

Gabriola Streamkeepers—Water levels and quality

Observations at Coats Marsh, Gabriola Island

—with notes on Coats Marsh Creek, East Path Creek, and Stump Farm Streams.

References:

[RDN Coats Marsh Regional Park](#), 2011–2021 Management Plan, Appendix A.

[RDN Coats Marsh Weir Assessment](#), June 1, 2020, SRM Projects.

[Gabriola Riparian Areas](#), February 24, 2012, Madrone.

[RDN Berm Report](#), September 12, 2013.

[RDN Water Level Management](#), September 14, 2021, Madrone.

[RDN NHC/EDI Weir Replacement Study](#), April 12, 2023.

[RDN/NTBC Coats Marsh Weir Management Proposal](#), May 2, 2023.

[RDN NHC/EDI Decommissioning Plan](#), December 18, 2023.

[RDN NHC Beaver Dam Risk Assessment](#), January 10, 2024.

[RDN Coats Marsh Weir Pool Mitigation Plan](#) October 2024.

[RDN NHC Weir Demolition Plan](#) May 2025.

[RDN Final Weir Demolition Plan](#) May 2025.

For an up-to-date complete list see [here](#). For pertinent Gabriola Streamkeepers notes see [here](#). There is a [GSK Glossary](#).

[Coats Marsh hydrogeology](#) .

Water-levels' [summary](#).

Coats Marsh RP and 707 CP Trail [Maps](#): Maps Y and Z.

Gabriola Stream and Wetlands [Atlas](#) .

Coats Marsh Species [Checklists](#) .

Freshwater [fish](#) on Gabriola Island, BC

Coats Marsh – human disturbance of breeding and migratory [ducks and geese](#).

Coats Marsh – [beaver dam stability](#).

Coats Marsh Management - [paper on](#), [weir decommissioning](#)

Coats Marsh brief [history](#).

Long-term precipitation (1944-2024) – [statistics](#). Updated every month and used as the “normal” meaning average precipitation at Coats Marsh.

Field observations—2025 (Oct.—Dec.)

THIS FILE ([Field Observations 2025](#)) IS A SUPPLEMENT TO:

“[Observations at Coats Marsh, Gabriola Island](#)” File: 673.

For an up-to-date list of supplements see [here](#) . Previous file: [673zg](#). Next file: [673zj](#)

October 1, 2025 (day 3728,3653+75):NGRG cum. 83.1 mm (norm. 83 mm).

Mushrooms are sprouting everywhere.

[Long-term precipitation statistics have been reviewed and revised, so there may be slight hiccups in the rainfall remarks.

General comments on rainfall at the end of each month in these 673 files from now on will be based on the revised data, but revision of all such past 673 notes has not been done. That's unnecessary as the updates are so small, and the general remarks are not intended to be a prime source of information.

The long-term rainfall statistics were originally based on data for YCD (Nanaimo Airport) but Environment Canada ceased to publish YCD data after April 2022. The long-term data from that time on is now based on a new "virtual" gauge for YCD derived from rainfall reported at Entrance Island and Nanaimo City Yard and appropriately scaled to the YCD site. This restores continuity with observations at YCD dating back to March 1947. See [File: 698](#) in *SILT* for the technical details.

From July 18, 2025, the start of the Coats Marsh annual monitoring, daily rainfall at Coats Marsh will be based on scaling of the accumulated daily figures for the "virtual" YCD. This is the NGRG gauge in these notes.

The Nanaimo City Yard observations data will eventually be replaced by observations from a new and improved rain gauge installed at El Verano, Gabriola, and currently undergoing calibration.]

October 9, 2025 (day 3736,3653+83):NGRG cum. 90.6 mm (norm. 107 mm).



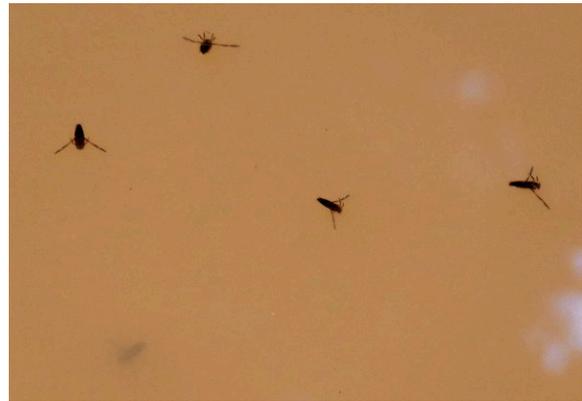
Not a lot going on at the weir site. Looks like the project is winding down? If so, couldn't they just have taken the flashboards out?

Although there are iron-oxidizing bacteria that can turn water with an iron component orange, I've convinced myself that what we're seeing in the runoff from the beaver dam to the weir site is inorganic (*ferrihydrate*).

Managed to find a place where I could scramble down to the water without leaving myself the problem of climbing back up a stone-less clay-rich slope, a problem that has led to the demise of many incautious animals over the years.

The bed of the stream is a very fine, grey mud with a silky texture; fine silt at the most, and more likely finer, probably too fine to be the result of glacial erosion.

The gelatinous substance in the mud, I guess to be a colourless silica-gel the ultimate weathering product of feldspars, mainly *plagioclase* in this case. The "fibrous" nature of the orange-stuff is not, as I supposed earlier, the result of a coating of decayed vegetation. There was no sign of this being so. Instead the filaments easily broke up completely on being lightly touched, leaving a cloud of small particles of a fairly equal size. These were tiny but not so tiny that they couldn't be seen, which perhaps rules against them being seeded by bacteria or other microorganisms.



Pretty harmless I would guess. It will wash out in the winter. At the moment the water has attracted the attention of water boatmen.

