to be leaning west, or down on these images. Why? (They aren't, really.)

b) At 7_2.5 there's a pale platform, about where Bay Creek Trail starts to loop back. It's at the edge of a clearing behind some parked cars. Flipping back through earlier aerials, you'll find that it's always been open here; it was never forested. How would you characterize its appearance on the aerials compared to the sphagnum bog at 4—3.5?

c) Were these photos taken in the morning or afternoon?

PS 2012 'Deliverables' from our 1990 teacher workshop series were 3-ring binders placed in every school library. These included limited sets of stereograms and stereoscopes for group viewing. In this re-issue we're only offering the stereograms in digital form. But, depending on availability, you may be able to borrow a set of viewers and images from our office (463-1500). See *Using the stereoscopes & stereograms* in my [Overview document](#) for more suggestions on viewing options.

To Auke Bay teachers

The Auke Bay stereograms provide insights into Juneau's history, geology, and natural communities. All 3 stereo pairs are also included as slides in the following slide show [*PS 2012—now a downloadable powerpoint*]. But if you study them first in stereo, it'll be easier for you to interpret features, and you'll do a better job of guiding your students around on the projected photos. We also suggest leaving a stereoscope and stereogram, along with the puzzler sheet, out in your room for students to use during free time. Some teachers at other schools report high interest. (Watch out for wet hair after recess! Causes irremovable stains!)

Surficial geology map Earth science teachers will be especially interested in this USGS map by R.D. Miller, which has a wealth of local information. I've excerpted just the portion centered around your school. You may want to order the original map from USGS, which has a more complete description of the surface types. It's a beautiful map to leave up on your wall.

Teacher's answers for stereogram puzzler sheet I've given coordinates to the nearest 1/2. Answers in that vicinity are fine.

1) 1984s development

- 4—3.75 The school was built on a muskeg! ¹
- DeHart's, Fisherman's Bend

2) 1984s forests

- Same size. Close together. Same age.
- The 1883 blowdown now has century-old forests recovered from a storm which also leveled stands on campus and at Eagle River.

3) 1979s Spaulding Meadows

- A little less than 3 miles.

4) Squire's dump

- The peninsula wasn't there!
- When the land was being prepared for the school, the surface of the muskeg was bulldozed away for the foundation, and dumped on the beach in front of Squire's Rest. For more info on this, see the slide show script, number 10.

5) Landforms and drainage - forests

- Tallest trees are in upper left, north shore of Áak'w.
- The surface type is yellow colored, labeled "f" for "alluvial fan." This is where Lake Creek comes out of its mountain gorge and deposits sand and gravel. Large-tree forest often grows on such fans. You can see Lake Creek clearly on the 1979 color infra-reds. The fan is mostly spruce, and the trees show a darker red than the surroundings.

¹ PS 2021: "Muskeg" is a word I've been [trying to leave behind](#). A better term for ancient freshwater wetlands with deep peat is **peatland**. Peatlands may be further subdivided into **sphagnum bog** or **sedge fen**. The Auke Bay school building site was on bog. Since the RD Miller map uses the antiquated "muskeg" terminology, I leave it undisturbed here, but it's useful for teachers to understand these distinctions.

