January 15, 2024 File: Binder673

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.

Binder of supplementary files in the 673 series

This is a very large file. It will also may not be perfectly up-to-date; the current file particularly may contain recent content not yet included in this binder.

Master file:

Observations at Coats Marsh RP, File 673 not included.

For an up-to-date list of all Coats Marsh files see https://nickdoe.ca/gabriola.html#coatsmarsh

Observation files containing field notes contained herein are:

2015: Supplementary file, File 673d.

2016 (Jan. - Mar.): Supplementary file, File 673e.

2016 (Apr. - June): Supplementary file, File 673f.

2016 (July - September): Supplementary file, File 673g.

2016 (October - December): Supplementary file, File 673h.

2017 (Jan. - Mar.): Supplementary file, File 673j.

2017 (Apr. - September): Supplementary file, File 673k.

2017 (October - December): Supplementary file, File 673m.

2018: Supplementary file, File 673n.

2019: (Jan. - June): Supplementary file, File 673q.

2019: (July - December): Supplementary file, File 673r.

2020 (Jan - June): Supplementary file, File 673s.

2020 (July - December): Supplementary file, File 673v.

2021 (Jan. - July): Supplementary file, File 673w.

2021 (July - September): Supplementary file, File 673x.

2021 (October - December): Supplementary file", File 673y.

2022 (Jan. - December): Supplementary file, File 673z.

2023 (Jan. – Apr.): Supplementary file, File 673za.

2023 (May – August): Supplementary file, File 673zb.

2023 (Sept. – Dec.): Supplementary file, File 673zc.

2024 (Jan. –): Supplementary file, File 673zd (incomplete).

Field observations—2015

The observations reported in the <u>Coats Marsh hydrology report</u> were made on <u>May 8 and May 11, 2015</u>. Rainfall in these notes are as recorded at the time; they have not been corrected.

The site was visited again on June 24, 2015 (day -24).

A visit to Coats Marsh a couple of days ago produced a surprise. In spite of the lack of rain and warm temperatures, the open-water level in the marsh was as near as I could judge as it was in early May, when it was higher than usual at that time of year. The marsh bed must be really tightly sealed against leakage into the ground, and the combined subsurface, littoral, and open-water area greater than the open-water area would leave you to believe. Interesting.





The site was visited again on <u>July 14</u> (day –4).

Photos left. The lack of rain, warm temperatures, and north-westerly wind is at last having an effect. There was a drop in the June water level of roughly 8 inches (200mm).

The concrete walls of the cistern were above the water level, but as before, I could not detect the slightest movement of water from or in the cistern. The water level in the cistern is the same as outside.

The site was visited again on July 20, 2015 (day +2).

At south side of cistern, level was -400mm below the top.

The water level was -300mm [previous day 0.95 ft = -290 mm] below the bottom of the

outlet pipe at the scale by the bridge. This is off the scale. Graduations are 0.1 ft. Photo below.



The site was visited again on August 1, 2015 (day +14).

At south side of cistern, level was -510mm below the top.

The water level was $-360\,\mathrm{mm}$ below the bottom of the outlet pipe (8-inch) at the scale by the bridge.

August 4, 2015 (day +17)

Extensive coverage of water-lily pads (*Brasenia schreberi*). Two spinning "dust devils" were observed, starting on the north shore of the marsh and moving on to the open water. They were accompanied by a startlingly loud roar, comparable with a noisy truck, foaming water and spray, about 6-10 feet high lasting perhaps only 30 seconds but moving rapidly in a chaotic fashion. Some reed canary grass and dead branches thrown several feet into the air. Light wind, mostly clear sky, warm. Level at the cistern -

510 mm below.







August 6, 2015 (day +19)

The water level was 1.24 ft = -378 mm below the bottom of the outlet pipe by the bridge.

August 9, 2015 (day +22) After rain (revised to about 5 mm)

Level at the cistern -500 mm below the uneroded concrete top.

The water level was -380 mm below the bottom of the marsh outlet pipe; hence, Coats Marsh Creek was completely dry.

<u>August 10, 2015</u> (day +23) Flow from the drainage pipe from private property into Coats Marsh Creek below the weir finally ceased.

August 14, 2015 (day +27) No rain.

Level at the cistern -535 mm below the uneroded concrete top.

The water level was -415 mm below the bottom of the marsh outlet pipe.

August 16, 2015 (day +29) No rain.

The water level was -420 mm below the bottom of the marsh outlet pipe. Coats Marsh Creek monitored at the culvert on the trail at the west end of the park was completely dry.

August 21, 2015 (day +34) No rain.

Level at the cistern -565 mm below the uneroded concrete top. Dropping at 4.6 mm/day.

August 27, 2015 (day +40) No rain.

Level at the cistern -583 mm below the uneroded concrete top. On making my way back from the cistern a short distance through the woods to the trail, I was surprised to see, sitting at the top of the slope in the middle of the trail, what I took to be a cat, about 50 feet away. It was silhouetted against a very bright sun-filled gap in the trees, so I couldn't see its face, but it appeared to be watching me with curiosity. I walked slowly towards it, still not entirely sure what it was, and then, in its own good time, it slowly turned and flew off languidly into the trees. Not a cat of course, but a great horned owl. The owl reminded me of the raven that used to check me out when I sat under a certain tree in the woods, usually to keep out of the rain, just quietly contemplating and letting my mind wander after I'd put away my notebook and completed my latest set of measurements at a petroglyph site I was researching some years ago. Good company and shared curiosity on Gabriola is not always human.

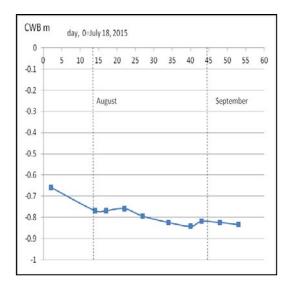
<u>August 28, 2015</u> (day +41) Rain, 4mm recorded at El Verano. August 29, 2015 (day +42) Rain, 10mm recorded at El Verano.

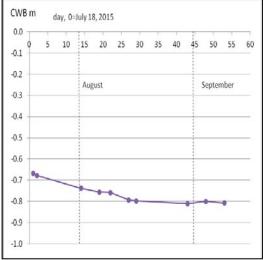
August 30, 2015 (day +43) Rain, 3mm recorded at El Verano.

Level at the cistern -560 mm below the uneroded concrete top. The water level was -433 mm below the bottom of the marsh outlet pipe.

The rise in water level at the cistern of 23mm is compatible the observed 17mm of precipitation. The marsh is acting as a big puddle. The beaver dam at the weir site appears to affect the level by slowing down changes in the marsh level. In future, I am only going to use the cistern results in the reports.

Diagrams below show the cistern results only left, and the weir pipe results only right.





<u>September 2, 2015</u> (day +46) Rain, 2mm recorded at El Verano. <u>September 3, 2015</u> (day +47) Rain, 2mm recorded at El Verano.

<u>September 4, 2015</u> (day +48) Rain, 1mm recorded at El Verano. Level at the cistern -565 mm below the uneroded concrete top. Despite 5mm of rain since the last observation, the water level has dropped.

The water level was -422 mm below the bottom of the marsh outlet pipe. Coats Marsh Creek at the trail culvert dry.

<u>September 6, 2015</u> (day +50) Rain, 5mm recorded at El Verano. <u>September 8, 2015</u> (day +52) Rain, 1mm recorded at El Verano.

<u>September 9, 2015</u> (day +53) Level at the cistern -575 mm below the uneroded concrete top. The water level was -430 mm below the bottom of the marsh outlet pipe. Coats Marsh Creek at the trail culvert dry.



September 13, 2015 (day +57) No rain. Level at the cistern -593 mm. Water is falling more slowly than before—about 2.7 mm/day. Reading taken at dusk, and while kneeling down doing that something flew right over my head, I could feel the down-draft of its wings. Not my friend the great horned owl though, it was smaller with a faster wing beat. Protrusions of reeds/sedges/grasses becoming more numerous out in the marsh. Photo above is September 14.

September 15, 2015 (day +59) Rain (trace), 0.2mm.

<u>September 16, 2015</u> (day +60) No rain. A 2nd gauge installed, this one at the marsh. Level at the cistern -600 mm. Beavers still active in the woods on the south side near the weir. Photo September 20.



September 20, 2015 (day +64) Rain 6.3 mm since last visit. The gauge at the marsh showed 9 mm compared to El Verano's cumulative 6.3 mm. Short sharp showers at this time of year lead to variations in precipitation at different places on the island.

Level at the cistern -592 mm below the uneroded concrete top.

This 8 mm rise since the gauge was installed indicates the level rises by the amount of rainfall. There is little or no inflow from any other source. The water level was -405 mm below the bottom of the marsh outlet pipe.

September 25, 2015 (day +69) Rain, 11.9 mm recorded at El Verano since last visit. Marsh gauge showed 11.5 mm.

Level -587 mm at cistern. A small frog at my observation point and two very busy clusters of water boatmen (Hesperocorixa spp.??) about 40 in each cluster. They are black, look like they have oval beetle-like shells, and are not elongated like mosquitoes; four "legs"—you can tell I'm not a biologist.

September 28, 2015 (day +72) Level at the cistern -600 mm. No rain.

October 1, 2015 (day +75) Level at the cistern -608 mm. The lowest of the year. No rain. Despite the low water level, the marsh appears in good shape — ducks, red and blue dragon flies, many small birds among the reeds, water boatmen, plenty of open water, and the stranded littoral fringes are still soft mud. The rate of fall in the water level when days are sunny remains about 2.7 mm/day. Photos.





 $\underline{\text{October 5, 2015}}$ (day +79) Level at the cistern -614 mm. Rain, 1 mm recorded at El Verano since last visit, 0.2 mm at the marsh.

October 8, 2015 (day +82) Level at the cistern -605 mm. Rain, 8.1 mm recorded at El Verano since last visit, 7.7 mm at the marsh.

October 11, 2015 (day +85) Thanksgiving visit. Level at the cistern -601 mm. The water level was -393 mm below the bottom of the marsh outlet pipe. The level at the cistern seems to be dropping faster than the level at the weir — isolated pools of water forming? Rain, 11.3 mm recorded at El Verano since last visit, 10 mm at the marsh.

 $\underline{\text{October 16, 2015}}$ (day +90) Level at the cistern -610 mm, lowest ever so far. Rain, 2.6 mm recorded at El Verano since last visit, 2 mm at the marsh.

October 20, 2015 (day +94) Level at the cistern -606 mm. Rain, 2.4 mm recorded at El Verano since last visit, 3 mm at the marsh.

October 24, 2015 (day +98) Learned that the beavers were introduced into the marsh from Hoggan Lake by former landowner Clyde Coats.

October 25, 2015 (day +98) Level at the cistern -612 mm. Rain, 2.1 mm recorded at El Verano since last visit, 2 mm at the marsh. Half a dozen scaups widgeons, but very few ducks otherwise.

WATER QUALITY TEST (east end)

рН 7.3

Specific conductivity $76\mu\text{S/cm}$ ($58\mu\text{S/cm}$ at 13.33°C in flask) Specific conductivity $58\mu\text{S/cm}$ ($44\mu\text{S/cm}$ at 13.25°C in large bucket) DO 5.4 mg/L (saturation 53%, 13.8°C , 99.3 kPa in flask).

October 27, 2015 (day +101) Level at the cistern -598 mm. Level at the weir -414 mm. Strange differences between the two locations. It's going to be an interesting winter.

Rain, 6.6 mm recorded at El Verano since last visit, 8.5 mm at the marsh.

October 29, 2015 (day +103)

Rain, 20 mm recorded at El Verano since last visit, 19.5 mm at the marsh. 5 scaups widgeons near weir, 15-20 near cistern. They're very shy.

WATER QUALITY TEST (west end)

рн 7.3

specific conductivity $183\mu\text{S/cm}$ ($140\mu\text{S/cm}$ at 13.28°C in marsh) DO 8.8 mg/L (saturation 86%, 13.8°C , 100.4 kPa in marsh).

WATER QUALITY TEST (east end)

pH 7.6

specific conductivity $95\mu S/cm$ ($74\mu S/cm$ at $13.89^{\circ}C$ in marsh, care taken this time to ensure no bubbles around the sensor, not checked last time)

DO 9.7 mg/L (saturation 97%, 15.1°C, 100.4 kPa in marsh).

Rain has raised DO? Sounds reasonable. Slightly alkaline because the sedimentary bed is partly marine?

Level at the cistern -568 mm. Level at the weir -374 mm.

November 1, 2015 (day +106)

Rain, 50 mm recorded at El Verano since last visit, 67.5 mm at the marsh, but includes some morning rain not measured yet at El Verano. Beautiful rays of sunshine breaking through the clouds to the southwest as the very heavy rain tapered off. Many ducks, perhaps three dozen enjoying the fresh water, scaups widgeons I think, but still not sure what type.

Level at the cistern -456 mm, up a whopping 112 mm. Level at the weir -270 mm, up 104 mm. Water is at the bottom of the anti-beaver cage. Response to rain is evidently instant, as expected, but unexpectedly large. The marsh is collecting more rainwater than the gauge?

November 2, 2015 (day +107)

Rain, 14 mm recorded at El Verano since last visit, 0.8 mm (trace) at the marsh; a time-of-day difference. Level at the cistern -455 mm. With binoculars looking at their heads instead of just their backsides as they flew away, could see that the "scaups" are actually widgeons (white foreheads). Also a few mallards around being idle out in the centre.

Since October 27, the marsh has risen 143 mm after 84 mm of rain $(\times 1.7)$. If there's no substantial inflow, then the only source of the extra volume I can think of at the moment is that of drowned vegetation (reed canary grass, water lilies, tussocks) and trapped air bubbles within it.

Run-off from exposed lake bed normally below water would contribute to a disproportionate rise in level, but it's hard to believe that such a large area of exposed bed exists without it being noticed. I suppose it is possible that the extra water is ground-water inflow from the surrounding basin, but the speed of the rise, and the abruptness with which it stops when the rain stops, augurs against the theory that any inflow from distant sources is responsible. Whatever the cause, the effect should diminish as the level gets higher, but will it?

November 5, 2015 (day +110)

Rain, 1.8 mm recorded at El Verano since last visit, 2 mm at the marsh. Level at the cistern -478 mm, a significant drop in level that cannot be just evaporation.

Since October 27, the marsh has now risen "only" 120 mm after 86 mm of rain $(\times 1.4)$. Maybe there is something to the air-bubbles in tussocks theory (Nov. 2).

Inflow from distant up-slope sources can be ruled out as an explanation as it doesn't explain why the marsh level should drop after its initial rise. If however the inflow is shallow ground-water moving rapidly over impervious clay beneath unsaturated soil immediately surrounding the marsh, I suppose a gradual up-welling of the water table in the top soil (by wicking) could pull water back

from the marsh after its initial rise. This effect, if it exists, would not be apparent in summer when rainfall is light, because the severely unsaturated soil would simply soak up the rain and lose it again by evaporation before it became flowing groundwater.

November 7, 2015 (day +112)

Rain, 16 mm recorded at El Verano since last visit, 18 mm at the marsh. Level at the cistern -445 mm, a rise of 33 mm observed immediately after the rain stopped.

A very autumnal-looking marsh, very quiet with only the sound of rain drops still being shed from the trees, a band of mist hanging above the water, the hardhack and tasselled reeds turning tawny amidst small clumps of sedges that retain their green, the sky dark and threatening, and the rising-water encroachment into the forest along the grassy and shrubby shoreline now very apparent.

November 9, 2015 (day +114)

Rain, 2.5 mm recorded at El Verano since last visit, 3 mm at the marsh. Level at the cistern -438 mm, a rise of 7 mm. There's a pattern; the marsh level rises about twice as much as expected in its immediate response to rain. I don't get it. The factor of two just seems too big.

Two ducks flew across the marsh and came down in front of me (a surprise as they usually do the opposite; taking-off as soon as I appear). Not widgeons, but gadwalls, one with bright orange on its bill when the sun caught it. Dabblers with broader, more shovel-like, bills than the widgeons. Checked out by a raven. Bright, sunny, cold NW wind.

November 10, 2015 (day +115)

Just a trace of rain recorded at El Verano since yesterday, none at the marsh. Despite this, level at the cistern -432 mm, another rise, which does hint at inflow from beyond the open water area.

Checked out the drainage channels observed last May near the park boundary at the main entrance. All were wet, but none contained even standing water yet alone water flowing into the marsh. There were muddy puddles in the ruts of the path on the west side of the entrance, but they were just that, puddles. Nothing that could be contributing significantly to the rise in the level of the water in the marsh.

November 11, 2015 (day +116)

Minor adjustment to baselines. Rain, 6 mm recorded at El Verano since last visit, 8 mm at the marsh. Level at the cistern -426 mm, a rise of 6 mm. Three buffleheads apparently greatly enjoying a freshwater

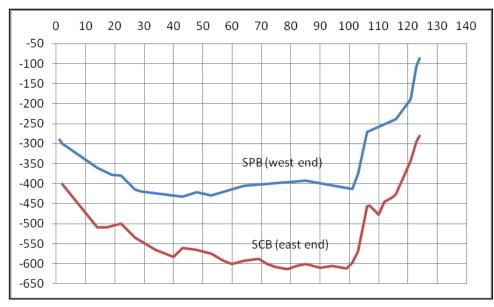
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¹ See Figure 21, p.43, Floodplain Water Level and Precipitation, in Jerad D. Bales & Douglas A. Walters, Relations between floodplain water levels, instream dissolved-oxygen conditions, and streamflow in the Lower Roanoake River, North Carolina, 1997–2001, Water-Resources Investigations Report 03-4295, US Dept. of the Interior & USGS, 2004.

bath. Only one or two other ducks in the distance (widgeons?). Level at the weir -238 mm (still using SPB, but established a WPB).

November 16, 2015 (day +121)

Rain, 25 mm recorded at El Verano since last visit, 32 mm at the marsh. Level at the cistern -342 mm, another sharp rise of 84 mm. Level at the weir -190 mm SPB, -83 mm WPB. Since October 27, the marsh has now risen 256 mm at the east end and 224 mm at the west end after 135 mm of rain at El Verano ($\times 1.9$) and 151 mm at the marsh. That's a lot to explain. Cold, wet, miserable.



Scales are local, not CWB.