BUT, if you disagree with my interpretation you may like this picture. Algae or lichen? And why else would the boatmen be interested? They specialize in eating plant detritus.



Well, one retort is that *ferrihydrate* is the least insoluble of the iron[III] oxyhydroxides and so may just be acting here as a fertilizer for the photosynthesizing green stuff.¹

¹ Seepages of groundwater in cliff faces on Gabriola are rarely accompanied by green mold; black crustose lichen is far more common.

Meanwhile, ducks on the lake, but no sign yet of the usual winter residents. Is that a female widgeon?

October 19, 2025 (day 3746,3653+93):NGRG cum. 123.0 mm (norm. 143 mm). Cistern -229 mm SCB. [cal. datum: cistern +0.138 m].

A restless wind, surfing through the canopy. Sunshine after showers.



The fungi have been waiting for the rain; and when it comes, they pop up out of the ground as if on a spring. Within a day, some are making an appearance. I'm tired of thumbing through photographs trying to identify them, and, even if I were successful, would it be worth having destroyed one of them. Flora, fauna, funga, or protista? Sometimes, it seems I'm no further than that.



Work seems to have stopped at the weir demolition site. Surveyors have adorned the weirpool bed with red flags, and I guess the backfilling of the berm on Lot 5 has been completed. No prospect of a sluice gate which is what we really needed, if we needed anything.

Recent rain has clarified the water of what I suppose we now have to call Coats Marsh Creek (below the beaver dam but above where the weir used to be). The *ferrihydrate* coats everything, even rock.



Microscope examination revealed nothing other than the smallness of the orange particles, too small for their structure to be seen.

They coat small grains of what I take to be *quartz* and perhaps fragments of *muscovite*. The nanoparticles are not magnetic.

The propensity of the orange particles to cling to surfaces is perhaps a consequence of the unusual arrangement of positive iron[III] ions on the surfaces of nanocrystals of *ferrihydrate*.² Mineral and biotic surfaces are commonly negatively charged, anions usually being larger and more numerous than cations.

I don't know why *ferrihydrate* should form "filaments" and appear floccose. The phenomenon has been associated with *ferrihydrate* in the making of chemical gardens, but others attribute the formation to the coating of filaments of biotic origin, presumably to the activities of iron bacteria, or unknown microscopic lifeforms in the remote cryptozoic (pre-Cambrian).

I prefer the abiotic chemical garden idea.³ As indicated earlier, the mud bed of the stream feels and looks like it contains silica-gel, and an aqueous solution of sodium silicates (waterglass) is an essential ingredient in making a chemical garden, that along with a cation of a transition metal, such as is provided by at least partially soluble salts and oxyhydroxides of iron.⁴



Chemical garden. Iron hydroxide.⁵

² Boily JF., Song X. *Direct identification of reaction sites on ferrihydrate*, Communications Chemistry **3**, 79 (2020). <https://doi.org/10.1038/s42004-020-0325-y>.

³ McMahon S. *Earth's earliest and deepest purported fossils may be iron-mineralized chemical gardens*, Proc. Royal Society B, 27 November 27, 2019. <https://doi.org/10.1098/rspb.2019.2410>.

⁴ The source of iron in the sediment is likely *annite* a Fe-rich *biotite* and Fe-rich *hornblende*. Both use iron and magnesium interchangeably and hence the iron is in a reduced state that is oxidized during weathering, either by oxygen or if not available, then H⁺ (serpentinization). The weathering products of both minerals, and of Na-rich feldspars particularly *albite* that are, or were, undoubtedly present in abundance in the sediment, include *silica*. Doe, N., *Non-marine weathering of sandstone and mudrock. SHALE* 25, 2011. [File: 54c](#).

⁵ Picture from Laura M. Barge reported by Joshua Sokol, New Scientist, August 10, 2016.

There is a perceptible flow in the creek, but not enough to reach the culvert on the Marsh Trail, though the orangeness is now creeping downstream. It's being held back at what was the weir by what I think are cofferdam bags topped with riprap.

October 21, 2025 (day 3748,3653+95):NGRG cum. 123.2 mm (norm. 151 mm).

Orange creeks, orange fungi. *Laetiporus conifericola*. On a deadfall. Below left: *Suillus lakei*, an abundant bolete. Below right: *Lyophyllum decastes*, trail-sides and 4-feet. Bottom: looking for *Agaricus arvensis*, they grow here, but that's not one, pure white gills.



Meanwhile, in Canary Grass Meadow away from the hubbub at the weir, all is peace and quiet. Goldenrod, tawny bracken, and woolly bears.



No fear of winter here.

October 25, 2025 (day
3752,3653+99):NGRG cum. 142.8 mm
(norm. 168 mm).

Rain, the old-fashion sort, steadily continuous all day from an almost uniformly grey sky. No sign of Mount Benson looking towards Nanaimo. At the wetland's entrance, there's a wind from the east, and so the paths of the falling raindrops slant. They're catching the light, so that with a protractor or my compass's inclinometer, I could measure their angle. The eye-catching slope of the rain is like that of the mid-day sunshine peeking through the branches of trees on the day of the winter solstice.⁵

The first of the winter residents are here; a group of ring-necked ducks. Males. Very skittish. I only have a photograph with their backs to the camera. The resident wood ducks look on, curious but unperturbed, all now in their very finest feathers, ready to party.

Taking to the woods to shelter a little from the rain on trails where the sky's the canopy. Chanterelles, the knobbly white ones. A lobster mushroom (*Hypomyces lactifluorum*).

The stipe-breakers and boot-kicking fiends have been busy. Why do some foragers needlessly decapitate the mushrooms they come across? Those of the common *Russula* genus are easy to identify as such, and they aren't very good to eat, the ones from the store taste better, but they're a treat to see with their variety of coloured caps, so why not just leave them be for others to enjoy?