6) Landforms and drainage - development

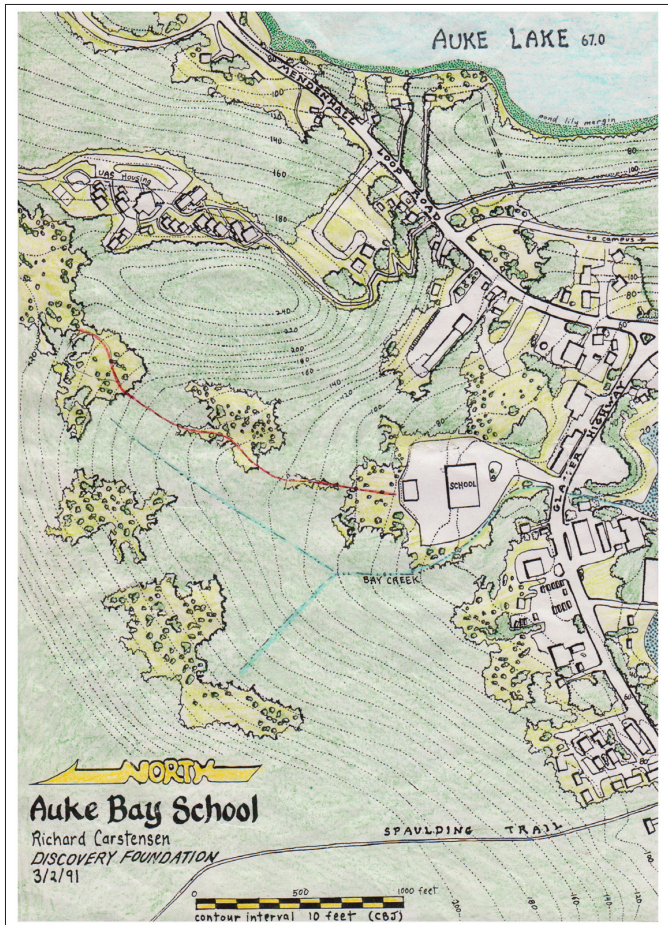
- 5—2. There are no scrubby pines in the opening, as in the other peatlands, and the edges are sudden and "clear cut," rather than feathered, as in a transitional area from good to poor drainage.
 - The surface type for this clearing area is tan, labeled "br" for "raised beach". This was a slightly steeper wave-exposed beach thousands of years ago, and still has coarser sediment than the silty terraces such as the school is built on. House foundations in this area are drier and more secure from sinking.

7) 2013 scaled-out

- Largest trees are at the edge of Áak'w, 5—13, along the steep sw-facing hillside
 - Surficial geology shows colluvium here, which often supports massive, deep-rooted conifers. Lastly, bedrock is high-carbonate argillite & slate, locally the best parent material for large-tree forest.

8) 2013 zoomed-in

- Center of these photos was over Áak'w, to the east. Around the margins of low elevation nadir aerials, trees appear to be leaning outward.
 - This wetland is richer green, deep peat but with more sedge than sphagnum content.
 - Morning. Tree shadows on Glacier Highway point northwest.



Above: USGS metric topo for school area. Bay Creek watershed roughly outlined. Yellow lines show trails accessible from school. ● **Left:** Discovery map for Auke Bay School. See notes to slide 12 in following interpretive script. On the cover of this landscape-format document, I rotated a north-up version. ● **PS, 2021:** Today, rather than hand-lettering comments onto paper maps, or laboriously drawing new ones with rapidograph and colored pencil, I work in GIS. While there are many advantages to this more efficient way of mapping, the old ones with their blotchy pencil-strokes have a certain charm.

Preface RC 2012: This and other slide shows in our *Nature near the schools* workshop series of course literally were *slide* shows in the early 1990s; collections of 35-mm slides were included in notebooks we placed in all school libraries. For this re-issue of the workshop notes, I've converted the shows to power-point format. You can download xxxxx.pptx from *JuneauNature*.

Auke Bay slide show

Note to Teachers The site interpretation workshop for Downtown Schools encompassed bedrock geology, glacial and human history, plant succession, “weeds,” mapping, intertidal ecology and many other topics. These site interpretation slides are exclusively of maps and air photos. chosen to give the 'big picture' of the Auke Bay area. For other, more intimate views (mouse tracks in snow for example), please refer to slide shows on other topics in natural history contained in associated notebooks.

You may wish to present some of the technical words, printed **bold**, in a separate class before viewing the slides.

I recommend you review the stereograms and puzzlers (following this script) before presenting the slide show to your class, and decide which you'd like to do first There are several 'teaser' questions, repeated in both formats. Depending on which comes first—stereo exercises or projected slides—you might want to withhold some of the “answers” (given in *italics* within this script).

If you've never used air photos before, don't be intimidated. We've discovered students are fascinated (especially when they find their houses!), and take to the historical sequences like ducks to water. When time permits, I like to have kids come up and point out features on the screen. If you have any questions about photo interpretation, or need suggestions on classroom use, contact one of the Discovery naturalists. We're also happy to help you with the stereogram page and accompanying worksheet,. which allows students to see some of these air photos in 3D by use of a stereoscope.