It looks as if in summer, as the water level drops, the marsh begins to break up into two (or more?) semi-isolated pools with their own water levels. A Google Earth shot from June 7, 2015, hints at this in that the west-end elevation at the weir is indicated at 99 m AMSL; yet the east-end is shown as only 98 m AMSL. Because the resolution is only 1 metre, the difference is anywhere in the range 0-2 m, but that there is any difference at all is interesting, but can't be said with confidence to support ground observations made later in the summer. The beaver dam is without doubt restricting water flow from the main lake to the weir area.

The same satellite imagery gives an indication of why the water level is rising so unexpectedly rapidly. The area and perimeters of the marsh were measured on the Google Earth imagery as follows (not incl. the 0.25-ha bay at west end beyond the beaver dam):

Open water in early June (approx. as waterline not always clear): area = 4.5 ha; perimeter = 980 m; elevation = 98m AMSL Littoral/riparian zones: area = 6.8 ha; perimeter = 1.08 km; elevation = 100.5 m AMSL area = 8.1 ha; perimeter = 1.16 m; elevation = 101.5 m AMSL.



100.5 m contour



101.5 m contour

The 101.5-m contour quite plausibly defines the original glacial meltwater basin as defined by thick layers of gleysol and is, in this image, 1.8 times the area of open water. The extension beyond the summer waterline, as shown in the satellite imagery, in terms of area, is mainly along the north shore of the marsh and less so on the eastern side, even though drainage channels have been observed 20 m inland and gleysol 30 m inland on the east side.

The favoured explanation for the rapid rise in water level at the end of summer is thus that the open-water area is accumulating rain captured from the immediate perimeter of the shallow saucer-shaped marsh, an area defined by underlying gleysol. The water has not far to travel, mainly does so in well-established rills in the claggy ground, and thus adds to the rain captured by the open water with little delay.

Simple, and hard to believe only because the area of the littoral zone of the marsh is easy to underestimate, particularly if you do not often visit the north shore where reaching the waterline is a scramble through reedy mire.

This though remains conjecture as water flowing down into the centre of the basin has yet to be observed.

November 18, 2015 (day +123)

Rain, 13.5 mm recorded at El Verano since last visit, 18 mm at the marsh. Level at the cistern -294 mm, a rise of 48 mm. Level at the weir -105 mm SPB, +02 mm WPB. For the first time ever, bottom of the cistern clearly visible.



Flooding of the reed-canary-grass area of the marsh along the north shore extensive. The water is in channels, though the flow was not strong enough to be observed, extending visibly up to 60 m from open water. Green sedges are good indicators of their presence (photo left), which in one place that was observed goes right up to the edge of the forest (photo right).





The 101.5-m contour appears to be a fair indicator of the limit of surface or very-near surface water. Everything with canary grass is interspersed with flooded drainage channels.

A lone drainage culvert [East Path Creek] with standing water on the east side was also observed about 90 m from open water. It was however in forest, not marsh.

November 19, 2015 (day +124)

No rain recorded at El Verano

since last visit, only a trace at the marsh. Level at the cistern - 280 mm, a rise of 14 mm despite lack of rain. Level at the weir -87 mm SPB, +24 mm WPB.

Established new baseline levels at the weir using laser level. The old ones were badly in error.

WATER QUALITY TESTS (west end)

specific conductivity $97\mu \text{S/cm}$ (77 $\mu \text{S/cm}$ at 14.8°C sample bottle) pH = 7.3

DO 9.0 mg/L (saturation 92%, 16.8°C, 102.0 kPa sample bottle)

water from drainage pipe left bank below the weir: specific conductivity $89\mu S/cm$ (71 $\mu S/cm$ at 14.7°C sample bottle) pH = 7.1

DO 8.3 mg/L (saturation 85%, 16.7°C, 102.0 kPa sample bottle).

Knowledgeable local resident advanced the "there are two springs" theory, but the conductivity measurements and other observations don't support it. The bedrock is Gabriola Formation sandstone, which does support minor ponding in depressions, but is usually too fractured to generate springs much above its contact with the underlying shale of the Spray Formation. However, residents are much better acquainted with the history of the marsh than I.

The beaver dam is not old and is still being worked on. Level of marsh (the "outer" marsh, east end) was eye-balled by a resident 300-400 mm higher on the marsh side than the weir side (the "inner" marsh or bay above the weir, west end).

Outflow into Coats Marsh Creek channel 0.2 L/s leakage from baffle + 0.3 L/s from right bank + 1.0 L/s (guesstimate)from drainage pipe. One L/s would require rainfall of 320 mm/day on 270 m 2 (the flooded area)— totally unbelievable. The pipe drainage area must be much greater. The forest, or downstream bedrock fractures, are soaking up all the outflow as there is no flow lower down the channel under the bridge.

Since October 27, the marsh has now risen 318 mm at the east end and 327 mm at the west end after 149 mm of rain at El Verano $(\times\,2.1)$ and 169 mm at the marsh $(\times\,1.9)$.

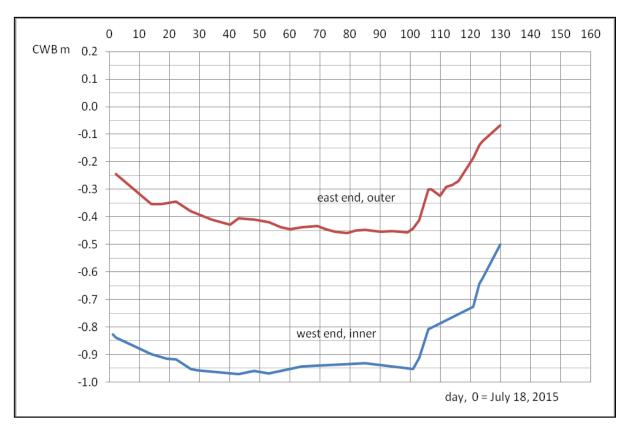
November 25, 2015 (day +130)

Rain, 13 mm recorded at El Verano since last visit, 15 mm at the marsh (frozen). Level at the cistern -222 mm, another sharp rise of 58 mm. Level at the weir +38 mm SPB (equivalent, submerged and at the limit of measurability), +150 mm WPB.

Since October 27, the marsh has now risen 376 mm at the east end after 162 mm of rain at El Verano $(\times\,2.3)$ and 184 mm at the marsh $(\times\,2.0)$. The level at the weir has risen 452 mm, in part, as a result of leakage through the beaver dam.

Made a measurement of the difference in levels between the marsh ("outer"/east) and the marsh weir ("inner"/west) using two poles and a Suunto inclinometer. Outer marsh was 430 mm higher. Hence:

222 mm SCB above outer: pole 1 mark above outer: 1015 SCB above pole 1 mark = -793 pole 2 mark above pole 1 mark: -793 SCB above pole 2 mark = inner above pole 2 mark: -1445SCB above inner = 652 WPB above inner: -150802 SCB above WPB = 647 CWB above WPB: SCB above CWB = +155 mm



With this calculation it is possible to show the levels both sides of the beaver dam relative to the primary base CWB.

If this determination is right, the marsh level is now [day 130] within 100 mm of the concrete baseline. Outflow was quite strong mainly over the baffle (≈ 150 mm above, no measurement of flow, probably <10 L/s). There was slight flow through the outlet pipe, roughly 0.2 L/s. The drainage pipe below the weir on the left bank was flowing at roughly 1 L/s, much as before.

Mixed flock of widgeons (10) and buffleheads (15) out on the water. Bright sunshine.

November 29, 2015 (day +134)

No rain. Level at the cistern -218 mm, only a 4 mm rise. Level at the weir +165 mm WPB, (+56 mm SPB equivalent), a 15 mm rise. The outflow of around 7 L/s is less than the inflow to the inner marsh area through the beaver dam.

Outflow into Coats Marsh Creek channel mainly from water overflowing the baffle, flow from the drainage pipe less than last time, only a minor flow from the outlet pipe as before, very little water from the right bank. Once it stops raining everything looks pretty stable.

Marsh has ice cover, but there is still open water around the margins where most ducks were, but one duck was walking unsteadily like a Saturday-night drunk out on the skim of ice!

December 2, 2015 (day +137)

Rain 9 mm recorded at El Verano since last visit, 12.5 mm at the marsh. Level at the cistern -192 mm, a 26 mm rise. Level at the weir +160 mm WPB, (+51 mm SPB equivalent), a 5 mm drop. Even with rain, the baffle overflow is now pulling down the level—did the beavers do some repair work?

Flows much as before, just a bit diminished. The water in the marsh is now within 150-200 mm of the top of the beaver dam. Lots of low cloud, a day of dusk.

December 4, 2015 (day +139)

Rain 22.5 mm recorded at El Verano since last visit, 30 mm at the marsh. Big difference, wonder what that was about. Level at the cistern -170 mm, only a 12 mm rise. Level at the weir +238 mm WPB (scale), (+129 mm SPB equivalent), a sharp 78 mm rise.

Debris from the old beaver dam (I don't think it's active) is now keeping water from flowing freely over the baffle. Water height, which should have been +231 mm above the baffle was only +50-60 mm above and flow was weaker than a couple of days ago. Outflow into Coats Marsh Creek channel mainly from water from the outlet pipe now flowing strongly (>5 L/s), flow from the drainage pipe on the left bank minor, as before, and very little water from the right bank. Coats Marsh Creek lower down now flowing more strongly than these figures would suggest.



Photo: Beaver dam 38-metres long holding up well.

The East Path Creek, first noted on November 18 is now flowing. It makes its way through salal and forest and then breaks up into rivulets and rills in waterlogged grassland where 9 inches of Saturnasoil covers a sandstone plain (102m AMSL). The gradient from here to the marsh

proper is very low. Flow at the culvert (diameter 31 mm, depth 12 mm, flow 1.2 ft./s Brunton, Q = 11.8 L/s). This is the first drainage channel I have seen from outside the immediate area of the marsh. The source is the land along the north side of the apple orchard. It clearly is not a spring. Buffleheads.

December 7, 2015 (day +142)

Rain 50.5 mm recorded at El Verano since last visit, 70 mm at the marsh. Another strange big difference. Level at the cistern -130 mm, only a 40 mm rise. Level at the weir +433 mm WPB (scale), (+324 mm SPB equivalent), a sharp 195 mm rise.

The East Path Creek is flowing at close to capacity (diameter 31 mm, depth 22 mm, flow 1.09 m/s float, Q = 53.1 L/s). The outlet of this culvert is not perched. This little hitherto-neglected creek is pouring a lot of water into the marsh now its riparian sides are flooded. Perhaps this is the "spring" oft referred to.

Lots happening hydro-wise.

Although debris from the old beaver dam continues to keep water from the baffle, the depth over the sill still only +90 mm, the backup socaused is allowing water to flow over the debris. Flow over the baffle is now very strong, stronger than from the outlet pipe, which is now flowing at capacity as its inlet is totally submersed. All in all, the total flow is probably now in excess of 100 L/s, which, together with the completion of flooding round the perimeter, probably accounts for the now only modest response of the marsh level at the east end to rain.

December 9, 2015 (day +144)

Lots happening hydro-wise. Light showers; it's rainbow time in the fitful sunshine.

Rain 41 mm recorded at El Verano since last visit, 49 mm at the marsh. Level at the cistern -109 mm, a 21 mm rise. Outflow from the marsh is slowing, but not yet stopping, the rise in response to rain.

Level at the weir +664 mm WPB (scale), (+555 mm SPB equivalent), another sharp 231 mm rise. Water is now leaking through, and overflowing, the beaver dam in increasing quantities producing flooding at the weir, and reducing the difference in water level between the marsh proper (east or outer end) and the area around the

weir (west or

inner end).

Startling thought: it may be that but for the beaver dam, the marsh would have gone dry this summer.

This flooding of the deck doesn't appear to be a serious problem, tho' there's a bit of gullying where the deck joins the berm.

The East Path Creek is flowing at capacity (diameter 31 mm, depth 31 mm, flow 0.71 m/s float, eddy at the entrance, Q = 53.7 L/s).

Theoretical 8-inch PVC pipe flow 3% gradient is about 36 L/s at capacity, but I stand to be corrected on that.

Debris from the old beaver dam continues to keep water from the baffle. Roughly 156 L/s (width 0.6m, depth at the baffle 280 mm, surface velocity 0.76~m/s Brunton, lambda 1.2).

Flow from the drainage pipe on the left bank into the creek bed below the weir stronger, about 2 L/s, and is keeping the drained area in the private property at a fairly constant level despite the change in level of the marsh.

December 11, 2015 (day +146)

Rain 9.5 mm recorded at El Verano since last visit, 12 mm at the marsh. Level at the cistern -112 mm, a 2 mm fall. Outflow is finally putting a ceiling on the level.

The East Path Creek is also flowing more slowly in spite of additional rain (diameter 31 mm, depth 17 mm, flow 0.46 m/s float, Q = 19.5 L/s).

The NE Arm drainage (Map 2.20) overflowing the trail - first time this observed. Several channels, one measured 14 L/s, so followed it down to the marsh through flooded glades intersected with rivulets. At the marsh, measured 85 L/s (1.5 m wide, 0.54 deep, 0.23 m/s float, lambda 0.85), but this measurement was crude and could be an under-estimate.

REALITY CHECK

Consider 25 mm of rain in a day, a lot.

INPUT 1: rain on to open water beyond the beaver dam

 $= 0.025 \times 46500 \text{ m}^2 = 1,163 \text{ m}^3$

INPUT 2: rain on to open water in the bay around the weir

 $= 0.025 \times 2300 \text{ m}^2 = 58 \text{ m}^3$

INPUT 3: moving into marsh from perimeter

= INPUT 1 (level has been rising twice as fast as rain when little output)

TOTAL rain input = $2,384 \text{ m}^3$

If the marsh were at a steady level, the outflow would need to be $2,384 \text{ m}^3$ a day = 28 L/s for one day, which is not all that much.

In fact the marsh level is not steady, it was up to December 11 rising, and the outflow was much greater than 28 L/s. So there must currently be a significant extra source of water. Is this East Path Creek and NE Arm combined?

On December 9 and 11, it was in the $100-150~{\rm L/s}$ range. And the estimated outflow on December 9 was $192~{\rm L/s}$ (pipe + baffle) with a flow in Coats Marsh Creek of $244~{\rm L/s}$.

Difficult to avoid the conclusion that the flooding that is occurring is mainly due to a recent inflow from the flooded NE Arm and areas east of the marsh. If true, the level of the marsh should revert to a lower level fairly rapidly once the rain eases off.





Photos. December 11, NE Arm of the marsh - a seasonal swamp (meadows, woodlands, and alder-groves) extending almost 500 metres to the east, now completely unable to soak up more rain.



The NE Arm and the East Path Creek, which drains land north of the orchard, only flow to the marsh during prolonged periods of heavy rain. The eastern NE Arm especially has been part of the marsh's catchment for only a few days this fall.

No springs seen, just drainage.

December 14, 2015 (day +149)

Rain 17.5 mm recorded at El Verano since last visit, 27 mm at the marsh. Level at the cistern -96 mm, a 16 mm rise. No longer a $\times 2$ rise in response to rain, but still a rise.

Rain 27 mm recorded at El Verano since last visit to the weir. Level at the weir +366 mm WPB (scale), (+257 mm SPB equivalent), a very sharp drop of 298 mm. The strong outflow is drawing the weir level down and the beaver dam is again holding the marsh level up.

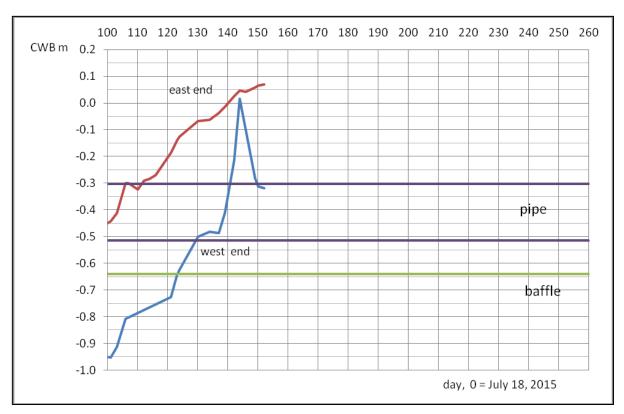
A very quiet day, no rain, and some weak sunshine, but no life it seems anywhere.

The <u>East Path Creek</u> is flowing at only slightly more than half capacity; I guess around 20 L/s. The NE Arm is still overspilling the path but flow is slightly less than three days ago.

The flooding at the weir has subsided. Flow from the drainage pipe on the left bank reduced to about $1\ L/s$. Baffle flow not measured, but a bit less than before.

December 15, 2015 (day +150)

No rain. Level at the cistern -90 mm SCB, a 6 mm rise. Level at the weir +335 mm WPB (scale), a drop of 31 mm. The weir level of -312 mm CWB is now slightly below the inlet of the outflow pipe. Debris from the old beaver dam still keeping water from flowing freely over the baffle. Sill depth +100 mm. The NE Arm is still overspilling the path but flow is much reduced.



The land in the NE Arm to the east is full of swales and other depressions that fill with water when the ground can no longer absorb it. These are the reflection of the gently undulating sandstone bedrock whose fractures have become choked with mud. The swales and sumps are like saucers. All the while they are not full, no water flows out of them. But the moment they are full to the brim, every drop going in becomes a drop flowing out. Hence, the flash flooding. As soon as the rain eases off, even slightly, these outflows abruptly cease and the water reverts to being isolated pools, ponds, and puddles that leak, over the course of a week or less, down through fractured sandstone into the ground. I call it the "cracked-saucer-effect".

Woods are strangely silent - dank and gloomy, yet green still with shiny-leaved salal, prickly mahonia with flashes of red, and mats of tree-moss on duff and needle-mould; all showing by their verdancy their disdain for what passes as winter here. Deeper in though, beneath closed canopies, I feel like a tunicate bulb, the only living thing in a cold sodden world, surrounded by rotting brown things; sheathed in drab protective layers, but inwardly assured that, even here, the light will return, and the dripping wet will relent when the earth, in its own good time, has rounded this shadowed arc of its perennial orbit.

December 17, 2015 (day +152)

Rain 3 mm recorded at El Verano since last visit, 12 mm at the marsh. Level at the cistern -85 mm, a 5 mm rise. Level at the weir +329 mm WPB (scale), a drop of 6 mm.

The East Path Creek is flowing at a measured 7.6~L/s. The NE Arm is still overspilling the path but becoming close to a puddle. The flow in Coats Marsh creek is lower again. All looking very stable. Wet snow here and there after sleet.