It will be a while before East Path Creek starts to flow. The two Appleyard Ponds are large, like bomb-craters, and at the moment, dry.

Coats Marsh Creek is flowing a little more strongly than a week ago. The orangeness still there as it flows into Lot 5, but gone as it leaves, changed instead to a murky greenish-grey. No flow at the Marsh Trail culvert. There's just a trickle at South Road, but the creek's well ponded. No sign of extraordinary turbidity or colour. Large-leaf maples colourful this fall. Green to yellow, yellow to orange, orange to bronze, all with a blue-green backdrop of conifers. The leaves catching the light wonderfully, as if bioluminescent and



Connopus acervatus on rotting wood.

⁵ The sun is only 17-18° above the horizon in late-December on Gabriola. Probably not far from the deviation from the vertical of driving rain that day.

returning some of the photons they've been consuming all summer, drifting down in breezes to form carpets of ever-darkening browns,⁶ a few seemingly apologetic, their leaf-stalks (petioles) rosy-red. If only there were more vine-maples to help the foliage out.

November 1, 2025 (day 3759,3653+106):NGRG cum. 188.5 mm (norm. 200 mm). Cistern -320 mm SCB. [cal. datum: cistern +0.047 m].

Precipitation in October equal to long-term average. Annual rainfall this year so far, now 7% below long-term average.

Little creek not flowing, but ponded and ready to go.

Lake level sharply down, after more than an inch of rain overnight. RDN have their syphons running again with the usual depressing-to-see, negative impact on the ecology of the marsh.

There seems to be no point in doing this when experience has shown that water level is quickly restored in a day or two of winter rain; it disturbs the arrival and settling-in period of the winter-resident ducks (no sign of them today); it disturbs migratory ducks using the wetland as a stop-over (no sign of them today either); East Path Creek and associated springs, which recharge the wetland in winter, remain dry and look like they're going to remain so for quite some time; the beaver dam already has adequate natural and beaver-built spillways; and expert opinion is that the dam is never going to fail catastrophically. The RDN has a bizarre way of managing a "nature" reserve. Sadly behind-the-times, stubbornly conforming to the traditional non-indigenous-peoples' notion that the over-riding purpose of parks and waterbodies-in-general is to meet the real and imagined needs of people. Their ill-advised water management practices are, for me, akin to bureaucratic vandalism.



⁶ The transition in colour of deciduous leaves in the fall is not unlike that of human soft-tissue after an injury, except that the order is reversed because the leaf is dying, while the soft-tissue is healing. Leaves transition from green (healthy) to yellow to orange to brown to black (dead). After an initial red phase, a serious bruise may go from black (injured) to blue to green to yellow to light-brown (healthy). The chemistry is different, so of course the match is not exact. A reminder that, one to two billion years ago, plants and us humans had a common ancestor.



WATER QUALITY TEST 25/1

Restricted because the optical dissolved oxygen (DO) sensor has refused to be calibrated and the replacement sensor cap is no longer sold. Working on it. New system would cost us a bundle.

Sensor: HANNA HI 98129 with ATC, $\beta=2\%/^{\circ}\text{C}$; $E_{25}=\text{EC}/(1+0.01*\beta(T-25))$.

Wx: rain yesterday, threatening again today, but clearing.

All calibrated and scaled for 25°C (specific).

Rainwater: pH: 7.00⁷ EC: 32 $\mu\text{S}/\text{cm}$

Lake surface east end: pH: 6.26; EC: 294 $\mu\text{S}/\text{cm}$

Coats Marsh Creek, weirpool: pH: 6.54; EC: 84 $\mu\text{S}/\text{cm}$

Coats Marsh Creek, culvert: pH: 7.14; EC: 85 $\mu\text{S}/\text{cm}$

Drained weirpool, puddle: pH: 6.49; EC: 170 $\mu\text{S}/\text{cm}$ ppt 0.1

The orangeness (*ferrihydrate*) has been swept away as expected, though the water still has a muddy, orange tint in a container.

⁷ This is a conjectured value. The pH of rainwater is difficult to measure because there is no buffering of the CO₂ content. You can change the pH by breathing on the sample.



The gardeners have started work planting, TU3-2 is it? (riparian, spoil site) in the northwest corner. Appears to be salal and, curious choice, lots of Indian-plum (*Oemleria cerasiformis*).

November 3, 2025 (day 3761,3653+108):NGRG cum. 189.2 mm (norm. 209 mm). Cistern -390 mm SCB. [cal. datum: cistern -0.023 m].

Small numbers of ducks of several species active, including the first fall-sighting of buffleheads (so much for my Nov.1 comment). Also ring-neckeds, wood ducks, mallards, and possibly widgeons [wrong, see Nov.11]. Water level continuing to be dragged down exposing surface coverings of a tangled mass of rotting watershield.





Above: The upper pond of the two Appleyard Ponds. Looking downstream.