Slide show script

1) title slide The Juneau Public Schools sit in one of the most dramatic landscapes on earth, where lush rain forest is sandwiched between ocean and icy peaks. Maps and air photos can help us see the BIG PICTURE. Where do we live? What shapes this place?

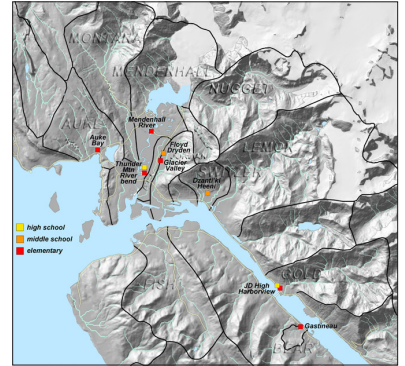
2) CBJ watersheds context [PS RC 2012: *I've replaced the original context slide with this hillshade map created in GIS. It includes features such as Thunder Mt HS, and a more accurate watershed delineation, not present or available when we gave these workshops.]*

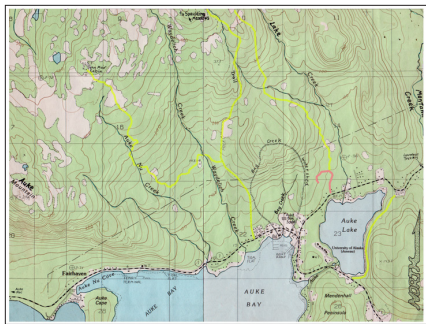
On this shaded relief map, the important watersheds for our schools are outlined, and labeled in caps. Auke Bay Elementary is in a loosely defined watershed that here includes Lake Creek, Auke Lake, and streams like Auk Nu and Waydelich. Tiny Bay Creek trickles along the edge of the school grounds.

Our remaining 5 schools are in the greater Mendenhall watershed, spanning about 100 square miles. But it's useful to subdivide it into 3 large basins: Montana, Mendenhall and Nugget. The smaller Jordan and Duck Creek watersheds are home to Floyd Dryden and Glacier Valley Schools. Thunder Mountain High and Riverbend Elementary are near a footbridge accessing the confluence of Montana Creek with Mendenhall River. Finally, Mendenhall River School is on the edge of the large Forest Service Recreation area.

The downtown schools are in the 12-square-mile Gold Creek watershed. Dzantik'i Heeni Middle School is in the Switzer Creek watershed, part of the greater Lemon Creek drainage. Gastineau Elementary is in the tiny Bear Creek watershed.

3) USGS topographic map The US Geological Survey has metric topographic maps





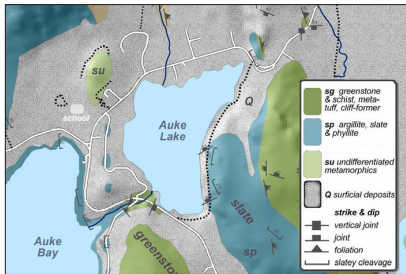
for the Juneau road system, based on 1984 air photographs, which you'll be seeing shortly. (Prior topos were based on 1948 aerials.) On these newer maps the scale is in kilometers instead of miles, and elevation contours are 20 meters instead of 100 feet. They're **coarser scale**; that is, objects appear larger on them, and they cover less area. Each of the squares on this map is one kilometer on a side.

Find the following features: Bear Creek and its watershed; Muir

Cabin; Auke Mountain; Auke Cape.

4) bedrock map of Auke Bay School area [PS 2012: I replaced the earlier hand-drawn copy from USGS with this slightly more current map, created during the CBJ trails interpretation project.]

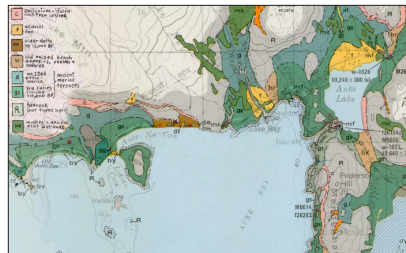
Bedrock is the solid mass of rock forming the earth's crust. This is based on a USGS map showing bedrock types of Juneau. The main types near the school are **greenstone** and **slate**. These are **metamorphic** rocks, altered deep in the earth by heat and pressure. Symbols at the bottom of the key show bedding character. Some of the slate outcrops on the beach at the mouth of Bay Creek are of roofing quality



The stippled area marked Q stands for **Quaternary** sediments, a term describing the landforms created during the last 2 million years of ice

ages. It shows surficial deposits, loose materials left by ocean, glaciers and rivers. Auke Bay School is built on these surficial deposits, shown on the next map.