Yule at the marsh.

December 29, 2015 (day +164)

Rain 51 mm recorded at El Verano since last visit, 88 mm at the marsh. Level at the cistern -88 mm, a 3 mm drop. Level at the weir +372 mm WPB (scale), a rise of 43 mm.

The East Path Creek is flowing at a measured 13 L/s. The NE Arm spillway over the path has almost stopped and there's very little babble from the several small streams flowing to the shore of the marsh. NE Arm flow into the marsh measured at about 9 L/s.

Sill depth +70 mm, velocity 0.68 m/s (Brunton), flow 34 L/s. Pipe at full flow, only just submerged, 32 L/s (possibly a low estimate given the flow in the creek). Flow from drainage pipe below the weir, probably <1 L/s.

Still something not right with the numbers. 88 mm of rain sounds like a lot, but over 12 days over a catchment area twice the size of the open water (including the west-end bay) it's only 8.3 L/s. The flow at the weir is too weak compared with Coats Marsh Creek; yet, too strong for the known input to the marsh.

December 31, 2015 (day +166)

Rain 2.6 mm recorded at El Verano (ice) since last visit, 0.1 mm (trace) at the marsh. Level at the cistern -80 mm, an 8 mm rise. Level at the weir +338 mm WPB (scale), a drop of 34 mm. The weir level of -309 mm (CWB) is 7 mm below the top of the outflow pipe at -302 mm (CWB) which is what you see. It is just slightly exposed.

Sunny. Ravens very vocal.

The East Path Creek is flowing feebly at a measured 4 L/s. The NE Arm spillway over the path has completely dried up. Lots of debris at the baffle. Sill depth +80 mm, velocity 0.67 m/s (Brunton), flow 39 L/s. Pipe at full flow, but the estimate of 32 L/s does look low in comparison with the flow over the baffle. If it were 40 L/s the weir flow today would match the Coats Marsh Creek flow, but leave unexplained where all this water is coming from.



A new year beckons!

Continued here.

Field observations—2016

The cistern datum SCB, still useable despite requiring wading to reach it, is taken to be +0.155 m relative to CWB.

The winter scale datum WPB is taken as -0.647 m relative to CWB. All rainfall recordings are as observed at the marsh.

January 04, 2016 (day +170)

Snow on the trail thick enough to crump underfoot, a sound so evocative to a one-time skier and mountaineer. Only the sole of boots compressing crystals of snow can make it.

About 20-30 mm of snow, 2 mm equivalent at the marsh. Level at the cistern -91 mm SCB, an 11 mm drop. Level at the weir +302 mm WPB (scale), a drop of 36 mm. The outflow pipe is partly exposed.

The East Path Creek is no longer flowing. Not only is the NE Arm spillway dry, but former ponds on the east side of the path looking into the arm are dry too.

<u>January 07, 2016</u> (day +173)

Rain 9 mm with some ice left over from last visit. Level at the cistern -91 mm SCB, unchanged. Level at the weir +274 mm WPB (scale), a drop of 28 mm. The outflow pipe is about half exposed and obviously doing its job in keeping the outer marsh at a steady level. Sill depth +40 mm.

Small flock of about 20 ducks at the east end. Buffleheads, probably widgeons, and a couple of handsome brown-headed common goldeneyes, hens, with a fascinating, self-assured, look-at-me look.

January 12, 2016 (day +178)

Rain 16 mm from last visit. Level at the cistern -86 mm SCB, a rise of 5 mm. Level at the weir +299 mm WPB (scale), a rise of 25 mm. A few frogs practising their courtship songs.

January 15, 2016 (day +181)

Rain 27 mm from last visit. Level at the cistern -72 mm SCB, a rise of 14 mm and a record high. Level at the weir +393 mm WPB (scale), a sharp rise of 94 mm.

East Path Creek flowing again, measured 15.8 L/s. NE Arm spillway flowing, not as much as in December, but several L/s over the path. The NE Arm must be waterlogged for the flow to start up again so quickly.

Outlet pipe inlet completely submerged. Sill depth $+95\,\mathrm{mm}$; flow about 47 L/s, but velocity measurement bad. Hard to position corn-starch floats because the water level is close to the underside of the bridge.



South shore in the wet season. Even donning gumboots doesn't stop you getting soggy socks as you skirt along here.

January 18, 2016 (day +184)

Rain 34 mm from last visit. Level at the cistern -70 mm SCB, a rise of a mere 2 mm, but another record high. Quite a few buffleheads out on the water. NE Arm spillway is flowing strongly.



Photo: One of several ephemeral creeks in the NE Arm.

The weir is poised to be flooded; flow over the debris at the baffle strong; pipe submerged; level +427 mm WPB (scale), another rise of 34 mm. Coats Marsh Creek flowing fast and noisily; and I see a spillway over the top of the beaver dam. Not leaking much, a few litres a second, but ready for a lot more.

January 21, 2016 (day +187)

Rain bucketing down, 32 mm from last visit. Memo to self. Keep the corn-starch peanut floats in a Ziploc bag when it's raining. Avoids a gooey mess in the raingear pocket.

Bushwhacked the "trail" along the south shore. So overgrown with breast-high salal, and obstructed by mossy, knee-stretching deadfalls that it can scarcely be called a "trail" anymore. The water has encroached into the forest in a few places, but no creeks flowing into the marsh from the south were encountered.



"Beaver bay" in the southwest corner of the marsh.

The weir surprisingly not flooded; flow over the debris at the baffle very strong; sill depth unusually high at +180 mm which accounts for lack of flooding. Pipe submerged; level +457 mm WPB (scale), a rise of 30 mm.

Level at the cistern -68 mm SCB, another small rise of 2 mm. NE Arm spillway flowing strongly, but East Path Creek not at full capacity.

January 22, 2016 (day +188)

Bridge deck flooded, more so than in December. Level +716 mm WPB (scale), a rise in one day of 259 mm. Sill depth +285 mm.





The new beaver dam (left) is still holding water back, but the over-the-top spillways are busy filling up the weir bay.

January 23, 2016 (day +189)

Rain 27 mm since two days ago.

Level at the cistern -51 mm SCB, a rise of 17 mm; hence increased flow over the top of the beaver dam. East Path Creek full, inlet of culvert submerged. NE Arm flowing very strongly at the spillway over the path, several tens of litres/sec.

Another spillway seen about 200 metres further along toward the junction of the East Path with the 707 CP's Marsh Trail. Normally just puddles either side of the track, leaving the track itself (the "highway") dry. Today water trickling across. Not creating a stream in the forest between here and the marsh; however, you can see rain-run erosion, evidence that in extreme storms this might be another source of runoff from the NE.

Level at the weir +655 mm WPB (scale), a drop of 61 mm in just 20 hours without rain. Sill depth +220 mm. Flooding of the deck now restricted to the southeast corner (the deck is not level) and significantly less than a few hours ago.

The 8-inch outflow pipe probably should have been a 12-inch one.

January 25, 2016 (day +191)

No rain. Flooding abated. Susurrus of rivulets in the NE Arm less sonorous, and of the creek below the weir from the trail, less thunderous.

Level at the cistern -62 mm SCB, a drop of 11 mm. NE Arm still flowing, but gently. Level at the weir +415 mm WPB (scale), a drop of 240 mm. Sill depth +100 mm. Flow from drainage pipe below the weir only a litre per second.

Those young grand firs that are open to the southern sky are displaying lemon-green flushes of new growth. And out on the water, the buffleheads play.

No observations January 26-February 4.

February 5, 2016 (day +202)

Rain. Groups of common goldeneyes out on the water.

Level at the cistern -45 mm SCB, a new high. NE Arm spillway flowing gently. East Path Creek lively, but not at full capacity. Level at the weir +411 mm WPB (scale). Sill depth +90 mm.





A nimbostratus day. The ash-grey and faintly-green epiphytic lichens that blotch and band the trunks of the alders providing variety that the blank sky lacks. Up above, the scraggly scarcely-fractal branches

of the trees silhouetted against the nimbus clouds sport catkins. The new year is underway.

February 8, 2016 (day +205)

Fine. 9 mm rain since three days ago. Level at the cistern -51 mm SCB, a drop of 6 mm. East Path Creek flowing weakly, about a quarter capacity, NE Arm spillway dry. Level at the weir +378 mm WPB (scale) which is -0.269 m CWB, a drop of 33 mm. Sill depth +50 mm. Debris under the bridge blocking the flow. Outflow pipe inlet appears to be just about completely immersed, which should be at the -0.302 m CWB level. Something not quite right, but I'm not going to worry about a better measurement of the pipe height just now. Maybe the end sags a little in summer when it's not immersed.

Barometric pressure high today; sky a hazy, smoky blue; no trace of wind; no suthering in the trees; only the faint near-infrasound of far-away traffic. The deciduous trees, their boles brightened by sunshine, suddenly look naked or dead.

Birds to be heard when you stop; stand; and listen. No choral masterpieces, but brief business-like tweets interspersed with silence. Red-winged blackbirds, proclaiming the name of the Somalian capital - "Moga'dEEE'shu", raucous crows, and a raven adding the slow measured whooshing of its wingbeats as it passes by. A flamboyant drake, a mallard, giving himself a splendid shower by furiously flapping his wings sending up fountains of spray. Frogs. A few midges over the water, caught like thistledown in the sunlight.

February 11, 2016 (day +208)

Rain off and on, 3.5 mm since three days ago. Level at the cistern -42 mm SCB, a rise of 9 mm, and another record high. East Path Creek



-56

almost no flow, NE Arm spillway dry. Level at the weir +329 mm WPB (scale), a drop of 49 mm. Sill depth +40 mm. Buffleheads bathing.

Very, very quiet; it's as if the clouds muffle distant sounds as well as the light. Frogs vocal, out-doing even the cawing crows, until that is, it starts to rain, when the frogs fall silent. There're the occasional skewering calls of a flicker, and the chattery, ratchety complaints of a jay, but mostly there's nothing to be heard when the frogs are done beyond raindrops pitter-pattering on the shrubbery.

February 14, 2016 (day +211)

the water level in the marsh to rise.

No rain. Low cloud wafting almost imperceptibly through the tops of the trees. 28 mm rain since three days ago. Level at the cistern -34 mm SCB, a rise of 8 mm, and another record high. East Path Creek about half capacity, NE Arm spillway still dry. Level at the weir +396 mm WPB (scale), a rise of 67 mm. Sill depth +75 mm.

Buffleheads, goldeneyes, and maybe widgeons paddling back and forth quite purposefully, not just foraging. Frogs almost shrill at times. The bulrushed beaver dam (below) audibly leaking, but still allowing



February 17, 2016 (day +214)

Rain 34 mm from last visit. Level at the cistern -9 mm SCB, an astonishing rise of 25 mm, something I'd have thought the beaver dam couldn't hold. Level at the weir +610 mm WPB (scale), a sharp rise of 214 mm and enough to put water on the SE corner of the deck, but no flow across it observed. Sill +150 mm.

East Path Creek flowing strongly, but not at capacity. NE Arm spillway across the trail flowing very strongly, probably as heavily as I've seen it. Maybe more than 10 L/s.

Dark moody nimbostratus threatening more rain; an occasional droplet pattering on my raingear hood. Frogs subdued. Does the world really need more wet?

February 19, 2016 (day +216)

Rain 20 mm from last visit. Level at the cistern 0 mm SCB (no measuring stick needed!), a rise of 9 mm. The dam really cannot take much more. Level at the weir +582 mm WPB (scale), just clear of the deck. Sill +140 mm. NE Arm spillway flowing very strongly, looking like a creek. Definitely more than 10 L/s. Spillway about 200 metres further along is full but not flowing, though the "puddle" on the east side is looking more like a woodland pool. I suspect though that this is not a serious contributor to the catchment despite earlier remarks because it is not well connected to a watercourse.



Curious to see how the beaver dam was doing, I brustled through a tall patch of dripping-wet salal to its northern edge. It looks very full. Several active spillways over the crest and a trickle creeping around it on the shore, even though the beavers had carefully tried to prevent it doing that. Rough measurement (no instruments) showed marsh was about 260 mm above the weir bay level. According to current baselines, it should be nearer 220 mm. SCB (+0.155m CWB) is perhaps a little low.

Breeze in the treetops, the suthering mimicking a fast approaching squall. The treetops sway as the wind strengthens and sends down short bursts of splattering raindrops.

February 23, 2016 (day +220)

Rain 4 mm from last visit. Level at the cistern -5 mm SCB, a fall of 5 mm. Level at the weir +387 mm WPB (scale), a fall of 195 mm thanks to the pond leveller. Sill +50 mm. East Path Creek low and flowing gently. NE Arm spillway drying out.



Sunny, cumulus and wisps of cirrus, but far too little to bother my shadow. Ring-necked ducks, and honkers, about 10, at times making quite a racket though I'm not sure the marsh needs Canada geese at this time of year. The woods too seem unusually chirpy, tweety, and twittery with occasional kores, kaars, and raspy rawks from the marsh's corvidae.

Large owl circling slowly like a vulture but just above the trees, being mobbed by one small bird -- yes I know one bird can't constitute a mob but this one was doing a good job in the circumstances. Couldn't see what species either were. The owl was whitish in the sunshine with bars and brown speckles, but not startlingly snowy white. A stubbyish fan tail and rounded wings. It was big.

February 26, 2016 (day +223)

No rain. East Path Creek only a trickle. Honkers noisy again. No measurements, forgot my gumboots.

February 27, 2016 (day +224)

7 mm rain overnight. Level at the cistern -4 mm SCB, a rise of 1 mm. Level at the weir +331 mm WPB (scale), a fall of 56 mm but still keeping the pond leveller busy. Sill +50 mm as before. East Path Creek a trickle. NE Arm spillway dry as are the ephemeral ponds in the alder-groves east of the path.

Honkers, and far-off ducks of various kinds (bufflehead, ring-necked, mallard, and probably others), fitfully vociferous, seemingly sounding alarms, being assertive, or squabbling rather than quietly chitchatting amongst themselves as they did in winter. Insects appearing.



Bulrushes on the beaver dam

March 1, 2016 (day +227)

A break after heavy rain, 50 mm. Level at the cistern +13 mm SCB, a sudden rise of 17 mm. Level at the weir +590 mm WPB (scale), a rise of 259 mm; the pond leveller can't cope. Deck on the verge of being flooded; water at the SE corner. Sill +120 mm. East Path Creek flowing strongly at about half capacity, and the NE Arm spillway flowing again, gurgling, and rising rapidly. The ground is soggy.

Only sparse rain now dimpling the sky-mirrored puddles. Frogs and buffleheads. Clouds, ragged and drifting, a range of battleship greys. The air restive in the treetops, but still on the ground.

In the subdued light, displaying the whole gamut of greens from shyof-blue to shy-of-yellow are carpets and cloaks of mosses, some dark but others so bright they appear luminescent; varied-forest-green needled Douglas-firs and occasional cedars with their understories of salal, Oregon-grape, evergreen huckleberry, and those sword ferns that

have survived the winter; pale-green-tinted lichens on leafless twiggery; lawn-green grasses and weed-seedlings along the trails; yellowish-green new-growth (*l'émeraude*) on balsam saplings; and, from aloft, darker-bluish-green sprigs from the wind-torn tops of the older trees. What chloroplasts reject, chlorolabes in my eyes willingly absorb. Our local Hul'qum'inum language is one of several in the world that use the same word for green and blue. There's a grass-coloured *cqway* and a blue-jay *cqway*.

March 2, 2016 (day +228)

Rain since yesterday, 3 mm. Level at the cistern +24 mm SCB, a rise of 11 mm. Higher and higher it goes. Level at the weir +677 mm WPB (scale), a rise of 87 mm. Deck flooded, but only partially as water is now flowing down into the hollowed-out by-pass slots the water has made for itself, mainly where the deck meets the berm on the south side. Sill +180 mm. East Path Creek flowing at measured 39 L/s, and the NE Arm spillway flowing strongly.

Water flowing into the marsh from pools in the woods on the west side of the main entrance. Only ducks seen, a pair of mallards. No geese. Very quiet apart from the susurrus of the trees in the breeze.

REALITY CHECK

In the last 90 days (228-138) the marsh as had 0.644 m of rain. Let's say the area of the marsh and its immediate surroundings is for present purposes 7.0×10^4 m² (7 ha). Then the volume of rainfall has been 4.65×10^4 m³.

During that time, the marsh level has risen by about 0.1 m, which accounts for about 7.0×10^3 m³ of the rainfall, leaving 3.95×10^4 m³ as outflow. This is an average outflow of 439 m³.day¹¹ or 5.1 L/s.

Now the average flow in Coats Marsh Creek over the 90 days can't be computed accurately because it was not observed daily, but based on the observations that were made it was about 123 L/s. We have to allow something for water flowing into the creek from below the weir and above the bridge where observations are made, so let's call it roughly 110 L/s.

Clearly then, I have either made a bad error in observations or arithmetic, or the catchment area of the marsh is very much larger than the assumed 7 ha. To reconcile the numbers, it would have to be 151 ha, or about 22 times larger.

This is a huge number, mitigated slightly only by the fact that the average distance of the watershed away from the marsh would be $\sqrt{22}$ or about 4.6 times larger.

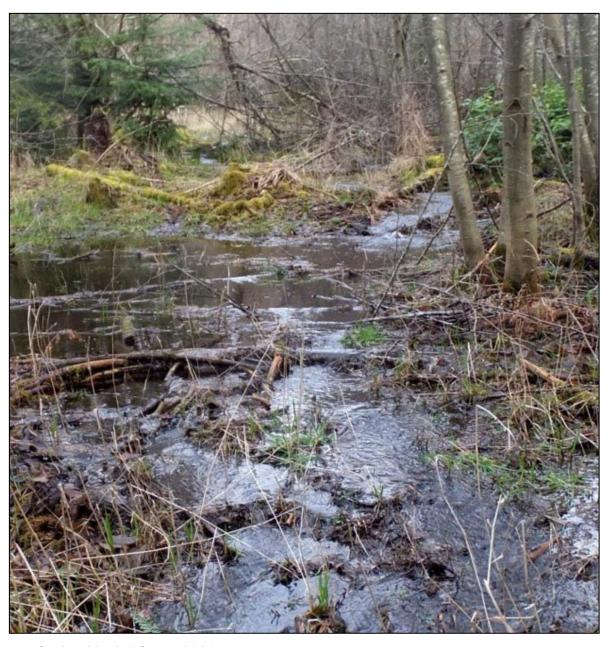
Looking at the contours of land around the marsh, which I don't have a detailed measure of, this "extra" area of catchment would have to come mostly from land to the east of the line of longitude through the east end of the open water area, meaning within a semicircle with radius 982 m. While this is, at a stretch, feasible, practically all the land so encompassed is forest below 125 m AMSL, albeit some with

thalwegs leading into Coats Marsh Creek rather than the marsh, it remains a puzzle as to why such a large influx of water is not more observable than it is. Granted there are heavy flows on occasion from the NE Arm and East Path Creek, likely together amounting to over 100 L/s, but these flows are far from continuous. Water also infiltrates the bedrock in the NE Arm at a significant rate, emptying ponds in less than a week.