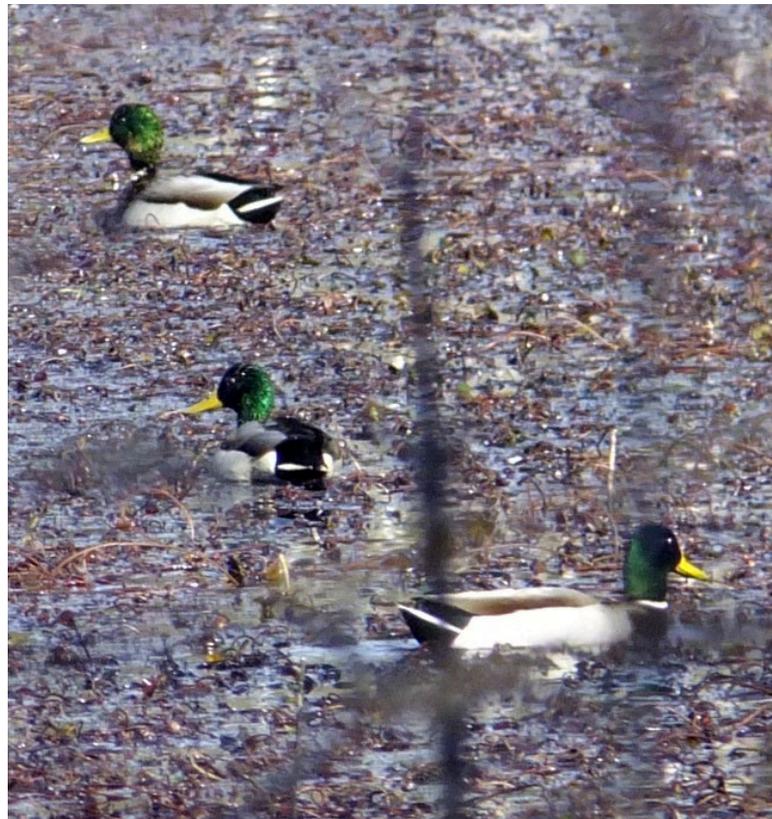
November 5, 2025 (day 3763,3653+110):NGRG cum. 201.6 mm (norm. 219 mm). Cistern -410 mm SCB. [cal. datum: cistern -0.043 m].



Lots of attention to the bigleaf maples and their golden, fare-thee-well leaves, but this little guy, the broad-leaved starflower (*Trientalis latifolia*), with its pale-yellow, fall foliage, often puts up an unexpectedly-eye-catching show in the understory. The neighbourly seedling here is a baldhip rose.

November 7, 2025 (day 3765,3653+112):NGRG cum. 214.3 mm (norm. 230 mm). Cistern -394 mm SCB. [cal. datum: cistern -0.027 m].

Flock of mallards (20+). Less easily spooked than the other ducks (incl. shoveller?). Either tired after a long migration, or accustomed to human disturbance.



No water in East Path Creek, although it is early days yet and the year so far has been a dry one.

November 9, 2025 (day 3767,3653+114):NGRG cum. 216.2 mm (norm. 240 mm). Cistern -401 mm SCB. [cal. datum: cistern -0.034 m].

Syphons still working. No mallards or buffleheads seen, but a flock of ring-neckeds arrived. More plantings; cedar and huckleberry at the riparian-upland border. Saskatoon would have been an interesting experiment.



November 11, 2025 (day
3769,3653+116):NGRG cum. 216.8 mm (norm.
250 mm).

Speaking of spooking (as I was in the Nov.7 entry), for a long while now, in spite of my best effort not to disturb wildlife unduly while observing what is going on in the wetland, I do occasionally, not often, flush a few ducks that I failed to notice on my cautious approach to the water.⁸ Nearly all of these incidences involve a flock of small ducks who hang-out together in the reeds or in the cistern. I never get to see or photograph them as they rapidly depart for a location far away. All I notice is that they are small like green-winged teals, have white wing-bars, but are otherwise without conspicuous colour or markings visible from behind.

Yesterday was different. I had my better camera and was able to clearly zoom in on them after they "landed" in the distance.

The flocks are made up entirely of female buffleheads. That the flock never includes a look-at-me male, that their white wing-bars are not striking when they are out on the water,⁹ and that almost nobody publishes photographs of them flying with their backs to the camera, all were the source of my problem, now resolved.

A rotting log, alder, on the Ridgeway that, last winter, sported hair ice is showing a growth of crust fungus that, is almost completely white with only faint zoning, close to hairless, and has thin rodlike stems penetrating deep into the wood, and a fertile surface without gills or pores, but with a maze of short segments of squiggly veins. The following is another look at this fungus with the possibility in mind that it is involved in hair-ice formation.

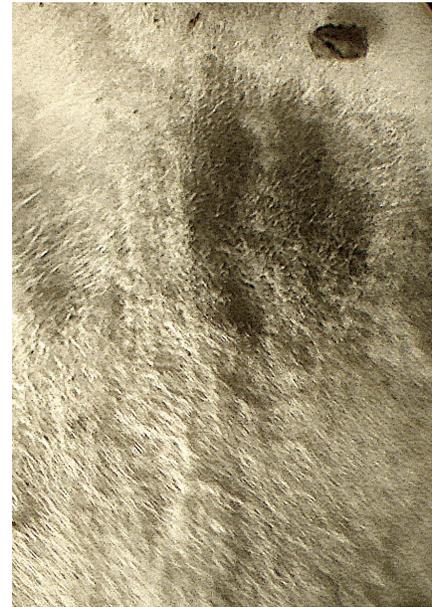


Inside-out mushrooms in duff below an old grand-fir in the Stump Farm Number 1 Stream riparian. Oft-cited is *Parasola plicatilis*, but I didn't see ink or grass and there are other possibilities. A *Tricholoma* perhaps.



⁸ Apart from being cautious, I also ration my visits severely in the breeding season.

⁹ There are excellent illustrations of the point by Greg Thompson and Lee Barnes in Cannings R., Aversa T., and Opperman H, *Birds of British Columbia and the Pacific Northwest*, Heritage House First Edition 2016, p67.



The speck of dirt top-right is
300 μ m wide.

The camera sees the upper surfaces with a blue tint not obvious to the eye. On a separate fragment of the deadfall there were turkey tails, clearly zoned and clearly polypores, but no hair ice had been seen in their vicinity.

The surfaces of the crust fungus are velvety, but seeing "hairs" requires a microscope. There are many small holes in the decorticated wood. I'm going with *Plicatura nivea*, which was my thinking earlier this year.