5) surficial geology map On this map by geologist R.D. Miller, bedrock has been lumped as simply "R", and shown in either grey or white, while the different types of surficial deposits are keyed by color families. Pink (c) shows material fallen off Auke Mountain (**colluvium**), and the tan color (f) shows **alluvial fans**, where creeks come off steep mountainsides, dumping sand and gravel. The fan on the right is where Lake Creek enters Auke Lake. We'll come back to this fan.

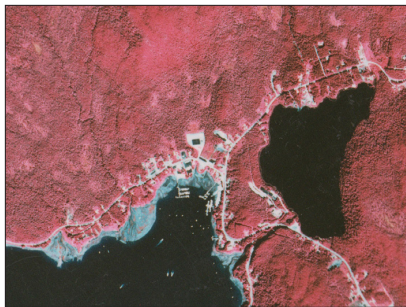


Greyish-greens (g, gg, gt and gs) are **marine terraces**, left by the sea when it covered the school area up to as high as 500 feet above present sea level. At that time, 9- to 12,000 years ago, Auke Lake was connected to the sea.

6) 1979 color infra red air photo of Auke Bay area Here's the first of several photographs taken straight downward from planes. This one, taken in 1979, is color infra-red: conifer forest is reddish, peatlands, meadows and alder thickets are brighter pink. Silty water (grey to our eyes) appears dark blue, and clear water is black.

This is the coarsest (or broadest) scale of the air photos you'll be seeing; that is, objects such as buildings appear relatively small, and it shows the biggest area. Find these features: Auke Bay, Auke Lake, Mendenhall Glacier, Lake, and River.





Spaulding Meadows is paler pink in upper left. Pale patch on Peninsula at bottom edge of photo is a recent clearcut. Now let's zoom in to look at just the area around the school . . .

7) Closeup of 1979 color infra red

It's easier at this closer scale to see buildings, differences in tree sizes, and **peatland** openings.¹ As you well know, the land around Auke Bay school is very wet and boggy. In fact, when it was first built, the school

began to sink into the ground and had to be closed for repairs. Forests and peatlands are closely tied to the landforms beneath them. Perhaps if we look at a close-up of the surficial geology map, we can get a better understanding not only of natural communities but of the patterns of human settlement. But before we see this blow-up, where is the biggest cluster of houses on this photo? (*In the blocks southwest from the school.*) This is no coincidence. Compare the landforms as shown on . . .

8) Closeup of surficial geology map The school and Bay Creek lie in the greyish-green area representing uplifted marine terraces. These are usually composed of hard-packed silt and fine sand, poorly drained and often too wet for trees. Peatlands are common on our local marine terraces.

But the cluster of houses we saw in the last air photo is on a landform colored tan and called "br". This stands for "raised beach," and refers

¹ PS RC 2012: See my CBJ trails guide and other publications for definitions of wetland terms—peatland, bog, fen, etc. I recommend avoiding the popular term "muskeg" which lumps important hydrologic and vegetational distinctions.



to a slightly steeper area that was a wave-exposed beach thousands of years ago, and still has coarser sediments than the silty terraces the school is built on. House foundations in this area are drier and more secure from sinking.

I've highlighted Spaulding Trail in yellow. We'll be able to see this trail in the next air photo

9) 1962 b&w of Auke Bay School area

The Spaulding Trail is still marked in yellow on the left. Now, find Auke Bay School . . .

Hey! Wait a minute! *It's gone!!* Hmmmm. so is the University, and just about everything.

Oh! This is **1962** (*ancient history from the perspective of an elementary school student*) So, what **was** present way back then? How about DeHart's store, at the intersection of Glacier Highway with the back loop road? . . . Yup, there it is.

Now, back to that question of drainage and its importance to choice of construction site. Notice the freshly cleared forest in the lower left. Somebody had already discovered where the raised beach landform and was preparing to develop it.