While something is wrong or wildly inaccurate, I still don't know what.

END OF REALITY CHECK

Floodwater from the NE Arm nearing the lake.



March 4, 2016 (day +230)

Rain since last visit, 20.5 mm. Level at the cistern +20 mm SCB, a drop of 4 mm. Level at the weir +651 mm WPB (scale), a drop of 26 mm. Deck partially flooded but no significant flow across it. Sill +160 mm. East Path Creek flowing strongly still, as is NE Arm spillway. Tracked this down to point where it joins the lake and measured 57 L/s. Seems more than this as the swampy woodland is laced with lively branching rivulets, at least three seemingly big enough to be called "creeks", and there are puddles-grown-into-pools everywhere. The "creeks" however are shallow and their flows not voluminous, even though they babble like brooks as they flow over deadfalls in this mossy waterland.

Water still flowing into the marsh from the woods on the west side of the main entrance. It's sheet runoff over the path, but only a litre or so a second if that.

Water trickling over the crest of the beaver dam in many places, in part driven by gusty SE wind, but the dam, as full as it is, shows no sign of washouts.

March 7, 2016 (day +233)

Rain since last visit, 46 mm. Level at the cistern +30 mm SCB, a rise of 10 mm; yet again a record high. Level at the weir +704 mm WPB (scale), a rise of 53 mm.



Deck partially flooded as before with a strong flow into the bypass slot along the deck's south side-the deck has become another sill; some flow also on the north side from the bank into a hole leading underneath the deck. Baffle sill +180 mm.

East Path Creek flowing strongly, almost full at the culvert. Bushwhacked down its course. The creek has several branches, as does the NE Arm.

They meander around trees,

become sheets of runoff across a sodden and flooded meadow, and run, heard but not seen, beneath tall dense clumps of salal. Their combined flow is hard to judge, but it looks heavy as the branches converge to fill the rills leading down to the lake. Similar in volume I would guess as the flow from the NE Arm which suggests its catchment area must be almost as large too.

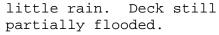
Forest has lost the deep silence and solitude of winter.



Photo (March 7): Confluence of two of the branches of East Path Creek as it approaches the lake. Looking upstream towards the path.

March 8, 2016 (day +234)

Level at the weir +652 mm WPB (scale), a drop of 52 mm in one day with



to the atlas. Two hawks

overhead, Cooper's

maybe.





Photo (March 9): Lipstick lichen in the headwaters of East Path Creek.



March 10, 2016 (day +236)

Torrential rain overnight, 70mm. Level at the cistern +77 mm SCB, a rise of 51 mm. Every depression, hollow, and ditch flooded, the trails all puddled. Level at the weir +802 mm WPB (scale), a rise of 150 mm.

Deck completely flooded with a strong flow across its entire width and additional flows round both ends. Sill height unreadable and meaningless, so strong the flow across the whole width of the weir. Moss has been stripped from the concrete, but the berm is holding.

East Path Creek level 20 cm over the top of the culvert's inlet, creating glugging eddies that ingulph air like drains in bathtubs.

NE Arm spillway a veritable creek, and even the smaller (potential) spillway further north along the path, (Jan.23 & Feb.19), flowing with a clearly-visible rill downstream leading through the woods.

Coats Marsh Creek has more than twice as much water flowing in it as ever has been observed before.

Oh yes! Quite a few buffleheads foraging out on the lake. Mallards in couples. No geese, but a fly-over by a bald eagle.







Flooding across East Path by East Path Creek (above) and across the NE Arm spillway (below).



March 12, 2016 (day +238)

Survey of East Path Creek headwaters continued. Level at the weir +713 mm WPB (scale), a fall of 89 mm. Deck back to "normal" flood conditions with water flowing into the growing gap between the deck and berm, but relatively little flowing directly across it. Stump Farm Number One Stream flowing vigorously (10+ L/s?) as it exits Canary Grass Meadow and crosses the Three Gates Trail.

No visit to east end, but the lake sounds at times like a barnyard meaning the trouble-making Canada geese are back again.

March 13, 2016 (day +239)

Spent time mapping some details. East Path Creek can indeed be traced back to McGuffies Swamp, 1.8 km away. It flows gently through High Point Meadows (end of Chernoff), then boisterously tumbles down some 25 metres through woods in small waterfalls, chutes, and gullies to Coats Drive, then west to the marsh.



Waves of wind in the treetops and the rain pummelling down as they break, sounding for all the world like heavy surf. Puddles in the sandstone are brick-red. My notebook is soggy and my pen doesn't work.



March 16, 2016 (day +242)

Rain since last record on March 10, 26.0 mm. Level at the cistern +42 mm SCB, a drop of 35 mm. Level at the weir +488 mm WPB (scale), a drop of 225 mm in 4 days. Deck dry. Sill +95 mm. Flow languid after last week's tumultuous spate. East Path Creek flowing about half capacity, NE Arm spillway flowing sedately.

Sunny; sky a sheer-veiled blue with cirrus and low cumulus lurking along the southern horizon. Cool, fresh northwest breezes from somewhere out in the Alaskan Gulf. They have the absence of scent that soap and shampoo manufacturers call natural. Ducks (and drakes) scattered over the marsh busy feeding, the ring-necked ducks are one moment up, the next topsy-turvy and diving down; there are probably more than it seems; a mallard couple at home in the weir bay; no geese. Wood ant colonies are full of activity.

Most puddles have dried-out; mud left behind in small hollows in the sandstone has lost its redness and become russet, *braunification* they call it; hematite or goethite to limonite perhaps, or just a trick of dehydration. A few towhees heard in the bush.

Lichens, liverworts, and hornworts are common in the marsh, thriving in the cloud-light that permeates the leafless branches of the winter alders. It's tempting to give them common names, but then there would be no point because your invention would not be "common". They're alien beings, and their alien names befit them.

March 18, 2016 (day +244)

No rain for 4 or 5 days now. Level at the cistern +34 mm SCB, a drop of 8 mm in two days. Level at the weir +390 mm WPB (scale), a drop of 98 mm. Pond leveller back in control. Sill +51 mm. East Path Creek flow low at measured 7.5 L/s, NE Arm spillway dry.



Fruiting frog-pelt lichen along the edges of the paths.

March 22, 2016 (day +248)

Rain since last record 14.0~mm. Level at the cistern +39 mm SCB, a rise of 5 mm. Level at the weir +335 mm WPB (scale), a drop of 55 mm. Sill +50 mm. East Path Creek very low and scarcely moving, NE Arm spillway dry.

WATER QUALITY TEST (East Path Creek at the culvert)

specific conductivity $75\mu\text{S/cm}$ (pre-cal $44\mu\text{S/cm}$ at 9.5°C) pH = 8.2 7.2 clear, almost no turbidity DO 9.5 mg/L (saturation 86%, 10.7°C, 100.5 kPa).

Much like other creeks after the heavy rains. Low conductivity reaffirms this is not groundwater from a spring.

March 25, 2016 (day +251)

Rain since last record 7.0 mm. Level at the cistern +39 mm SCB, no change. Level at the weir +305 mm WPB (scale), a drop of 30 mm. Sill +36 mm. East Path Creek no flow and NE Arm spillway dry.

Sunny, a nice-10°C-spring-day day. No stunningly azure sky, but drifting bands of cirrus like bands of black magnetite and ilmenite

left by almost-over waves forming and re-forming strand-lines on a sandy beach.

Through the brush to where the NE Arm enters the lake. Several trickles amounting to about a measured 7 L/s in total. Disappointing to find no skunk cabbage which is flourishing prettily along Chapple Creek, only sprouting stinging nettles in the soggy ground. The Oregon-grape blossoms up here too are only in bud, unlike on the south side of the island where the tall variety especially, with their native, berberine-inpired yellowness, rival the conspicuity of all those Dutch daffodil imports people have planted.

March 29, 2016 (day +255)

Rain since last record 2.0~mm. Level at the cistern +39 mm SCB, again no change. Level at the weir +293 mm WPB (scale), a drop of 12 mm. Sill +30 mm.

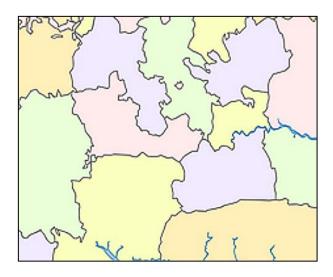
East Path Creek ponding along most of its length with no flow. NE Arm spillway dry though the reed-canary-grass meadows to the east still have a few inches of water; found a few white marsh-marigolds seaside bitter-cress plants, Cardamine angulata, in flower there (photos). They're red-listed, unlike its tiny and so-easily-overlooked relative, little western bitter-cress, Cardamine oligosperma, which in contrast, is abundant in the launds and along the grassy pathways of the marsh.

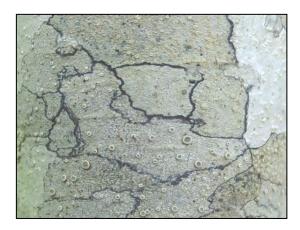
Tree Violet-green swallows over the lake. Redwing blackbirds calling and little song birds in the bush twittering and tweet-tweet-tweeting more than usual, nearly always unseen, but I did exchange visuals with a nuthatch while watching the buffleheads way out on the lake.



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¹ Caltha leptosepala ssp. howellii, wrong guess.





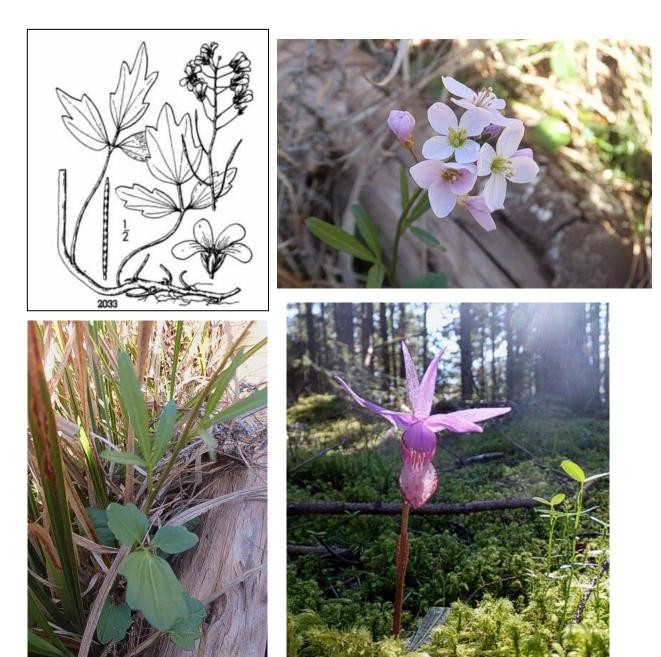
Who needs a map when there's one on the lichen-clad bark of every alder tree. Tell me that isn't old Berkshire in the middle.

Continued here.

Previous file here.

April 1, 2016 (day +258)

No rain. Level at the cistern +24 mm SCB, a drop of 15 mm in 3 days. Level at the weir +305 mm WPB (scale), a rise of 12 mm. Sill +34 mm.



Cardamine angulata. Leroy Abams, Illustrated Flora of the Pacific States, Vol.2, pp.280 & 284, Stanford University Press, 1944. Found in NE Arm. Cardamine nuttallii in Coats Marsh RP and Canary Grass Meadow.

Bottom right: Fairy slipper (Calypso bulbosa) in Coats Marsh RP.





So which picture was taken in the marsh and which was not? Both photographs were taken in early April.

The blossoms in the upper picture are of the tall variety of Oregon-grape, Mahonia aquifolium, which blooms earlier than the dull variety, M. nervosa. Although most Oregon-grapes in the park are M. nervosa, there are some M. aquifolium plants in the brush and this is one of them.

One Hul'qum'inum word for yellow, *luluts*', is the same as their word for the Oregon-grape; the plant is a source of a yellow die used by basket makers.

So the flowers in the lower picture were not seen in the park, right? Well, wrong. These commercial cultivars were growing in the west thistle-and-broom field (an old burn-pile clearing) on the north side of the lake. Oh well!

what's one more non-indigenous species. Some people just don't see the point of nature reserves.

Coats Marsh Creek flows strongly over, in places, sandstone ledges downstream of the bridge. Very lively; a "proper" brook. Stump Farm Number One Stream, having been joined by Number Two, is flowing at several litres/sec at its confluence with the larger creek.

April 4, 2016 (day +261)

Rain since last record 5.5 mm. Level at the cistern +34 mm SCB, recorded with bare feet as I forgot my gumboots again, a rise of 10 mm in 3 days. Three geese on the lake, the one gander making frequent and seemingly unnecessary raucous alarm calls. Buffleheads are still here, discreetly busying about in the reeds along the south shore; planning to be here all summer perhaps. A hawk of some kind (sharpshinned?) circling above the trees vulture-like. Violet-green swallows over the lake. Evergreen violets, Viola sempervirens, and wild strawberries, Fragaria virginiana, (photos) beside the trail.





The flow of Stump Farm Number One Stream has already abated. Scarcely any flow as it leaves Canary Grass Meadow.



Wandering through the meadow - not too mucky if you keep to the mossy hummocks - came across red-berried holly; a big-leaf maple

in flower; bitter-cherry trees, *Prunus emarginata*, festooned with blossoms; lots of *Cardamine angulata*; a few deep-pink veined, Siberian spring-beauties (candyflowers), *Claytonia sibirica*; and a redflowering currant bush, *Ribes sanguineum*.





Don't go into the meadow by the way without a compass; if the sun is obscured, the wind fickle, the rivulets aren't running, and the geese on the lake are quiet; you'll soon lose all sense of direction. The deer paths and faint traces of old logging routes are seductive, but, unless you're a deer, go nowhere in particular; and, after a









while, that tall mop tree on the skyline that you've been using as a landmark will begin to look like all the others.



April 8, 2016 (day +265)

Rain 2mm. Level at the cistern +37 mm SCB, a rise of 3 mm. Just rain? Level at the weir +235 mm WPB (scale), a drop of 70 mm in 7 days. The pond leveller is draining the bay, but the beaver dam is retaining the water the marsh will need this coming summer.

East Path Creek dry, as is the NE Arm all the way from the spillway to within 30 metres of so of the lake. Contribution to the lake probably less than 1 L/s. On, and beside, the trail, garter snakes (black with yellow stripe, no red), and very blue

violets, Viola adunca perhaps.

The wind gusts through the canopy with the sound of beaches on the outer coast, and, on the trails below, fresh air ruffles your hair as it wafts like currents beneath the waves.

April 11, 2016 (day +268)

No rain. Level at the cistern +35 mm SCB, a drop of 2 mm. Level at the weir +213 mm WPB (scale), a drop of 22 mm in 3 days.

Light breeze. Distant bird songs, now so familiar you have to pay attention to hear them. Buffleheads, two or three honkers, and mallards. Hiking the primitive trail along the south shore disturbs the ducks now and is not a good idea.



Pools in the woods that have not dried out have become stagnant.



Photo left: Wetland south of the lake and trail. It looks like good skunk cabbage habitat, but, despite extensive searches, I can't find any here or elsewhere in the park.

Photo above: Yet skunk cabbage is abundant in wetland along Chapple Creek.



Photo: Dents-de-lion. Wide grassy trails are convenient routes for people, but they're not the only intruders who find them so.

Isn't that right Daisy?

It's sometimes hard to be hard on weeds. They're successful, adaptable; are good eating for some; and most are as pretty as any other flower when you look closely.

Candyflowers so common in the NE Arm near the lake you sometimes have to watch your feet to avoid trampling them. There are yellow violets there too. Fairy slippers numerous in mossy places at the west end.

The bed of Stump Farm Number Two Stream is mucky, but mostly dry with only small lingering quagmires here and there.

April 14, 2016 (day +271)

Rain 3.5mm. Level at the cistern +38 mm SCB, a rise of 3 mm. Level at the weir +210 mm WPB (scale), a drop of 3 mm in 3 days.

WATER QUALITY TEST (Lake east end)

specific conductivity $88\mu\text{S/cm}$ (pre-cal $64\mu\text{S/cm}$ at 15.8°C) [this is greater than that of East Path Creek, so the creek is not a major source of dissolved minerals] pH = 6.2 6.4 clear, no turbidity

DO 9.6 mg/L (saturation 100%, 16.5°C, 748 mm.Hg).

WATER QUALITY TEST (Coats Marsh Creek)

specific conductivity $106\mu S/cm$ (pre-cal $65\mu S/cm$ at $11.5^{\circ}C$) pH = 6.5 6.7, pale yellow DO 8.9 mg/L (saturation 89%, $14.4^{\circ}C$, 750 mm.Hg).

April 18, 2016 (day + 275)



No rain. Level at the cistern +36 mm SCB, a drop of 2 mm. Must be similar to the level it was last May when, not knowing about the beaver dam, I was surprised to see it so high. Likely this "extra" water will be much needed again this summer.

Level at the weir +192 mm WPB (scale), a drop of 18 mm in 4 days. Water over the baffle and through the pond leveller is running light now -- Coats Marsh Creek down to 3.8 L/s and dawdling along at 16 seconds per metre.

Shafts of sunlight dappling the shade; tranquil, no breeze and relatively little bird-song; the air temperature that of red-wine in a crystal glass; the delicious smell of Douglas-fir resin dispelling the mustiness of winter. Buttercups (R. occidentalis and R. uncinatus). Woodpecker (female, hairy?). Ducks on the lake in only pairs or small groups, and very shy.

April 21, 2016 (day +278)



Rain 3 mm. Level at the cistern +32 mm SCB, a drop of 4 mm. Level at the weir +171 mm WPB (scale), a drop of 21 mm in 3 days. Water through the pond leveller just a dribble. Coats Marsh Creek down to less than two litres/sec. The dry is nigh.