Found same species, also on dead alder log (*Alnus rubra*), but with no known association (yet?) with hair ice.

November 13, 2025 (day 3771,3653+118):NGRG cum. 224.1 mm (norm. 261 mm).

Shaky IDs based on non-destructive observations.¹⁰

Following deer tracks in the woods used to have uncertain outcomes. If the idea of tracks is to get to B via a quick, easy, or scenic route then the tracks of the deer were obscure, often ending in bewilderment.

Nowadays, tracks through expanses of salal and around deadfalls are more likely to be made by humans hunting for fungi, and by following them, the chances of finding something interesting is a little bit better.



Top right: *Otidea pseudoleporina*; Lower right: *Helvella vespertina* w. mold *Hypomyces cervinigenus*;
Lower left: Don't know. Looks like *Deconica montana* but there are no mountains here.

Fallen leaves forming rain-glossed carpets under bigleaf maple trees; dead-bracken browns, wet and dry, like the browns in the fashions and décors of the nineteen seventies; a few among the leaves, bright yellow and orange still, lacking what's needed to make them red; others darkened with patches of soot-black speckles that will, in time, turn-off their light, as the western horizon does a setting sun, and spacetime the starlight from distant galaxies beyond the sky.

¹⁰ Mainly using Steve Trudell, w. illustrator Marsha Mello, *Mushrooms of the Pacific Northwest*, 2022 Edition; and. Royal BC Museum Handbook, MacKinnon and Luther, *Mushrooms of British Columbia*, 2021.

Now to be scientific. If the decomposing leaves lack the wherewithal to make red, how come there are some that are orange (red + yellow) and many that are brown (red + black)?

The incomplete answer I believe is that the redness is not being sourced by the leaf, it is the colour of the ambient light reflected back to the human eye after the green component of the light ceases to be reflected, and instead, is absorbed or transmitted.

So why yellow and orange? The human eye has no receptor (cone) for yellow. Yellow is the colour we perceive given a mix of green and red (strange no?), so a fading reflection of the once-dominant green turns the leaf, in our eyes, briefly yellow and then orange.

After the decay of the leaf progress to the point where little green light is reflected, it turns, not a pure red, but a colour dominated by red. A brown that basically is dark orange. It's drab, in part, because, even when the sky is cloaked in nimbostratus, the hue of the grey light is blue not red.

Pick up a brown maple leaf (picture below left) and hold it up to a cloudy sky (picture below right). If the light is strong enough and the leaf not too old, you'll see there's pale green or yellow left in it. The leaf has become translucent to the remnant green and yellow, sooty-black spots permitting;

hence, its delightful goldshine in the sun, but not when it's lying on the ground. What red there is from the sky is not making it through and not being absorbed as it was when the leaf was alive; it's being reflected back up, and, when we put the leaf back down on the ground, it's that light together with any left-over reflected green making yellow that our eyes are seeing.

But don't quote me. I may like explanations, but belief requires that no questions remain unanswered.



November 15, 2025 (day 3773,3653+120):NGRG cum. 228.8 mm (norm. 272 mm).

Doug-fir saplings, cobwebbed, and silvered by drops of rain.

Oregon-grape leaves prefer to stay green, but have a repertoire of colours to signal when they're severely distressed.



November 16, 2025 (day 3774,3653+121): NGRG cum. 229.1 mm (norm. 278 mm).
Cistern
-412 mm SCB. [cal. datum: cistern -0.045 m].

Light rain, on and off. The RDN continuing to drain the wetland with their syphons. The open-water on the lake is shrinking as the water shallows. Diving duck species, which includes many of the marsh's common winter residents, need open-water to take-off. No ducks now seen at the western end, divers or dabblers, only a small group of buffleheads at the eastern end.



Herbs, shrubs, and grasses making their appearance at was the weirpool. Nature expressing its opinion as to what should be in the seral community after the demolition of the old one. Herb-Robert, daisies, plantains. . . "lawn pests" disparaged know-how-to-survivors, common in the burn-pile clearings, and locally abundant ocean-spray. What the beaver has in mind not yet clear.





November 18, 2025 (day 3776,3653+123):NGRG cum. 229.5 mm (norm. 289 mm).



I use the term "lake" to refer to the prominent waterbody in the CM-RP knowing full-well that this "shallow-water wetland" does

not fully comply with everybody's definition of a lake. I do this because:

(1) the shorter term is obviously more convenient and everyone knows what I mean, and;

(2) I disagree with the contention that for a lake to be a lake it must be deep enough for stratification to develop and that the CM-RP waterbody is too shallow for that. My disagreement with this assertion is based on a reading of the following article that suggests it might not be too shallow: Mikkel R. Andersen, Theis Kragh and Kaj Sand-Jensen, *Extreme diel dissolved oxygen and carbon cycles in shallow vegetated lakes*, [Proc. R. Soc. B 284: 20171427](#).

One of the problems of measuring dissolved oxygen (DO) is that optical DO sensors are expensive and commonly not waterproof. But since I've recently obtained a replacement for GSK's failed device I intend to research the variability of water quality with depth using a battery-operated water transfer pump of the type commonly used by people with aquariums. If the sensor can't go into the water, I'll bring the water up to the sensor. Might not work, but I'm set to give it a try.

November 20, 2025 (day 3778,3653+125):NGRG cum. 230.5 mm (norm. 300 mm). Cistern -425 mm SCB. [cal. datum: cistern -0.058 m].

Woods almost finished winterizing. Maples, alders, and ocean-spray are done. Now is the time for yellow-leaved tall shrubs and small trees to shine. Cherries (*Prunus emarginata*, *P.virginiana*), crab-apples (*Malus fusca*), cascaras (*Rhamnus purshiana*), willows (*Salix* spp.), and ninebarks (*Physocarpus capitatus*). Who knew they were there? Like candlelit homesteads on a prairie of darkness.