Let's look at the Auke Bay School site in 1984, and then jump to 2006.

10) 1984 color aerial In 1984, the school was present, but not the covered playground. Homes had been built in that block on the lower left we just saw, but the grounds for the University's student housing hadn't even been cleared.

Find these places: the bus barn, the



post office, DeHarts, the University's cafeteria building (*no Egan Library yet*), and the bike path running north from there to the back loop road.

Where are the biggest trees on this photo? (*upper right corner*) Do you remember what kind of landform they're growing on? Hint; Look for where Lake Creek dumps into Auke Lake. This is the Lake Creek **alluvial fan**. Fans are usually well-drained and often have the biggest trees.

Toggle back and forth between 1962 and 1984, watching the area in front of the Squire's Rest. A huge bunch of material of some kind was dumped onto the beach there. (*Dan Bishop told us that when the land was being prepared for the school, the surface of the bog was bulldozed away for the foundation, and placed You guessed it. In front of Squire's Rest.*)

Have you walked or skied up through the series of **bogs** and **fens** behind Auke Bay School? Let's find them. The first bog opening is just behind the playground. The second opening is at the base of the little hill which is covered with the oval-shaped patch of darker trees. And the third is in the saddle at the left edge of the photo. From that saddle you can now walk right down into the student housing.

Now what about that dark patch of trees on the hilltop? Any ideas why they look so different from the surroundings? (*This is a tight stand of hemlocks which came up together after a major windstorm destroyed the previous forest in 1883. Notice they're the same color and texture as the trees along the University bike path, also part of that blowdown forest.*)



11) 2006 aerial [PS 2012: *this image is being added with the re-issue of Nature near the schools. Yellow lines are from my CBJ trails layer.*] There was almost as much new development between 1984 and 2006 than in the interval between 1962 and 84. Toggle between 2006 and 1984, searching for these additions . . .

Student housing, in the upper center; University gymnasium, dead

center; UAS Egan Library, lower center; new road connecting campus to the back loop.

On the other hand, trees that were allowed to remain on the edges of roads and house lots grew perceptibly between 1984 and 2006, sometimes covering features. On example is along Auke Lake. Can you find others?

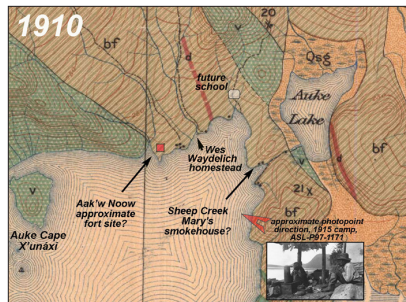
12) 1910 Knopf map In 1910 the USGS printed this bedrock geology map. No roads were yet present in Auke Bay, but there were a few cabins (small black squares). We've marked where the school now sits. The Y-shaped stream is Bay Creek, and the small hill shown within the green bedrock (marked "v" for volcanic rock) is "blowdown hill." Imagine how different the forest on this hill looked in 1910, only 26 years after the previous forest was destroyed!

Now find the trail, marked with a dashed line, which leads over a saddle and down to an "x" and the number 20. This was a mining claim on a small tributary to Lake Creek.

The miner's trail from Auke Bay was exactly the same route we now take through the bogs and fens on cross country skis! Long before there was a Mendenhall Loop Road, people used the peatlands behind our school to travel inland from Auke Bay. And before Euro-american miners "discovered" this route, the Tlingit certainly used it, and before them, the bears. The ski trail is an ancient pathway, through bogs and fens that have changed little in appearance over thousands of years.

The trail leading north from Wes Waydelich's homestead later became the Spaulding Trail. (Victor Spaulding was Wes' son-in-law)

13) Discovery map of Auke Bay School area Here's a hand-colored copy of the same map I made in 1991 for use on your field trips around the school. Finally we can see where the University housing was built. The ski trail is colored red. We haven't yet





carefully mapped Bay Creek, and for now this is our best guess. We also haven't put in the Dan Bishop Bay Creek Trail.

[PS RC 2012: Trails are for the most part well mapped on the preceding 2006 aerial. But I still haven't walked all the tributaries of Bay Creek with a GPS. That would be a great project for a class at Auke Bay School. Please contact me if you want help with mapping here.]