Woodpecker (unseen); dogwood with showy white bracts; occasional frog; redwings and towhees; ducks in pairs (mallards, buffleheads, ringnecked?); purplish-pink dovesfoot cranesbill,



Geranium molle, never convinced these are, along with herb-Robert, noxious weeds; the broom in the old burn-pile clearings is blooming; arbutus suffering as they seem to be everywhere; sedges inflorescencing (they look like Carex elata to me but they're less-exotic slough sedges); strawberries, blue violets, candyflowers, and miner's-lettuce; picture-perfect Amanita pantherina; midges I had to dispel by waving my metre-long measuring stick like a codger shaking his cane at hooligans; many plants and bird songs

I don't know; sky, stratus fractus, offwhite with the translucidity of a duck-egg

shell; the winter creek beds now black soil with deer prints.

<u>April 22 & 23,</u> 2016 (day +279-80)

In Canary Grass Meadow, mats of bunchberries bedstraw? possibly blue field madder (right), a large sprawling red-berry elder in creamy-white bloom; a red-rosewood-flowered gummy



gooseberry bush (*Ribes lobbii*), and a garter snake. The meadow is mostly dry but there's still some standing water hidden from the lightly-shod incautious in rills and runnels among the reeds.



Above: The Arbutus are suffering badly, possibly fatally, from leaf loss this year.

Left: Slough sedge (Carex obnupta).



Right & below: Hi! We're from England. Nice marsh you have here.





On the Marsh Trail, among the ribwort plantain and the lavender-pink flowering vetch: small-flowered nemophila (Nemophila parviflora), rare on the mainland but at home here on the Gulf Islands; broad-leaved



starflowers (Trientalis latifolia); and miner's-lettuce.

The miner's-lettuce up in the parks tends to be tiny with discs *15mm across compared to the salad-sized ones down here on the south shore where saucer-shaped discs *40mm across are common.



April 25, 2016 (day +282)

Rain 9 mm. Level at the cistern +33 mm SCB, effectively no change. Level at the weir +177 mm WPB (scale), an inconsequential rise of 6 mm in 4 days. Stability. Water still running through the pond leveller, just skimming off the rain. Coats Marsh Creek down to about one litre/sec.

One mallard duckling doing well. Mother swam out a little from the shore as I approached instead of taking flight as she normally would, quack quack, quacking, and out of the reeds darted the little one, paddling to her very effectively like crazy. Mother wasn't satisfied, so I guess there were more, too shy or too young. I may have to reduce my data-collecting visits here for a few days. There were a pair of mallards in the weir bay too and a Canada goose. Three buffleheads, one male two females, out on the water not looking like they were going anywhere soon.

The A. pantherina's are plentiful and vandals haven't mindlessly kicked them over yet. More garter snakes.



A day of blue; blue sky; blue rain-jacket, the air still cool in the shade; blue Thrifty's shopping bag with my notebook and stuff; flittering pale-blue butterflies in sunny spots along the trail, "spring azures" or "blues", though I prefer



their more formal name celastrina (C. ladon); damselflies with blue-tipped abdomens (Ischnura cervula); blue-eyed darners; and a blue RDN park notice with a longish, but very incomplete, list



of things you shouldn't do in the park.

April 28, 2016 (day +285)

No rain. Level at the cistern +19 mm SCB, a rather startling drop of 14 mm in 3 days. The air is warming, so evaporation will be becoming significant, but it's not warm enough I would have thought for that much drawdown. Level at the weir +171 mm WPB (scale), a drop of 6 mm. Water has stopped flowing over the sill but continues to drindle out

of the pond leveller. Coats Marsh Creek sluggish and quiet, preparing to pond, and down to much less than one litre/sec.

Walk with Bill Merilees and Kent Anders, well-known naturalists from Nanaimo, together with Gabriola's Phyllis Fafard along East Path and into Canary Grass Meadow.

Several bufflehead families out on the water near the south shore. They nest in cavities in the trees, but not out of sight of the water, which is something to remember when injudiciously planning intrusive trails deep into a nature reserve as the RDN are at the moment doing.







The spring surge of rathe little white flowers is ebbing, mostly candyflowers, strawberries, and daisies remaining. A rattlesnake plantain (an orchid); false morel; spotted coralroots (another orchid); and vanilla leafs. Lots of *Inocybe* spp. "little brown mushrooms" (LBMs) though I grew up knowing them as toadstools. Some salal plants have blossoms.

April 29, 2016 (day +286)

No rain. Level at the weir +168 mm WPB (scale), a drop of 3 mm. Coats Marsh Creek has stopped flowing, but water drains still from the pond leveller like a tap with a leaky washer.

Swallows winging about in an old burnpile clearing, now a weedy and broomy greensward. If only my camera were as fast. They were hunting damselflies, Pacific forktails. After 20 minutes the show was over and they were gone.

Elusive white, or perhaps dun-tinted, butterflies, probably with darker markings, but if so, nothing striking and without bright colour. Small, smaller than the blues. Endlessly bobbing and

weaving, fluttering in the shade of the Douglas-firs from one patch of sun to another, never ever still. Skippers would be a good name for them, but I've no idea if that's right. I think I'll just call them bianchi.

Ant hill near the beaver dam is 2½ feet high (Formica obscuripes). OK, OK, you've seen taller ones.



May 1, 2016 (day +288)

Rain? There's a cobweb in the gauge. Level at the cistern +14 mm SCB, a drop of 5 mm in 3 days. Level at the weir +168 mm WPB (scale), no change. Watershields are appearing in the shallows.



The May-Day dance floor. Not nearly as tranquil as it looks.

It being May Day, Walpurgistag, an' all, I sat quietly by the lake in the sunshine watching a swarm of mayflies. They were jigging up and



down like young people do in nightclubs. Every now and then a bouncer-eluding dragonfly would cruise through the crowd flying more or less horizontally, and I wasn't sure if they were hunting and confused by the verticality of the action, or whether they were just, like the rest of the crowd, looking for a hot date. No sign of fish though, only rising marsh-gas blebs and diving beetles dimpling the surface; in mayfly time, any fish would be feeding on nothing else.

Photo left: Two dancers, top right and bottom left.

Out on the water, several duck families, mallards and buffleheads, the young ones growing up so fast they were adventurously mingling with the adults creating a measure of parenting anxiety. A bald eagle was watching too.

Blues and blue-tipped damselflies all around me as I sat. At one point, butterflies at my feet and on my notebook and pen, which happens to be blue, five in all, and the damselflies on my measuring stick; one even resting peacefully for a while on the nail of my thumb.

A few bianchi in the woods and on the trail, their nimbleness matching their ungoogleability. The shafts of summery sunlight are speckled with the wings of busy insects.

May 4, 2016 (day +291)

Rain 1 mm. Level at the cistern +9 mm SCB, another drop of 5 mm in 3 days. Level at the weir +158 mm WPB (scale), a drop of 10 mm. Sun and cloud, warm dry NW wind, the sort to encourage evaporation.

Swallows very active skimming over the water surface. A few ducks in the distance, possibly ring-neckeds. Clumps of yellow pond-lilies (Nuphar polysepalum) in bloom.

Walk with Lyndon Turvey, a lacustrine invertebrate expert, but not much to see without sampling equipment beyond a few diving beetles. Next time.







<u>May 5, 2016</u> (day +292)

In the clearings, brambles blooming among the blooming salal (Rubus ursinus, Gaultheria shallon). The first step to a new batch of wild-berry jam.

Several kinds of butterflies: red admirals, apricotcoloured fritillarylike ones? grey hairstreaks with orange spots, brown





elfins, and "blues".
There were more, but I'd rather they remained nameless than risk doing them any harm.

A coal-fired NW tradewind swaying the shrubs and trees; relative humidity only 30%.

May 7, 2016 (day +294)

No rain. Level at the cistern -3~mm SCB, a drop of 12 mm. Level at the weir +145 mm WPB (scale), a drop of 13 mm. Pond leveller dribbling.

Mallard families about, one mother with a raft of at least eight



ducklings, maybe ten, all huddled close to each other and to her, wending their way briskly but carefully in and out of the reedy margin.

A very handsome <u>hooded merganser</u> couple crossing the lake. Lots of violet-green swallows, maybe some tree swallows too. A lone Canada goose, very quiet. Has it been left behind or has it chosen to have been?



Roses are out (Rosa gymnocarpa). There aren't many in the park, more in the 707 CP, but some where East Path Creek flows in winter.

Left: Not all introduced species are obnoxious weeds. Black medic (nonsuch, Medicago lupulina), which is common in the park's launds and ways, is, some say, the true shamrock of the Irish.

The boreal tradewind still blows strong; the evening soundscape mostly the startlingly-loud susurrus from the trees and the calls of the redwing sentinels around the marsh. The nimbus cloud-cover, purple-grey in

the dusk like a bruise, being driven up and away to the east without a drop of rain. Only windswept cirrus and patches of clear sky low on the horizon in the direction of the setting sun.

May 10, 2016 (day +297)

Actually, to be honest, the park has its fair share of introduced and invasive plant species, especially in the grassy areas where anything growing there is probably also growing in your lawn.¹

Today, I came across a large, but lone, English hawthorn covered in mayflowers in the NE Arm (while in my hence-permitted shirt-sleeves). This is listed by Nanaimo City as a "priority invasive plant", though it is not one that comes to my mind first. There is horror-of-horrors, Scotch broom despite the 2011-2021 RDN/TNT Management Plan to be rid of it. And among many others seen while nuddling along are tiny white-flowered plants that I suspect are related to stickyweed (Galium aparine),



except these were too small to be those and they weren't sprawling over everything.

¹ Jane James and Phyllis Fafard, *Gabriola Plants Checklist*, Gabriola Historical & Museum Society, 2007, lists 416 species of which 136 (33%) are introduced. Many introduced species are agricultural and lawn weeds, but some are medicinal herbs once used by both indigenous and immigrant women who must have learned from each other, and a few are ornamental or culinary.

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The old burn-pile clearings and fourwheeler trails are where to find such contemptibles.

Left: Colourful residents of the marsh, one native and one introduced, living modestly in the weedy patches: bicoloured flaxflowers (*Linanthus bicolor*) and really-tiny, pale-yellow-to-blue forgetme-nots (*Myosotis discolor*).

May 11, 2016 (day +298)

No rain. Level at the cistern -17 mm SCB, a drop of 14 mm. Level at



the weir +128 mm WPB (scale), a drop of 17 mm. Pond leveller dry, no water over the baffle, and creeks all dry, so, assuming infiltration is very low, which it probably is, evapotranspiration may currently be close to 4 mm/day.

The Canada goose is now accompanied by a noisy gander. Few ducks out in the open but there's some quacking going on. Dragonflies—darners. Rare (for the marsh) blue-eyed Marys.

Picture left was actually taken a few steps into the forest from the Folklife Village parking lot. Pictures taken in the marsh are too blurred, and I can't find the flowers again.

May 15, 2016 (day +302)

No rain. Level at the cistern -29 mm SCB, a drop of 12 mm. Level at the weir +119 mm WPB (scale), a drop of 9 mm. There still is some drainage into the creek from the the pipe on the left bank from the private property adjoining the park. Not enough to provide any flow downstream, but a little surprising given the lack of rain for several weeks. This is nothing new though, owners suspect some near-surface reservoirs of water in the forest upstream of the property.



Not many ducks in the open, one mallard couple in weir bay, two mallard families on the lake but with only 2 or 3 beginning-to-look-grown-up ducklings each; just possibly a hooded merganser (female) in the reeds on the south-east side. Two geese on one of the south-shore grassy patches.

A new hatch of damselflies, boreal bluets (Enallagma carunculatum?), the males more blue than the still-numerous forktails, and the females are a dull olive-green. If you sit down, they'll come and sit on you.

Twinflowers out. Ox-eye daisies starting to bloom.







Left: Twinflowers (Linnaea borealis) on the Marsh Trail. They hang like lanterns, and you have to tickle them under their chins to get them to show their faces.



Above: A starwort (possibly Stellaria borealis) in the Canary Grass Meadow.

Below Left: Erratics like this are common in both the 707 CP and CM RP. This particular one appears to consist mostly of quartz and

plagioclase with only isolated mafic crystals, which are mostly biotite. The texture is too coarse for it to be aplite, so the rock is probably a leucogranodiorite or leuco-tonalite.

This doesn't give us much of a clue as to whence the ice brought it; however, three other erratics I looked at in Coats Marsh are, like this one, intrusive, but with more usual amounts of both biotite and hornblende. So although these might be Vancouver Island Jurassic intrusives, my quess is that they are all slightly-later arrivals from the Coast Mountain Plutonic Complex. This would fit with the presence of biotite, which is rare in Vancouver Island granodioritics; the lack of basaltic boulders; and with the near-by presence in the 707 CP of volcanic erratics, which undoubtedly were brought here in the final stages of the last ice age from the direction of Howe Sound.

Don't, by the way, think of hammering these rocks at this time of year. It's a very good way of generating sparks.



May 17, 2016 (day +304)

Day of rocks and rud. Some Oregon-grape leaves showing reds from bronze to vermilion. I used to think this was seasonal, but it looks more and more to me that these leaves are being attacked by a pathogen. A pileated woodpecker in flight with a heron-like posture, but with a bright red crest. A cinnabar moth in a grove of alders in the Canary Grass Meadow. Late in the day, a red-winged blackbird showing off its splendid epaulets lit up by the sinking sun as it hunts dragonflies from its pole-perch by the water.



One of the bianchi (April 29) fluttered in front of my face and was easy to imprison in well-cupped hands. It even rested enough for me to photograph it, before it flitted off into the woods unharmed. Some kind of day-flying moth, but I still have no idea what its "proper" name is (Western white-ribboned or half-white carpet moth, Mesoleuca gratulata. Jeremy

Tatum, Patrick Lilley).

May 20, 2016 (day +307)

Rain 15 mm. Level at the cistern -31 mm SCB, a drop of 2 mm. Level at the weir +134 mm WPB (scale), a rise of 15 mm.

Mallards, one with a sizeable family, at least five or six. Two vultures circling. Swallows swooping and soaring this way and that over the water feeding on flying things smaller and drabber than damselflies. Two geese on the south shore again.

The spring flowering has transitioned; roses have faded; every last dandelion has clocked out; mostly only black medics, crimson-tipped white daisies, and a few wild strawberries remain. Even the muted wine-dark redness of the oceanspray's new growth, not a unique attribute in these coastal forests, now catches the eye amongst all the greens. Towering cumulus in the east is glowing, unphotographed, in the light of yet another sunset.

May 22, 2016 (day +309)

No rain. Level at the cistern -34 mm SCB, a drop of 3 mm. Level at the weir +134 mm WPB (scale), no change. Drainage from the private





property continues to drindle into puddles, but the sill, leveller, and the creek downstream are dry.

No ducks, but two vultures circling in hawk-like fashion. The goosey couple are preening on the south shore. Many violet-green swallows; woodpeckers; a song sparrow having a bath; towhees; humming birds, their wings sounding like they're driven by rubber bands; and a piik-piik-ing American robin, not at all pleased by my presence.

Watershield now covering perhaps a third of the surface, a few with flowers, the colour of hardhack blossom. I wonder how these plants affect the rate of evapotranspiration?



A new hatch of damselflies and dragonflies, some of the latter large, brownish with yellow markings, female darners perhaps, with the unsettling habit of hovering, facing you, only a little more than arm's length away, like drones with hi-tek sensors feeding gigabytes of data into vast and sinister far-away databases.

Four-spotted skimmers, smaller and far less formidable, near the beaver dam. The lesser insects dimple the surface like raindrops, but, alas, no fish respond to their allure. I see only blebs, beetles, boatmen, and tadpoles.

Herb-Robert down by the bridge, not the more commonly seen dovesfoot cranesbill. The

wind-waved grasses of the old burn-pile clearings are yielding the swards to stinging nettles, bull thistles, Canada thistles, broom, bracken, burdock, hairy hawkbits, sheep sorrel, vetch, cleavers, foxgloves, ox-eye daisies, and all kinds of other botanical riff-raff. Tansy ragwort must be there too for the cinnabar moths are on patrol.

Not all of these are introduced, I thought; in the east clearing, there're patches of weedy, but all-



Four-spotted skimmer.

American, wild carrots (*Daucus pusillus*), their white flowers so small you almost need a loupe to see them. But no, turns out they're not carrots, these pretty little things are "obnoxious weeds", burchervils *Anthriscus caucalis*.

The 2011-2021 RDN/TNT Management Plan for the park calls for an



educational
facility to be
built here. I
don't know why.
It already is
one. A textbook
example of a
disturbed-site,
ideal for the
study of a
vibrant wasteland community.

Meanwhile, the dry channels from the NE Arm spillway down through the bush to the lake have become blue rivulets of forget-me-nots (*Myosotis laxa*) with islets of yellow monkey-flowers, tastefully-cropped by the deer (*Mimulus guttatus*).

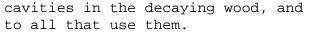
 $\frac{\text{May } 27, 2016}{+314}$ (day

Rain 10mm. Level at the cistern - 43 mm SCB, a drop of 9 mm (20mm evapo. over 5 days less 10mm rain, makes sense). Level at the weir +128 mm WPB (scale), a drop of 6 mm. Drainage from the private property continues.



Showers. Glimmery sunshine and dark heavy rain-clouds that are underperforming. The wind nothing more than occasional small pockets of cold air from above, ruffling the lake's sky-mirrored surface as if something mysterious were moving beneath it. A woodpecker, so unbelievably loud, its bursts of drumming echoing all around the lake like a lone voice in a hushed and darkened theatre.

Two families of mallards, one including a proud male with several ducklings, everyone sticking close to the reedy shore. A hooded merganser mother² with a flotilla of chicks, at least 6 maybe 8. Exciting. Hooded mergansers nest in secluded tree-cavities and their presence here might be due in no small measure to the activities of the beavers. By raising and keeping the water level high, they've turned encroaching alders into snags to the benefit of all who create



May 29, 2016 (day +316)

Along the Three Gates Trail, chestnut-backed chickadees with a flock of garrulous fledglings. Often heard, but seldom seen in the marsh.

Blue-eyed grass (Sisyrinchium idahoense var. macounii) on the wayside of the 707 CP's Mainline Trail.