Left: ocean-spray among the seedlings.

Above: Nice clean hole 3-in. dia. right through this sandstone boulder lying near the old weir. Why and when?

November 23, 2025 (day 3781,3653+128):NGRG cum. 239.6 mm (norm. 317 mm). Cistern -430 mm SCB. [cal. datum: cistern -0.063 m].

The syphons, still actively draining the lake. Only winning because the rainfall this month is well below normal. East Path Creek dry.

A compact group of ring-neckeds, but scarcely a single bufflehead and nothing else to be seen.

A lone frog (northern re-legged) in the Weirpool Creek, looking lethargic, not sure what's going on.

Curious sheen reflecting the sky. Unusual, probably bacteria. It shatters if you try to capture it.



What might this be? Sycamore maple? Douglas maple? But no, it's a multi-stemmed, tall shrub, not a tree. It's a Pacific ninebark, undersides of the leaves hairy and

a few hairs star-shaped. Lovely pale-yellow fall leaves visible from afar.

Earth-moving equipment at work in, or in the vicinity of, the riparian area of East Path Creek upstream of the apple yard.



November 27, 2025 (day 3785,3653+132):NGRG cum. 268.2 mm (norm. 341 mm).

The shadows getting longer. My shadow at noon¹¹ today will be 2.8 times longer than my height, which since I'm 5ft.8in. (1.72m) tall, makes it 15ft.10in. (4.83m) long.

But in a month, at the winter solstice, it will have become 3.18 times longer than my height, an increase of a noticeable two feet (5.47m).¹²

November 29, 2025 (day 3787,3653+134):NGRG cum. 268.2 mm (norm. 353 mm). Cistern -352 mm SCB. [cal. datum: cistern +0.015 m].

East Path Creek ponded at East Path, flow held up by accumulated debris. No flow beneath Coats Drive coming down from High Point Meadows.

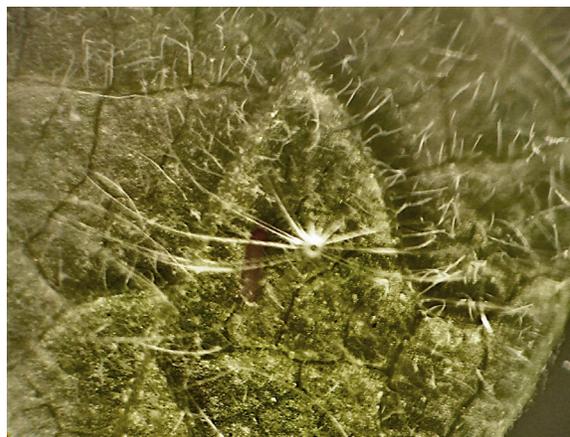
The ferrihydrite deposits in the old weirpool outlet appear to be developing mats of iron-oxidizing bacteria. Interesting but complicated chemistry.¹³

November 30, 2025 (day 3788,3653+135):NGRG cum. 268.8 mm (norm. 359 mm).

Rainfall this month 43% below long-term average, less rain than last month.

Annual rainfall this year so far, now 13% below long-term average.

The fall-quarter season (Sep,Oct,-Nov) was 26% below average.



Hard to find if you don't carry a microscope in your backpack, an example of stellate-pubescence on the underside of a *Physocarpus capitatus* leaf. Best I could do.



¹¹ At transit (sun due south,, not 12 PST). My arbitrary observer position was 49°9'N, 123°48'W, 125m AMSL.

¹² It's all because if $r = \text{shadow/height}$, and $\theta = \text{altitude of the sun}$, then $r = 1/\tan(\theta)$ and $dr/d\theta = -1/\sin^2(\theta)$., As θ becomes small, $\sin(\theta)$ becomes equally small, $\sin^2(\theta)$ even smaller, and $dr/d\theta$, the rate at which the ratio increases as θ decreases, becomes rapidly larger.

¹³ The bacteria are possibly one of the *Geobacter* genus. Prolific growth appears to demand a low redox potential (no rival oxidizers). I can imagine that beneath the clay in the weirpool sediment, anaerobic conditions were common, but I have no idea why these should persist on exposure to the atmosphere. I am not an expert in these matters. Might be interesting to measure the ORP. Not something GSK usually bothers with.

Name: Weirpool Creek. Any part of the prominent drainage ditch in the RP wetland (the "lake") that is not submerged. [File: 661](#)

Currently that is the section between the beaver dam and the site of the weir, now removed. In the past, the whole ditch from the eastern shore of the wetland to the outlet was exposed. The course of the submerged part is easily traced by open water, open because the water is locally too deep for aquatic vegetation (watershield and to a lesser extent water smartweed).

Stump Farm Number 2 Stream flowing but no flow out of the NE Arm or out of Canary Grass Meadow.

December 8, 2025 (day 3796,3653+143):NGRG cum. 298.5 mm (norm. 407 mm).

Small stand of unusual trees. Unfortunately not within the CM catchment area, but they could be, and unusual enough on Gabriola Island to merit a note: black cottonwood (*Populus trichocarpa*).

Syphons still running. I guess the plan is to leave them running all winter.

December 13, 2025
(day

3801,3653+148):NGRG cum. 320.7 mm

(norm. 438 mm).

Cistern -114 mm

SCB. [cal. datum: cistern +0.253 m].

A few buffleheads and ring-neckeds.

Rain created large puddles on the trails, but in less than 24 hours most had soaked into the

ground. East Path Creek heavily ponded but not much of a flow. Nothing from the NE Arm. Easterly wind pushing water up against the beaver dam. Weirpool Creek flowing quite vigorously, the pools suddenly looking dark.