On the Marsh Trail, one tall, yellow-flowered, cabbagey, field mustard, conspicuous, but looking though it would be more at home in a veggie garden. Twinflowers are abundant under conifers.



² It is normal for male hooded mergansers to leave the scene once incubation begins.

June 1, 2016 (day +319)

Rain 10mm. Level at the cistern -55 mm SCB, a drop of 13 mm. Level at the weir +120 mm WPB (scale), a drop of 8 mm.

So quiet when the splattering of passing showers on the salal eases off. With no wind, you can smell the water when you wade, and there's a scent of crushed vegetation underfoot when you walk through the meadows. The clouds are motionless, smokey, layered, a jumble.

Only a few solitary female mallards out on the water, hard to spot as they serenely make their way through the watershield like ice-breakers through pack ice. Swallows and blackbirds.





On the trails, woodland tarweeds (*Madia madioides*), each daisy-like bloom, seemingly unremarkable, but on closer inspection, revealing



curious, starfishshaped, florets within their central discs.

On the fringes of the riparian woods, silvery-voiced Pacific wrens. And a pair of house finches, the raspberry-rinse of the male a little faded, but the couple looking contented enough.

June 4, 2016 (day +322)

Rain trace. Level at the cistern -65 mm SCB, a drop of 10 mm. Level at the weir +107 mm WPB (scale), a drop of 13 mm.

A sunny morning. Breeze, enough to creakily rub together the boles of some of the crowded, spindly conifers. The flowering reed canary grass, now taller than me, bowing in the wind.



Mallards, females (or juveniles?), one with four ducklings. Hooded merganser out there too with her ducklings, one choosing to scamper over the leaves of the watershield instead of doing the ice-breaker thing.

Two vultures, occasionally mobbed. Brightly-red-winged blackbirds as always. A few swallows. Lots of

dragonflies including one black-and-white-winged eight-spotted skimmer (Libellula forensis).



East end especially alive with birdsong. There must be wrens, kinglets, nuthatches, song sparrows, but they're all so secretive I can't sort them for sure by sound alone. Robins. Twotogether fox sparrows (or juvenile towhees?) in dense, reedy-rosy thickets at the water's edge. Hoods (and bibs?) like towhees, but slate-grey, smaller, but surprisingly big for sparrows if that's what they were, lots of streaks, nothing rufous, nothing white, too big to be MacGillvray's and anyway no yellow. But to make up for that non-yellowness, a handsome male common yellowthroat (Geothlypis trichas) in a brief, but no-nonsense sighting.

The shrubs and trees in the East Path Creek catchment (dogwood, oceanspray, hardhack, roses,

willows, alder, Indian plum, redflowering currant, cherry) is better habitat for birds. In the west-end, Doug-fir forest, there's often near silence, not broken even by the mournful cry of a varied thrush as you occasionally hear elsewhere on the island.

Violet-tinged marsh violets (Viola palustris), mimulus, Siberian spring-beauties, and forget-menots on the floodplains of East Path Creek and the NE Arm.



³ Some willows are tall (24') and one, stem broken, still living, is big (DBH \approx 0.79m). Mostly Sitka, I think, but you may "scoul-"; your opinion "var-y"; and we'll need somebody to "e-lucida-te". Large willows growing in the near-by 707 CP are Scouler's. Rob Brockley: The very large one here is probably *Salix lucida*.

Western redcedars are also more common in this area than in most other parts of the park.



<u>June 10, 2016</u> (day +328)

Rain 4mm. Level at the cistern -82 mm SCB, a drop of 17mm in 6 days. Level at the weir +61mm WPB (scale), a drop of 46mm. Drainage from the private property ≈ 0.5 L/s. Since May 11 (298), when flow into Coats Marsh Creek from the weir and pond leveller ceased, the cistern level has dropped at 3.5 mm/day after accounting for rain.



Mixed-bag weather. Lake quiet. Whites. A white foxglove, a pair of whitecrowned



sparrows with young, white clover, oceanspray, and ox-eyes white-dotting the launds, 4-foots, and waysides. Honeysuckle, the pink kind, not the orange one; self-heals; creeping buttercups; and many grasses flowering.



June 14, 2016 (day +332)

Rain 19mm, considerably more than on El Verano. Level at the cistern -71 mm SCB, a rise of 11mm. Level at the



weir +70mm WPB (scale), a rise of 9mm.

Birds lower down than usual, presumably because of the rain despite its spottiness. The list is

not at all remarkable other than that the birds were all seen clearly without binoculars: white-crowned sparrow, fox sparrow, northern flicker, spotted towhee, rufous hummingbird, and chestnut-backed chickadee. A flock of five or six ducks on the lake taking flight as soon as I appeared. White on the wings, all looking the same.

Juvenile mallards? Yarrow, St.

John's wort (H. perforatum), and, on the Weir Trail, purple but-actually-dirty-yellow cudweed. I like the yarrow, it's a friendly import.

June 17, 2016 (day +335)

Rain 3.5mm. Cistern level -81 mm SCB, a fall of 10mm. Level at the weir +64mm WPB (scale), a fall of 6mm. Private property drain still running.

Several ducks and a few ducklings, well-camouflaged as they wend through the watershield, skimming as they go. An adult male mallard preening, starting to moult perhaps; haven't seen a green-head for a while.

Hairy cats ear, smooth hawksbeard, wall lettuce, wood groundsel, woodland tarweed, nipplewort ... sunflowers galore. I'd love to add "nipplewort" to the list, but can't; it grows everywhere it seems, except in the marsh. They're all originally from somewhere else, but then so is most of the human population of Gabriola, including myself. Some are pinpoints of bright-yellow on long, wiry, almost-invisible stems...in the forest shade, they look like lights at nightfall from houses in a village far down in a valley below.



White-tail Eight-spotted skimmer at the marsh. Photo taken in the Somerset pit on the GaLTT Gabriola end-to-end trek.

There's no mistaking these weeds' liking for trails and their track spaces (4-foots). Go into the bush along the south shore, for example.



Beyond red-stemmed, pink-tinted flowers of the salal and occasional bunches of raspberry-jelly-red salmonberries, there's almost nothing but dead leaves and tree bark that isn't green.

Shoulder-high thickets of salal aren't these weeds' favourite stage in the forest's sere, nor, come to that, are they mine, but then, among them are the snags used by those marsh-dwellers that drum for borers, creating cavities for birds and bats.

The first Canada thistle is out on the north shore... yes, they too are from somewhere else. The bull thistles are not in such a hurry.

Dragonflies and damselflies, pale-blue dashers perhaps, white-tail or eight-spotted skimmers, and several other skimmer species. Some of



the males
seeming to
be having
a hard
time
finding
the right
kind of
female

...feel free to supply your own wisecrack.

June 22, 2016 (day +340)

Rain 18.0mm. Cistern level -80 mm SCB, a rise of 1mm. Level at the weir +78mm WPB (scale), a rise of 14mm. Private property drain still running; where is the water coming from? Maybe time to look again at the idea that it's leaking through the berm.



Overcast; the lake has an any-minute-now-it's-going-to-rain-again tranquility. The air is soft. A few of everything (swallows, dragonflies, ducks), not many of anything. Ravens calling; otherwise, mostly all I hear is mild tinnitus. Yeah! nipplewort at the west end



of the park close to a glade full of vanilla-leaf near the creek. But the *fleurs du jour* are tarweeds for their unphotographical 3-D effect.

The west burn-pile clearing, not content with ox-eyes, has Shasta daisies. They're double the diameter, and twice as tall.

A spotted coralroot(Corallorhiza maculata), looking droopy and alone beneath crowded juvenile firs near the beaver dam.



The young chickadee families are a delight; stand still, on the Marsh Trail and they gather and circle around, coming closer and closer, chatting away, full of curiosity. It's better than having monkeys.

June 24, 2016 (day +342)



Eastern
eyebright
(Euphrasia
nemorosa)
beside the
Marsh Trail
at the westend gate.
Pretty
little
things.
Labelled

"weedy" by some, don't know why.

Handsome mushroom breaking free from the mossy duff. Russula I guess, a Mischpilz possibly, but I didn't munch it just to find out.



European (Essex) skippers in, where else? the clearings.

Flock of five flickers in the west one with fledglings in the trees.







Sheep sorrel there is at its weedy best. St. John's wort also out.

Flock of five juvenile dabbling ducks in Weir Bay.

More mushrooms after rain, R. xerampelina and puffballs (eßbar).

Foamflowers (Tiarella trifoliata) on the banks of Coats Marsh Creek. Nearby, some path-finder (Adenocaulon bicolor), so-called because



it has arrow-head-shaped leaves that are white-haired when turned over. Its miniscule flowers are whitish with green club-shaped fruits.

On the beaver dam, some, or perhaps

all, of the 15 species of sedges (with edges) that have been found on the island, but I only noticed the blondes ... and of course the carpet heads of the new crop of tawny tassel-topped bulrushes (Carex exsiccata and Typha latifolia).

A wren of the *idunno* species. Spittlebugs (cuckoo spit) abundant.













June 25, 2016 (day +343)

Rain 16.0mm. Cistern level -71 mm SCB, a rise of 9mm. Level at the weir +91mm WPB (scale), a rise of 13mm.

Tadpoles at the weir, some breathing air.

Ravens conversing more loudly than the red-wings. The blackbirds sometimes "chek-chek-chek" as if they had hiccups these days. A bald eagle hunting or bathing in the reeds, and another pair jostling playfully as they flew over the lake. Swallowtails.



Fresh creamy oceanspray, pink honeysuckle, yellow bartsia, and two more flowers that had me sprawling on the East Path amongst channery to picture them (pincushion plant, Navarretia squarrosa, and Scouler's harebell, Campanula scouleri).

The less-

common tufted vetch (*Vicia* cracca) in the west clearing.
Interesting to see that the
Himalayan blackberry bush noted
in the CM-RP Management Plan
(Appendix A pp.20 & 37)







recommended for removal is still there. In December 2010, the "infestation" appeared to be "minimal as compared to other sites in the local area".

In June 2016, nothing had changed.

Nearby, there's plants that look awfully like wild marjoram (Origanum vulgare). If

that's what they are, what are they doing out here in the woods?







Damselflies and green darners, some with confusingly-blue rear-ends.

Left: yellow bartsia (Parentucellia viscosa)



Several cedar waxwings (a family?) near the entrance.

June 29, 2016 (day +347)

No rain. Cistern level -90 mm SCB, a drop of 19mm. Level at the weir +70mm WPB (scale), a drop of 21mm.

Sunny; muggy, but, now and then, a gentle puff of cooler, drier air... but no whispering through the firs to cover the sound of flies in the greenswards, or the tread of your feet on dead arbutus leaves.

Song sparrows in the clearings feeding on grass seed.
Moulting ducks looking dishevelled.

Blue damselflies as always..boreal tule bluets. Dragon flies: blue dashers,

white tail skimmers, cherry faced red western meadowhawks





The red-faced ones for a long while refused to face the camera... In the old days they would have cost me a roll of film.

The lake quiet but for the occasional quack. Everything dozing in the sun.

June 30, 2016 (day +348)

Say what you like about the old burn-pile clearings, these wastelands are always full of surprises.



The east clearing particularly (shown) is infested now with thistles with a very prickly attitude. Mostly Canada thistle, *Cirsium arvense*, (left), but some bull thistle too, *Cirsium vulgare*, (right), which has just begun to bloom.



The west clearing (shown) has thistles too, but their numerous companions are ox-eye daisies, stinging nettles, and broom. But that's far from all there is. There 're horsetails for a start!

On following the guidance of the deer through the thistles, I came across lovely butterflies, really handsome large black-and-white Lorquin's admirals with small orangey-red spots on the tips of their wings (Basilarchia lorquini possibly ssp. ilgae). I imagine they're there for the purple-bloomed hardhack down near the water.

Purple must be in as there were also pink yarrow, oregano, and the last of the foxgloves.

Cinnabar-moth caterpillars on







tansy ragwort (Senecio jacobaea),
not yet in bloom but getting
there.

Near the entrance to the clearings on the Coats Marsh Trail, common centaury (Centaurium erythraea), and a patch of common cudweed (Filago vulgaris), their verticality making them look like trees, or one of those chemical gardens that kids grow. There's probably some in your driveway.

 \Diamond

Continued in the next file $\underline{\text{here}}$. Previous file $\underline{\text{here}}$.





July 2, 2016 (day +350)

Coats Marsh Creek from the stone culvert down to its confluence with the Stump Farm Streams has no flow, but there still are a few puddles. The bed is bare bedrock, and the rubble in the channel mostly channery and flaggy sandstone with only a smattering of volcanic or intrusive stones. The area must have emerged from the great melt at the end of the ice age with only a very thin remnant of ablation till, the sandy



other organic acids in the runoff from the forest. Life in the Mesozoic era, 65-70 million years ago, still providing habitat for life in our woods today.

Lovely three-leaf foamflowers (Tiarella trifoliata ssp. unifoliata) in the forest shade. A holly tree. Many snags, one with bark stripped away showing the trails of the borers.

Near the bridge, a great horned owl keeping a lackadaisical watch over activity on the trail.



loam soil of the banks being, I'd guess, glaciofluvial and organic-rich detrital sediment deposited after the sea had departed.

Some of the puddles are in hemispherical

hollows. These are the result of chemical weathering of calcitecemented concretions by humic and





Two or three boletes, caps dry and a bit scaly, flesh and tubes yellow, brownish where damaged. Most probably *Suillus caerulescens*, but I didn't tear them apart to make quite sure. Early for them.

Juvenile spotted towhees, a test because right now they're streaked just like sparrows. They bob their heads to keep their balance.

The boreal bluets play the same tricks with my vision as they do with the imperfect auto-focus of my point-and-shoot camera. When they fly

into my field of view, I see only a blue blur as my eyes continue to focus on what's behind them.

July 5, 2016 (day +353)

Rain a trace. Cistern level -114 mm SCB, a drop of 24mm in 6 days. Level at the weir +21mm WPB (scale), a substantial drop of 49mm. Private-property drain still running.

More Russula sp. maybe xerampelina with a pinkish-mauve cast on cap and stem, the cap deepening to brown at the centre but not darkly so. Not sure, but whatever; early this year.

Adult male hairy woodpecker (definitely not a bill-size-challenged

Downy). Fox sparrows and chickadees in their usual abodes.

Hardhack in bloom by the water. Real tansv (Tanacetum vulgare) out in the clearings, their black-hole centred discs looking like a picture in an astronomy magazine. The other kind, tansy ragwort, those deer-poisoning and honey-spoiling weeds, are about to flower everywhere. There's no way the cinnabar-moth caterpillars can cope

with anything but a small fraction of them especially when they themselves are preyed on by carpenter ants (there's one

Pineapple weed in the hard-packed tracks. Although it may be odd to be reporting such a familiar plant, it really was my first sight of it in the park, and it was

above the caterpillar in the photo left).



that sort of a day. Don't miss a chance to crush and smell it. It's a native plant, so in other continents it's an introduced weed.





A number of ducks out on the lake, mostly female mallards or juveniles, but I can't say that's all there were.

July 8, 2016 (day +356)

Rain 6.5mm. Cistern level -118 mm SCB, a drop of 4mm. Level at the weir +6mm WPB (scale), a drop of 15mm. Private-property drain still running.

Showers. The western sky a pall of nimbostratus; the eastern sky brighter, stratus-fractus with

white-edged sunlit patches allowing a peep through to the blue beyond. Wind in the canopy soughing restlessly, sometimes pushing down to the ground. Thunderstorm that night.

Ducks not to be seen. On the east side, a solitary greater (or lesser?) yellowlegs (*Tringa* sp.) foraging purposefully as it waded through the reeds. Orange-crowned warblers (the grey-headed kind), one looking fluffy and young. Deptford pink (*Dianthus armeria*); there's a few in the 707CP too. They like calcareous soil, so perhaps

they've found some concretions?



On the north side, several garter snakes but one with legs! -- a northwestern alligator lizard amongst Clyde's rubble (Elgaria coerulea principis).







A lone red admiral. Surprisingly, a humming bird, green, female, hard to identify despite her hovering a few feet



from my face. Many grasshoppers, some greenish-yellow, but the dragonflies and damselflies mostly in hiding.

Yet another early mushroom, Reifpilz (Rozites caperata) obviously edible by something. Beside the trail, others that had been there for some time with nothing showing any interest in them, including me. Finally I stooped and picked one. Curious, it had decurrent tubes like a bolete. My guess though, a polypore, tiger's eye, Coltricia perennis. They're related to

bracket fungus, and so very woody and leathery. Not surprising they had remained for so long unmolested.

Smelly tarweeds. *Madia glomerata*? Too soon to tell for certain, no flowers yet, but in the 4-foot of the NE Arm spillway. At the weir, water-plantain (*Alisma plantago-aquatica*)...stars in the night-sky flowers.

July 11, 2016 (day +359)

Rain 14mm. Cistern level -115 mm SCB, a rise of 3mm. Level at the weir +6mm WPB (scale), no change. Private-property drain running. Owner Lot 5 tells me it ran until August 10 last year. Berm construction so water-tight that water is unlikely to be seeping through it. The gap in the sandstone, where the weir is now, was blasted out by Bill Coats sometime in the 30's, not by the Hoggans as I had surmised. The drill holes are said (haven't found them myself) to look like those that were packed with black powder to pry the sandstone millstones free from the bedrock; also a Bill Coats

enterprise (1933-36). The creek just downstream of the weir is clearly a narrow "dug or blasted trench" (noted in the Management Report, A p.5, Dec. 2010).

New SPB established as the water is dropping off the scale. Pacific tree frog (pale green form *Pseudacris regilla*) in the bay. Water striders moving on six dimples (possibly *Limnoporus notabilis* and a second smaller more active species) in the cistern.



Groundsel has gone to seed. It's not common in the park, living mostly close to boundaries with residential properties. Solitary and tall; some of its flowers have rays rather than being brushes; a few have inconspicuous black tips to their bracts, but most tips are green. Hence, probably wood groundsel, Senecio sylvaticus, rather than the vulgaris kind.







In the clearings, the common burdock plants, Arctium minus, are now up to two metres tall.

I see no sign of the common mullein listed in the Management Report, A p.20, Dec. 2010. Maybe they saw foxglove stalks? It would be hard to tell what they were in midwinter.