Deer have been around in the weirpool garden but no sign that the beaver has. The old weirpool-bed mire taking on a hint of green, our own little patch of muskeg in the making perhaps.



Tall deciduous tree; riparian habitat; leaf shape cordate (more deltoid than ovate); leaf margin entire, sparsely ciliolate; petiole round; fall colour yellow; bark grey with long, continuous, narrow, vertical furrows.



Mosses carpeting the forest floor and adding cushions to tree-trunks and rocks.¹⁴



¹⁴ Mosses come in a wonderful variety of greens ranging from yellowish-green, to bright green, to dark green. I often see dark green described as blue-green, I have done so myself in these notes I see, but to be honest, I never perceive the dark greens of some moss species and the foliage of some of the older conifers as being blue. To check this, I recently took a few photographs of dark greens. First I filtered them through an RGB (red-green-blue) filter and noticed nothing seemed to change much colour-wise. I then reduced the R and G saturation to zero and boosted the B saturation to 100%. The result was a grey lighting much like that of the cloudy sky, I was doing this in a drizzle with no sign of the sun. The only blues I could see in the photographs were in small patches of lichens on the bare branches of trees. Too few to pin-point a species of lichen; many showed no such effect. My tentative conclusion, is that the forestry here shows very little, if any, foliage that is blue-green. Dark green is nearly always just a green without yellow. Any exception might be when a Doug. fir, which has needles with two parallel grooves with white bottoms on the underside of its needles, is reflecting the light of a blue sky, but that's not to say that the fir needles have a blue pigment. I won't use the descriptor blue-green again.



Old man's beard and witch's hair festoon the bare branches (*Usnea* and *Alectoria* spp.) and some lichens and liverworts share the ground with the mosses.

Restless wind that comes with cold fronts has brought down twigs and small branches, many carrying lichens that thrive in the well-lit canopy.





December 17, 2025 (day 3805,3653+152):NGRG cum. 350.3 mm (norm. 463 mm). Cistern -61 mm SCB. [cal. datum: cistern +0.306 m].

Atmospheric waterfall yesterday, almost an inch in a few hours. All creeks running including the NE Arm outlet. Lots of birds out on the lake, ring-neckeds and a newly-arrived flock of mallards, mostly males.

Not yet enough rise in the water level to cause any major spillage over the beaver dam so it remains calm at the weirpool.



December 21, 2025 (day 3809,3653+156):NGRG cum. 365.5 mm (norm. 487 mm).

WATER QUALITY TEST 25/2

New dissolved oxygen (DO) sensor obtained. Old but still usable. New sensor also for temperature, pH, electrical conductivity (EC), and oxidation-reduction potential (ORP). The OBEST 8-in-1 Meter performed well during calibration. I've also obtained a simple (no messenger) 0.5L Kemmerer Water Sampler relying on descent and ascent to control the flap valves at both ends. And if that doesn't work a battery-powered aquarium pump that I can use to collect water samples from below the surface.

Sensor: OBEST 8-in-1 meter.

Calibration pH, 3-point 4-7-10.

The meter only does 2-point calibrations, but I use 3 manually:

$$\text{pH}_{\text{CAL}} = 0.0547 \cdot \text{pH}^2 + 0.4099 \cdot \text{pH} + 1.4251.$$

Calibration soln: Alphachem BU1400R (pH4), BU1700Y (pH7), BU1100B (pH10).

Calibration EC.

No ATC, used 7-point using 1413 $\mu\text{S}/\text{cm}$ solution at various concentrations and temperatures and AQUAFINA de-ionized water for zero.

A three-step process. Results for the meter that I was using.

1. Determine the EC of the solution at the test temperature T_{SOL} .
HANNA 1413 soln. HI 7031: $\text{EC}_{\text{SOL}} = 0.064 \cdot T_{\text{SOL}}^2 + 23.865 \cdot T_{\text{SOL}} + 775.2287$;
2. Determine the relationship between EC_{SOL} and the meter reading EC_{M} :
 $\text{EC}_{\text{SOL}} = 0.9431 \cdot \text{EC}_{\text{M}} + 12.253$. The AQUAFINA is not exactly zero but close enough. I used an arbitrary 5 $\mu\text{S}/\text{cm}$ in the calculations.
3. Convert EC_{CAL} to EC_{25} , which is the EC of the sample at 25°C (the specific EC): $\text{EC}_{25} = \text{EC}_{\text{CAL}} / (1 + \beta(T-25))$, $\beta = 0.0187$.

For a sample, correct EC_{M} using relationship 3 so EC_{SOL} becomes EC_{CAL} at the sample temperature T. Temperatures (°C) from the meter as for calibration.

Calibration ORP.

Using manufacturer's calibration. Accuracy not critical.

Sensor: PASCO PS-2196 with PS-2008A (SPARK) reader.

Optical dissolved oxygen sensor (DO). Useful for the lake because it does not require sample stirring. Saturation is the key measurement used to determine concentration.¹⁵ The SPARK unit does provide a concentration estimate, but I preferred to do my own calculation based on the observed saturation so as to have control over the variables involved, which are atmospheric pressure, salinity, and temperature. For pressure, I took the SPARK figure, for salinity I used my EC_{25} measurement as a basis, and for temperature I used the SPARK auxiliary probe PS-2125.

In summary, observation data needed is:

DO_{SM} (observed saturation, a percentage ratio)

T_{M} (observed temperature °C)

BP_{M} (observed barometric pressure, mm Hg)

EC_{25} (specific electric conductivity, $\mu\text{S}/\text{cm}$), used to estimate salinity.

The salinity of freshwater not from an aquifer is very low, and assuming it is zero will rarely introduce a significant error.