July 13, 2016 (day +361)

Rain 1mm. Cistern level -121 mm SCB, a drop of 6mm. Level at the weir +0mm WPB (scale), -124 mm (SPB16), also a drop of 6mm.



remarkably quiet and languorous. Distant traffic noise muffled and faint; few birds calling; even the flies are not buzzing; butterflies are sheltering; convection currents gently moving the air in the grasses but not a whisper from the trees; sunny with cumulus, but the clouds motionless, as if they were an oil-painting; not especially hot. Ah! but

The marsh

the seed pods of the broom are popping. Heavy showers the next day.

In the 4-foot at the NE Arm spillway, a lovely, very graceful umbellifera. There's more in the east burn-pile clearing within the present park, and there are other places on Gabriola where it thrives.





First thought was that it was hartwort, a Mediterranean flower, but that's never been seen here and is rare even in England. It's most likely a Torilis sp. either "spreading hedge-parsley" Torilis arvensis or, less likely, "upright hedge-parsley" Torilis japonica. Rare enough that I had to use my ancient "Wildflowers of Britain and Northern Europe" book to find it. It's missing from most Pacific NW Wildflower books and red-listed (endangered) throughout the UK.





 $\underline{\text{July }17,\ 2016}$ (day +365, the last day of the observational year)

Rain 4mm. Cistern level -128 mm SCB, a drop of 7mm. Level at the weir -137 mm (SPB16), a drop of 13mm. The

puddles in the Coats Marsh Creek channel immediately below the baffle are currently 2.92 m below the concrete (CWB) baseline. A few ducks in the weir bay.

Agaricus sp. (arvensis, campestris?) looking and smelling good.

Painted ladies, I think, fritillaries? anyway, orangey things among the thistles (butterflies I'm talking about).

Chocolate-brown wood nymphs (*Cercyonis oetus*), settling with their wings closed, refusing to be photographed, as is their wont. Two "eyes", one decidedly bigger than the other. Many Pacific forktail damselflies.

Pearly everlasting (Anaphalis margaritacea); so far I've not seen one displaying its yellow discs; the deer like to chomp off their heads while they're still young.

One species of tarweed at the NE Arm spillway is *Madia glomerata* but there appears to be another with a bigger flowerhead not yet in bloom,



broader and greyer leaves, and squat. *Madia sativa* perhaps, but they're not very tall.

Tansy ragwort out everywhere. It's related to groundsel and you can see that clearly in the buds.

The long-stalked hairy cats ears, *Hypochaeris radicata*, are putting on a show just by virtue of their numbers, coming close to outdoing the fast-fading ox eyes.

THAT CONCLUDES THE FIRST YEAR OF OBSERVATIONS AT THE MARSH ◊

SECOND YEAR OF OBSERVATIONS STARTS HERE

July 22, 2016 (day +370, 366+4)

Rain 0mm. Cistern level -140 mm SCB, a drop of 12mm. Level at the weir -166 mm (SPB16), a drop of 29mm.





Out-of-season violets, Viola adunca.

More chocolate-brown wood nymphs (Cercyonis pegala) in the clearings, larger than the Cercyonis oetus and with equal-sized "eyes".

Western pondhawks, Erythemis collacata, the females all-green.

In the muddy strand left by the receding water, marsh horsetail, Equisetum palustre.

July 29, 2016 (day +377, 366+11)

Rain 0mm. Cistern level -182 mm SCB, a drop of 42mm.



Level at the weir -210 mm (SPB16), a drop of 44mm.
Private-property drain running only very slowly, several ten's of seconds per litre.

Northwest wind has been strong the last few days, 5-8 knots mean, relative humidity 60%, temperature 20°C.



In the west clearing, Queen Anne's lace, for me "summer snow-flakes". And next to the wild marjoram, winter savory, Satureja montana.

On the Marsh Trail, a flock of dark-eyed juncos. Common on Gabriola, but this is the first time I've seen any within the boundaries of the park. Male mallards are now in their eclipse plumage.

Another great horned owl, this

one near the Stanley Road entrance.

A mature western hemlock visible to the east from the East Path;



they're rare in the regional park, where the most common conifer by far is Douglas-fir. There are grand firs too throughout the park, but western red-cedars are only locally common in damp areas and absent elsewhere.

<u>July 31, 2016</u> (day +379, 366+13)

At Stump Farm, ladies tresses, Spiranthes romanzoffiana.

The bats at the farm are probably Myotis californicus.

August 05, 2016 (day +384, 366+18)

Rain 6mm. Cistern level -210 mm SCB, a drop of 28mm. Level at the weir -242 mm (SPB16), a drop of 32mm. No flow from private-property drain.

Very very quiet. Only crows (or ravens?) to be heard, and a few swallows and cedar waxwings to be seen over the lake.

August 11, 2016 (day +390, 366+24)

Rain 2mm. Cistern level -231 mm SCB, a drop of 21mm. Level at the weir -261 mm (SPB16), a drop of 19mm.

Evening. Only deer show any sign of activity. The languid dog days.

I've been trying to get a good picture of a cross-section of a marsh

horsetail stem, which would confirm that is indeed what it is. The best I can do is this:





A better picture is David Fenwick's:

http://www.aphotoflora
.com/horsetail_equiset
um_palustre_marsh.html

The species is uncommon in BC but not rare.

August 16, 2016 (day +395, 366+29)

No rain. Cistern level -254 mm SCB, a drop of 23mm. Level at the weir -283 mm (SPB16), a drop of 22mm. Warm sunny day with northwest wind. Nanaimo max/mean/min RH 92/64/32%, 28/21/14°C 11/4/0 knot.



Evening. A few birds around: hairy woodpecker; mallards; unidentified duck, very dark plumage; ravens; a pair of kingfishers? (far off, noisy, flashing white, perching on snags between short flights over the water, not swallows or redwings). Large formidable-looking dragonflies. Beavers, that's one on the left. Rarely seen in daylight.

August 21, 2016 (day +400, 366+34)

No rain in gauge, but spotting with rain as I left. A weak cold front passing by. It has been significantly hotter lately.

At cistern: air 21.8°C RH 30% Surface water (no-touch meter) 19.9°C. At weir (later in afternoon): air 18.8°C RH 35% Surface water (no-touch meter) 20.1°C. Need to check water temperature again with a regular thermometer, but it seems it reflects average daily temperature as one might expect for such a shallow lake.

Cistern level -278 mm SCB, a drop of 24mm. Level at the weir -309 mm (SPB16), a drop of 26mm.



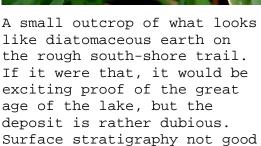
Interesting walk.

A barred owl in an alder grove at the top end of East Path; red-legged frog at the weir; goldenrod near the water at the clearings; greater bladderwort (Utricularia vulgaris) stranded in the mud at the water's edge, a strange carnivorous flower that floats in the water; and a fresh-looking batch of "dandelions" on the trails, this time scrawny, smooth hawksbeard with narrow-leaves.

Found an isolated Himalayan blackberry plant, which I think I'll take out next time I visit, notwithstanding any required formalities.









(a hump brought up by a tree root or just a rubbish dump? No auger to hand). Indifferent to roasting in an oven, while diatomaceous earth



on Gabriola commonly turns pinkish when organic material burnt off. Could be just rotting cement or concrete, which is becoming a common anthropic rock. No reaction to acid, so kaolinite I guess also a possibility.

Moths and small butterflies in unusually high numbers. Possibly a satin moth? All white, greenish tinge, furry, near park entrance. Only one butterfly among the multitude willing to pose for me. I think a mylitta crescentspot (Phyciodes mylitta) in the thistle field.

August 24, 2016 (day +403, 366+37)

I've decided to compile <u>species checklists</u>, which means I have to pay more attention to the less-showy inhabitants of the marsh and to those with only botanical names. I started adding to the lists with bracket fungus (*Ganoderma applanatum*) on

Douglas-fir and willow. It's common. It's also known as a "conk", which to me, as a kid, meant your nose. While photographing it, came across a snowberry bush. Snowberry is abundant on the dry south coast of the island, but not so up here.





You can't see ducks on the lake anymore, but in the evening you can hear them quacking.



<u>August 26, 2016</u> (day +405, 366+39)

No rain. Cistern level -299 mm SCB, a drop of 21mm. Level at the weir -333 mm (SPB16), a drop of 24mm.

The water level is now low enough that you can wade along the south shore without getting a boot-full, unless, that is, something catches your eye just a little out of your depth, which it often does.







Deer fern (Blechnum spicant) dutifully recorded for the checklist among the normally flooded alders.
Mats of

bladderworts. Ladies tresses. And new species, non-weedy ones to boot. Marsh speedwell (Veronica scutellata) and the late-summer bloomer, Eaton's aster (Aster eatonii) with its curious yellow disc florets.

At the cistern, a green tree frog hopped onto my forearm while I measured the water level. It stayed for a while. Why? For a bet? So he could brag to his mates? Because he was oblivious to the danger? Because he was adventurous, reckless, or both? How skillfully he positioned himself so I could not reach for my camera until he was back down in his hidey hole among the reeds. Others of his ilk were brown.

Of course, I've read David Haskell's "The Forest Unseen", and Franklin Russell's "Watchers at the Pond", naturalists who rigorously avoid anthropomorphizing, who mostly portray nature much as it mostly is, full of conflict and consumed by seeking to survive and propagate, but I dunno. I

sometimes like to think that little fellows like this have a shared sense of joyful curiosity. After all, what's 360-million years of evolution between friends.

<u>August 28, 2016</u> (day +407, 366+41)

Checklists additions: lady fern, only locally common along creek banks, and red huckleberry, which you'd think would be common in the park but isn't. This is partly because Douglas-firs and alders are the dominant trees in the park and red huckleberries prefer to grow on cedar stumps and deadfalls, and perhaps also because the loggers didn't



leave much cedar behind. I've only come across one plant in my wanderings. It was in the cedar grove along Coats Marsh Creek and was, at the time, berry-less and well-shaded, so, instead of showing its picture, I'm using bloggers' licence and showing one from the Turkey Shoot Road Swamp taken last June.

August 31, 2016 (day +410, 366+44)

Rain am. Cistern level -310 mm SCB, a drop of 11mm. Level at the weir -344 mm (SPB16), a drop of 11mm.

Very little going on, except there are slugs having a field day after the rain: banana and the introduced black ones. Ravens.

Times like these, while keeping species checklists, remind me of train-spotting when I was a kid. I was remembering how in the summer there was always a lull in rail traffic through our little station between 2 and 4 in the afternoon. Everything dozed in the sun. Just an occasional Hall, County, or no-name hauling a slow goods train. Then around 5, the first of the express trains came pounding through from London, bound for the west country, hauled by a King or Castle, followed by the slower stop-everywhere commuter trains. Always a chance of something new amidst the sooty-smoke and steam. It's been quiet like that here for the last week or two as we await the fall migrations.

September 4, 2016 (day +414, 366+48)

Rain 11.5mm. Cistern level -322 mm SCB, a drop of 12mm. Level at the weir -335 mm (SPB16), a rise of 9mm. Showers and summertime evaporation in a tussle? or the beavers playing games? Wind is more often from the southeast now as the high pressure ridges weaken.

Ducks out on the lake, about a dozen at least. Mallards recognizable, and a flock of smaller ones at the far west end of the lake, just possibly American widgeons, but even with x10 binocs not possible to be sure. Small birds that inhabit the forest's undergrowth appear to have migrated up into the canopy where they can be faintly heard but seldom seen.

Bushwhacked from the entrance between the lake and path around to the north-shore clearings. Several large ant nests and a couple of dead deer mice some distance apart. Not obvious why they died. Owls maybe?

Added to the checklists: Pacific ninebark, there's one at the Stanley Road entrance and another at the weir, must have looked at them dozens of times but not noticed them; pallid-



winged grasshopper, the dry gone-to-seed grass is full of grasshoppery





things, some flying like they were moths; bur-reed, a strange floating plant like bladderwort; whirligigs in the cistern; a moss and a sedge.

<u>September 9, 2016</u> (day +419, 366+53)

Rain 8mm. Cistern level -311 mm SCB, a rise of 11mm. Level at the weir -217 mm (SPB16), a seemingly impossible sharp rise of 118mm unless the beaver dam is leaking.

An everybody-is-somewhere-else type Friday evening. No wind, no rain. So quiet. A duck on the lake, not a mallard. Blue-eyed darners,

watched one catch a flying ant. Ravens and a towhee or two, nothing else.

<u>September 12, 2016</u> (day +422, 366+56)

Level at the weir -344 mm (SPB16). September 9 reading made in twilight with no flashlight must be wrong.



<u>September 13, 2016</u> (day +423, 366+57)

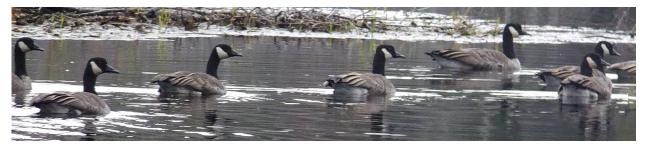
No rain. Level at cistern -327 mm SCB, a fall of 16 mm in 4 days.

Pair of dabbling ducks on the lake, not mallards, not shy like widgeons, not seen up-ending, and no hint of a coloured speculum. Their non-breeding

plumage not helping much. Most likely immature green winged teals as blue-winged teals are rarely seen on Gabriola. They may have been here unrecognized for the past few weeks.

September 16, 2016 (day +426, 366+60)

No rain. Cistern level -339~mm SCB, a fall of 12mm. Level at the weir -352~mm (SPB16) a fall of 8 mm. Overcast and about to rain.



Dozens of Canada geese "western ssp." out on the lake. Must be around fifty. Unidentified ducks, the not-particularly-shy couple recorded



Sept.13, and another group of about five, some, but not all, with large white wing patches in flight. Very shy, good fliers, too far away to see

clearly. Common mergansers?? or if not, widgeons, goldeneyes? September 18, 2016 (day +428, 366+62)

Rain 13 mm. Cistern level -326 mm SCB, a rise of 13mm. Active rainladen sky, broken cumulus with rainbows. Ducks but no geese. HARMAC noisy.

<u>September 22, 2016</u> (day +432, 366+66)

Rain 18.5 mm. Cistern level -319 mm SCB, a rise of 7mm. Level at the weir -310 mm (SPB16) a rise of 42 mm.













No geese but about twenty ducks with varied appearances, unfortunately all a long way from wherever I chose to observe them.

For sure, American coots with several pale seagull-looking offspring.

For sure too, a pair of wood ducks, the female with a very showy darkblue speculum easily outclassing that of the mallards this time of year.

Other than that, juvenile-female- or eclipse-plumaged ducks? None identifiable. Possibly mallard hybrids but nothing fits. It's frustrating that bird guide books show mostly pictures of ducks in their

courting plumage, and nothing of their everyday attire at other times of the year.

Scouler's willows growing along the south end of the

707's Three Gates Trail in the Stump Farm Number 1 Stream catchment area.

White-faced meadowhawks, actually striking

September 30, 2016 File: 673g

because they're mostly red, numerous. I wonder if the absence of fish is why the lake appears to be such good dragonfly habitat.

Chanterelles, bright egg-yellow rather than the-for-me "usual" orange, and the anastomosing shallow gills not running down the stem very far.

<u>September 27, 2016</u> (day +437, 366+71)

Rain 9.5 mm. Cistern level -319 mm SCB, no change. Level at the weir -302 mm (SPB16) a rise of 8 mm.

The NW wind is blowing, big trees are rocking, gusts are ruffling your hair, and cones and twigs are raining down. A large black-tailed stag lets me appoach unheard above the noise of the buffeting wind and the lack of underfoot crunch from the rain-soaked leaf litter.

One or two yellow-tubed boletes, possibly B. edulis;









pear-shaped
puffballs;
lilac
inocybes
growing in

fox sparrow insisting on having his picture taken.

the duff.



September 30, 2016 File: 673g

September 29, 2016 (day +439, 366+73)

No rain. Cistern level -322 mm SCB, a drop of 3 mm. Level at the weir -304 mm (SPB16), a drop of 2 mm.

Perfect fall day. Blue sky, mild, light breezes.

Several small flocks of juncos and finches (possibly purple) feeding on translucent red honeysuckle berries; and along the Ridgeway, flickers doing likewise with the mat-red berries on some of the arbutus trees.



Willows in the SE Arm wetland including some that might be Sitkas, but don't quote me.

Migrant mallards joining the residents, the newbies jauntily showing off their new season's plumage.





THE END OF SUMMER.

Continued here.

Previous <u>here</u> ◊

October 2, 2016 (day +442, 366+76)

Quiet. On the Marsh Trail, more *Inocybe geophylla* not lilac, and an eye-catching cluster of a *Collybia* sp., yellowish, hollow stems.





October 4, 2016 (day +444, 366+78)

Light rain 5 mm. Cistern level -327 mm SCB, a drop of 5 mm. Level at the weir -302 mm (SPB16), a rise of 2 mm.

A moist SE wind signalling a change of season. The average daily temperature up north must be falling below that of the ocean. The cooling air over the mountains, tundra, and boreal forests is building up pressure there, making sure that us down here in the bottom lefthand corner of the country have flows of mild maritime air to keep us from wishing we lived back east.



A red-tailed hawk sitting atop a fir near the entrance, only its unfamiliar call attracting attention, not only mine but that of a raven too. The raven alarmingly checked me out too before flying off. Impossible to get a good photo.

A couple of American widgeons near the cistern in field-guide plumage, but they are so shy. They fly as soon as you see them, sometimes before. It would be very easy to visit the marsh and see only mallards.



A large grasshopper (Melanoplus sp.?) curiously making its way quickly through the wet grass, seeming to be a mouse or a snake. Wasn't until I saw the photograph that I could see what it was.

Possibly *M. sanguinipes*, a migrant species and an agricultural pest in the southern US.

Mushrooms and toadstools everywhere, especially under conifers. Autumn's spring flowers. Charming, cute, and elegant, not all

of them for the hungry, but an important part of forest life. There's too many species for me to try and identify them all, even if I could. I'll just have to re-post if I ever find out what they are.



Marasmius sp. horsehair mushrooms, looking like tall thin blackstemmed wine glasses scattered on table-cloths of conifer needles. Maybe they dance when I'm not looking.











Didn't pick to check stem, rings, veil, gills, volva, smell, taste... nor did I do spore prints, so Agaricus safewayus is all I recommend. They're not so bad and they come with labels.



Top left: don't know. Top right: don't know, *Clitocybe* sp.?