¹⁵ Calibrating optical sensors with fully saturated and 0% (sodium sulphite) solutions seems to be standard.

[check calculation values: $DO_{SM} = 50$, $T_M = 9.0$, $BP_M = 756.5$, $EC_{25} = 1167$]

The units' conversions needed are:

DO_{SMR} (observed saturation ratio) = $0.01 * DO_{SM}$

T_{MK} (observed temperature °K) = $T_M + 273.15$

BP_{MPA} (observed barometric pressure, kPa) = $BP_M * 133.32239/1000$

S_M (salinity, g/kg) = $D27 * EC_{25} + E27 * EC_{25}^2$ assuming common freshwater ions.

[check calculation values: $DO_{SMR} = 0.5$, $T_{MK} = 282.15$, $BP_{MPA} = 100.858$, $S_M = 0.6530$]

EXACT SOLUTION: there is a simpler good approximate solution below.

The observed concentration DO_{CAL} (mg/L) =

$DO_{CAL} = B27 * F26 * G27 * H27 * EXP(I26 + J26 * 100 / C26 + K26 * LN(C26 / 100) + L26 * C26 / 100)$
[check calc. = 5.724]

where the terms used (arbitrary names Excel spreadsheet cells):

B27 = 1.42905 [check calc. = 1.42905]
 C26 = T_{MK} [check calc. = 282.15]
 D26 = S_M [check calc. = 0.6530]
 D27 = 0.5572E-3 [check calc. = 0.5572E-3]
 E27 = 2.02E-09 [check calc. = 2.02E-09]
 F26 = DO_{SMR} [check calc. = 1.00]
 G26 = BP_{MPA} [check calc. = 100.858]
 G27 = $(G26 - G28) / (I28 - G28)$ [check calc. = 0.9953]
 G28 = $I28 * EXP(J28 + K28 / C26 + L28 / C26^2)$ [check calc. = 1.14777]
 H27 = $EXP(D26 * (M26 + N26 * (C26 / 100) + O26 * (C26 / 100)^2))$
[check calc. = 0.9958]
 I26 = -173.4292 [check calc. = -173.4292]
 I28 = 101.325 [check calc. = 101.325]
 J26 = 249.6339 [check calc. = 249.6339]
 J28 = 11.8571 [check calc. = 11.8571]
 K26 = 143.3483 [check calc. = 143.3483]
 K28 = -3840.7 [check calc. = -3840.7]
 L26 = -21.8492 [check calc. = -21.8492]
 L28 = -216961 [check calc. = -216961]
 M26 = -0.033096 [check calc. = -0.033096]
 N26 = 0.014259 [check calc. = 0.014259]
 O26 = -0.0017 [check calc. = -0.0017]

The calculation using three different online sources gave 5.77, 5.73, and 5.73 mg/L compared to my 5.72 mg/L.

SIMPLER SOLUTION: (based on results of the "exact" calculation above)

Needed in range: T_M (0–30), BP_M (755–785), EC_{25} (0–1200), and DO_{SMR} (0–1)

1. $DO_T = 4.455E-03 * (T_M - 10)^2 - 2.761E-01 * (T_M - 10) + 11.277$
2. $DO_{TP} = 9.524E-07 * (BP_M - 760)^2 + 1.502 * (BP_M - 760) + DO_T$
3. $DO_{TFS} = -4.286E-05 * (EC_{25}) + DO_{TP}$
4. $DO_{CAL} = DO_{SMR} * DO_{TFS}$

[check calc. = $T_M = 9$, $BP_M = 756.5$, $EC_{25} = 1167$, $DO_{SMR} = 0.5$, $DO_{CAL} = 5.72$]

Sampler: LABFISH (Amazon) 0.5L water sampler, valved but no messenger as is in the Kemmerer sampler design. Height 130 mm; diameter 70 mm.



Above: Cladonia sp. possibly *C. portentosa*, maritime reindeer lichen, picture taken outside the CMC catchment because it's rare to see it thriving within the area due to the absence of sandstone plains. It forms hummocky mats in the moss, but isolated specimens may superficially look like fragments of other genera of pale branched lichens blown down from trees.

Others: I can't reliably ID. Just a small selection in this "lichen season". All in the CMC area.



December 26, 2025 (day 3814, 3653+161): NGRG cum. 394.7 mm (norm. 517 mm). Cistern +25 mm SCB. [cal. datum: cistern +0.392 m].

December 31, 2025 (day 3819, 3653+166): NGRG cum. 395.2 mm (norm. 549 mm).

Rainfall this month 28% below long-term average.

Annual rainfall this year 16% below long-term average.

◇ [previous file next file](#)

ODDS AND ENDS FROM THIS
AND PREVIOUS YEARS.

Thanks to writers and artists, John
Clare, Edith Holden, Robert
Macfarlane, Adam Shoalts.

Opposite: [Gabriola,
November 2021]

*Shades tho yere
leafless save the
bramble spear*

*Whose weather beaten
leaves of purple stain*

*In hardy stubbornness
cling all the year*

*To their old thorns
till spring buds new
again..*

John Clare [A Copse in
Winter] 1820.

Opposite: A
watercolour of bramble
leaves (id. by the artist, *Rubus fruticosus*). Some blackberry leaves,
but not all even on the same plant, acquire a pinkish-purple colour in
winter.

Edith Holden, [November, The Country Diary
of an Edwardian Lady] 1908.



A better picture than mine: Hans Pixabay 4193.
"And oft the morning muser see, Larks rising from the
broomy lea, And every fairy wheel and thread
Of cobweb dew – bediamonded." R.L.Stevenson
Rare use of the be- prefix that I use for "beponded",
later found in the OED citing "bediamonded".

Cobweb pictures Nov.15, 2025.