Middle left: *Boletus* sp. *lakei* ? + *Russula xerampelina* (no, not posed) Middle right: *Amanita muscaria*Bottom left: *Laccaria amethysteo-occidentalis* ? Bottom right: *Lycoperdon pyriforme*



Pixie-cup lichen (*Cladonia* sp.) on one of the erratics, becoming common.

October 6, 2016 (day +446, 366+80)

Light rain but a lot more coming. A real front, not one of those feeble occluded ones.

A northern shoveller out on the lake showing green in its speculum as it flew off. Also what looked like a hooded merganser, far away.

Some of the ducks on the





lake must be mallard hybrids, most often crosses with widgeons, but there may be some with







one of the three kinds of teal.

The hybrids' heads have the green gloss of the pure-bred mallards but the gloss varies more with lighting and wetness, gleaming sunshine can create the illusion of patches of white, and the green is almost never as bright, sometimes quite dull. Hybrids too lack white neck-rings and their bills are seldom yellow.

October 9, 2016 (day +449, 366+83)

Rain, after the downpour 68 mm. Cistern level -256 mm SCB, a rise of 73 mm. Level at the weir -209 mm (SPB16), a rise of 93 mm.

No puddles yet in creek beds. Leakage through the baffle tinkling, but there's no flow. Raindrops on the grass glinting in the sun.

No new duck arrivals. Golden-crowned kinglet on the West Entrance Trail where small flocks of smaller birds busy about in thickets along the boundary between the Douglas-fir forest and the field outside the park. The tweet-tweeting of the troupes is easily heard, but they're the devil to spot, even though they'll come near if you just stand still for a moment. The soundscape has certainly changed in the past couple of weeks. Unfamiliar calls of migrating strangers. Like being in a train station in a foreign land.

October 10, 2016 (day +450, 366+84)

No rain. Cistern level -252 mm SCB, a rise of 4 mm. Level at the weir -209 mm (SPB16), no change. Quiet.







Top left: Pholiota squarrosa?

Top right: orange peel, *Aleuria* aurantia

Left: don't knows.





Top left:
Helvella
lacunosa
Elf's
saddle
Top right:
Amanita
muscaria
button
Below: a
whole
crowd of
don't

knows.



October 12, 2016 (day +452, 366+86)

No rain. Wood ducks, American widgeons, others far away. Still dragon flies in the old burn-pile clearings, Canada darners (new species for the list) and western meadowhawks. One even landed on my head. Wind enough to stir the branches of the willows in the Canary Grass Meadow. Some purple finches there.





October 15, 2016 (day +455, 366+89)

Lots of rain, about a month earlier this year than last. The winter wet season has begun. Gauge shows 100mm.

Level at the cistern
-83 mm SCB, a rise of 169 mm.
Level at the weir +149 mm WPB (scale), a rise of 234 mm as leakage through the beavers' dam increases. Sill depth +27 mm.

No flow from the pond leveller or the privateproperty drainage pipe.

East Path Creek is flowing, about 7.0 L/s. Nothing from the NE Arm, still looks dry at the spillway. No flow

from the Canary Grass Meadow into the Stump Farm Number 1 Stream beyond a local trickle. Stanley Road wetland however is flowing in sheets down the entrance path from the west side. Coats Marsh Creek is flowing. [see main <u>file</u> for analysis]

Out on the lake, all I see through rain-speckled glasses are widgeons.

October 18, 2016 (day +458, 366+92)

Rain 40 mm. Cistern level -23 mm SCB, a rise of 60 mm. Level at the weir +305 mm WPB (scale), a rise of 156 mm. Sill depth +95 mm.

East Path Creek is flowing strongly, 16.3 L/s. Nothing at the NE Arm spillway. Stanley Road wetland flow has eased. Coats Marsh Creek is flowing strongly. You can hear it now as you approach it. Pond leveller working at well over half of its full capacity; flow from private-property drain just below the weir has also started.

A raft of about 20 ducks on the lake; mallards, widgeons, and maybe a hybrid or two; male and female. Very easily spooked. The whole flock took off together and headed east. Didn't look as if they were coming back any time soon. I was being careful not to alarm them, so if this were ever to become a popular birding spot, a blind on stilts would be essential.





The rising water has submerged the leaves of the watershield, which I suppose could be contributing to the rise in water level beyond that in the rain gauge.

Much-Ponding-in-the-Marsh. In the NE Arm wetland it's now ankle deep almost everywhere despite no water being visible yet at the East Path spillway. A vole, probably a Townsend's, scurried across the old logging track north of the wetland (the NE Arm Trail) as I wandered by. Poor guy -- must have been desperate to be out in the open like that. Looking for a drier winter home in the 4-foot probably.

Numerous flocks of small birds, some with mixed species, taking advantage of the lull in the rain. So hard to identify - they are so active among the becoming-leafless alder branches. Finches, warblers, sparrows, nuthatches... but not a good sighting of any of them.



After deciding not to take any more pictures of mushrooms came across two species that needed a break in the rule. Pseudohydnum gelatinosum a curious gelatinous, milky-white, translucent mushroom with small teeth for gills. And some steinpilze? I just wish that mushroom foragers wouldn't leave behind a trail of kicked-over or broken-off rejects. It doesn't take much practice to recognize a not-worthcollecting Russula, Suillus, Boletus, or whatever without destroying them.

October 22, 2016 (day +462, 366+96)

Rain 29 mm. Cistern level +38 mm SCB, a rise of 61 mm, and now close to as high as the beavers' dam will allow. Level at the weir +335 mm





WPB (scale), a rise of 30 mm. Still a ways to go before it reaches the deck, but the pond leveller is already working at close to full capacity. Sill depth +100 mm. Flow from private-property drain just below the weir now substantial, maybe around 3 L/s.

East Path Creek is at 15.6 L/s. Ponding in the NE Arm has suddenly reached the spillway where water is starting to flow over to the west side leading down to the lake. Less than 1 L/s at the moment, a gutter full, but any more rain will start it flowing in earnest. Must fix the leak in my boot.





Meanwhile, the overcast sky is moody, keeping everyone wondering what it will do next. No wind, quiet. Just one mallard couple out on the lake acting as caretakers.

Show time for all those ninebarks, bigleaf maples, cherries, willows, and Indian plums dwelling unobserved in the understory and along the margins of the Douglas-fir forest; their leaves catching the slanting light with their yellows, oranges, and browns.

October 25, 2016 (day +465, 366+99)

Rain 10.5 mm.
Cistern level +45 mm
SCB, a rise of 7 mm.
Level at the weir
+305 mm WPB (scale),
a fall of 30 mm.
Sill depth +80 mm.
Flow from privateproperty drain around
1.5 L/s. Everything
stable, the pond
leveller in control
as the rain tide ebbs
a little.

East Path Creek is

slow at a measured 1.3 $\rm L/s$. No flow at the NE Arm spillway and no flow where it enters the lake.

The wind aloft breaking up the layers of cloud into ragged fragments and trying, unsuccessfully, to disperse them. A wind-surf in the canopy, adding twigs and small branches to the strandline on the ground where the gusts dwindle away. Fitful sunshine, but not much for a garter snake on the trail and two dragon flies in one of the clearings. Small flocks of juncos. A bold purple finch along East Path Creek. A mallard couple and an American widgeon couple have the

lake to themselves. The ducks seem proud of their new plumage, occasionally splashing and preening to keep it spick-and-span.







October 28, 2016 (day +468, 366+102)

Rain 19 mm. Cistern level +64 mm SCB, a rise of 19 mm. Level at the weir +326 mm WPB (scale), a rise of 21 mm. Sill depth +90 mm. Flow from private-property drain around 1.0 L/s.

East Path Creek is at a measured 8.4 L/s. No flow at the NE Arm spillway, though the pond is high on the east side.

Lost my notebook in Coats Marsh Creek, had to wade down a hundred metres or so in the fast-flowing water to find it lodged under some woody debris fully submerged. Hair-dryer time when I got home.

The ring-necked ducks are back! About eight. Easy to spot; they dive rather than dabble. More widgeons too.

A rough-skin newt (Taricha granulosa) on the weir bridge rail. Dead. A gift maybe? These things are very giftig so you don't touch them with bare hands.

Lots and lots of white mushrooms, mostly *Inocybe geophylla*, a few of which are lilac.

November 01, 2016 (day +472, 366+106)

Rain 10.5 mm. Cistern level +79 mm, a rise of 15 mm. Level at the weir +311 mm WPB (scale), a fall of 15 mm. Sill depth +77 mm. Flow from private-property drain around 2.0 L/s.

East Path Creek is at a measured 6.3 L/s. No flow at the NE Arm spillway, though the pond is



still high on the east side.

Pacific wrens chit-chit.
Several. Not shy.

Just when you think it's safe to ignore all the mushrooms, a curious club coral emerges, Calvaria purpurea perhaps.



A perfect sighting of a hawk, perched, not noticing me peering at it from behind a small tree. I'm absolutely sure it might possibly have been a sharp-shined, not a Cooper's.





Many ducks on the lake. Mostly ringneckeds, counted thirty but there were more. Some buffleheads. Plus a widgeon and a shoveller or two.



November 03, 2016 (day +474, 366+108)

Rain 42 mm. Cistern level +109 mm SCB, a rise of 30 mm. The water now so high it doesn't matter if my boots leak or not — the water overtops them anyway as I wade out to the marker, so I take them off. Level at the weir +469 mm WPB (scale), a rise of 158 mm. The deck is



surprisingly still dry. Compared to last year, the beaver dam is higher, less porous, and the flow over the baffle is greater. Sill depth +250 mm. Flow from private-property drain around 2.0 L/s.

East Path Creek is at a measured 37.9 L/s. Almost a full culvert, but no spilling over the pathway. NE Arm spillway flowing strongly, I'd estimate at around 30 L/s. The NE Arm meadows are flooded, the bracken brown.

Coats Marsh Creek flowing seriously with a heavy weightiness beneath its hitherto brooky babbling. Entrance wetland overflowing at several litres a second, the path becoming a canal.







Fewer ringneckeds, more buffleheads.

Angel wings, not a rare mushroom, but not common in the park. They grow on deciduous trees.

Small flocks

of chickadees, one with what looked like a golden-crowned sparrow tagging along.

November 05, 2016 (day +476, 366+110)

Buffleheads in numbers, especially females (or is it hens?). Ring-neckeds too. Ravens,

I always forget to mention ravens, but they're always here. Gangs of curious chickadees. Autumn leaves not up to eastern standards, but here and there, one or two showing how it should be done.









Lots of fairy-ring mushrooms in all the greenswards. They have a nice mushroomy smell.

November 07, 2016 (day +478, 366+112)

Rain 26 mm. Cistern level +98 mm SCB, a fall of 11 mm. Level at the weir +384 mm WPB (scale), a fall of 85 mm. Sill depth +140 mm. Flow from private-property drain around $2.0\ L/s.$

East Path Creek is at a measured 14.1 L/s. Moderate flow at the NE Arm spillway.

Gloomy, grey-wracked clouds moving swiftly in a scumbled sky; only low-wattage light bulbs on.

November 11, 2016 (day +482, 366+116)

Rain 3 mm [gauge #2]. Cistern level +94 mm SCB, a fall of 4 mm. Level at the weir +320 mm WPB (scale), a fall of 64 mm. Sill depth +75 mm. Flow from private-property drain around

1.0 L/s. East Path Creek is at a measured 3.3 L/s. No flow at the NE Arm spillway.

Sombre day, a socked-in sky; not raining, but so close to tears.

About 30 ducks visible on the lake, mainly buffleheads and ringneckeds with a few widgeons. Wrens, chickadees, siskins, and other small birds to be seen, not just heard now that the alders are leafless, but my camera and binoculars can't keep focused as they flit and flutter from branch to branch. Otherwise all very quiet.



November 15, 2016 (day +486, 366+120)

Rain 22 mm. Cistern level +101 mm SCB, a rise of 7 mm. Level at the weir +335 mm WPB (scale), a rise of 15 mm. Sill depth +85 mm. Flow from private-property drain around 1.0 L/s. East Path Creek is at a measured 8.3 L/s. No flow at the NE Arm spillway and pond level on east side low. Wetlands in the SE Arm (East Path Creek headwaters) flooded - as expected.

Overcast, only spitting with rain. Buffleheads, ring-neckeds. Rich soundscape includes "warque", "wack" (ravens), "skeu" (flickers), "chit", "cheep" (hosts of little brown birds), "chit-chit" (wrens), a babbling whistling+piping+whinnying (bald eagle), "croaks" (frogs), drumming (woodpecker), "toreeee" (towhees), warbles (finches). I'm only slowly learning.

Novemb<u>er 18, 2016</u> (day +489, 366+123)

Rain 6 mm. Cistern level +92 mm SCB, a fall of 9 mm. Level at the weir +311 mm WPB (scale), a fall of 24 mm. Sill depth +70 mm. Flow from private-property drain around 0.5 L/s. East Path Creek very slow at an estimated 1 L/s. Low flow rates have been underestimated in the past because of the presence of a vertical eddy at the culvert outlet when ponding on the west side is high.

No flow at the NE Arm spillway, but just a few tens of metres downstream from the spillway, flow was observed [right] even though the pond on the east side was a metre below the track. There is flow from the NE Arm even when the spillway is dry, presumably because water can percolate from the pond to the east through the rubble base of the track.

Area: using new Google Earth images and the polygon tool, the main area was estimated at $55116~\text{m}^2$ and the weir bay $1730~\text{m}^2$. However, as noted in the budget table notes 3 and 4,

these revisions have little impact, and so the old area values have been retained for consistency.

A cool 8°C. A wintery clammy quietness pervades.

November 24, 2016 (day +495, 366+129)

Rain 65 mm. Cistern level +115 mm SCB, a rise of 23 mm. Level at the weir +448 mm WPB (scale), a rise of 137 mm. Sill depth +220 mm. Flow from private-property drain around 1.5 L/s. No flooding at the weir. East Path Creek nearly full, guggling through the culvert at estimated 34.7 L/s. Heavy flows across NE Arm spillway and from the wetland west of the entrance. New water budget calculations working out well. The beavers have certainly improved their dam since last year.

Cold air, clearing skies after prolonged rain. Two or three dozen





ducks, mostly ring-neckeds. NE Arm wetland very flooded and froggy. Alder catkins out.

Most mushrooms are done, but found bright white coral fungi in the forest gloom, along with junco's flirting their equallywhite feathered tails.

November 28, 2016 (day +499, 366+133)

Rain 66 mm. Cistern level +111 mm SCB, a fall of 4 mm. Level at the weir +442 mm WPB (scale), a fall of 6 mm. Sill depth +215 mm. Flow from private-property drain around 1.5 L/s. Still no flooding at the weir. After more than two inches of rain! East Path Creek same at estimated 32.6 L/s. Heavy flows across NE Arm spillway and some also from the minor spillway 200 metres north. Puddles in the clearings. Met an ex-duck-hunter. Says teals are getter rarer now everywhere, and migatory



ducks use the lake as a resting place - it's not good to disturb them. December 5, 2016 (day +505, 366+139)

Rain 20 mm. Cistern level +103 mm SCB, a fall of 8 mm. Level at the weir +366 mm WPB (scale), a fall of 76 mm. Sill depth +100 mm. Flow from private-property drain around 1.0 L/s. Everything in moderation. East Path Creek at estimated 10.1 L/s. No flow across NE Arm spillway surface, but pond to the east is full and there's flow down to the

lake.

Breezy fingertipnipping day. Several dozen ducks. Mostly ring-neckeds, some buffleheads, and a far-off glint of emerald green (mallard), speaking of which, the mosses are thriving in the long-shadow sun that now unaccustomedly threads through the boles beneath the canopy. The solstice is nigh.

December 11, 2016 (day +512, 366+146)

Snow/Rain 15 mm. Cistern level +108 mm SCB, a rise of 5 mm. Level at the weir +363 mm WPB (scale), a fall of 3 mm. Sill depth +90 mm. East Path Creek at estimated $9.8~\rm L/s$.

Patchy foot-, hoof-, and paw-printed snow. Lightly overcast. A wintery silence, even the ravens are quiet; only what used to be called winter wrens can be heard. Ice on the lake, mist on the ice, the ducks sheltering among the tawny reeds.







Paths strewn with small alder tree branches.
Can't have been the weight of the snow, not enough of it, or the wind, only the leafless alders affected. The diameter of the break points are remarkable similar, about one inch.
Some strange cold-weather biophysics going on?



<u>December 16, 2016</u> (day +517, 366+151)

Rain gauge buried in frosty snow. It'll have to wait. Cistern level +99 mm SCB, down 9 mm. Level at the weir +354 mm WPB (scale), also down 9 mm. Sill depth 90 mm. East Path Creek 9.4 L/s. Hoar-frosted-snow covered ice over most of the lake, but the creeks still flow, and the pond leveller still works. I'm supposed to say the sun was weak, it being less than a week to the solstice, but welcomingly warm is more how I would describe it.



December 21, 2016 (day +522, 366+156)

Weir +411 mm WPB (scale), up 57 mm as ice and snow melts. Dank day as befits the year's nadir.

December 24, 2016 (day +525, 366+159)

Rain 31 mm. Cistern level +100 mm SCB, a rise of 1 mm over 8 days. Level at the weir +395 mm WPB (scale), a rise of 41 mm over same period. Melting ice and snow. Sill depth +100 mm. East Path Creek at estimated 12.8 L/s. Some surface



flow across
NE Arm spillway.

Still cold, but not finger-blowing or foot-stampingly so. A trumpeter swan in a patch of open water near the beaver dam. Otherwise only a few buffleheads around.

More frost-felled (?) brushwood among the alders everywhere. One stem already hosting a pink, almost-bracket, fungus.







An unusual walk on the weir side of the beaver dam. The water on the topped-up marsh side looked scarily high in places — one had to have faith in the beavers' engineering abilities to be there.

A final flourish to end the year; a troupe of twenty or more juncos foraging on the 4-foot by East Path Creek. They scattered into the bush as I approached, but quickly returned as I stood and watched.

They were finding lots to feed on, and gradually came closer and closer as I stood there. One would curiously glance at me from time to time, but clearly I was being accepted as part of the landscape. Mainly juncos, but a couple of towhees, and the fox sparrow that is wont to hang out there by the creek. A delightful year-end greeting from my friends at the marsh.

♦ Continued <u>here</u> in 2017. Previous here.





January 6, 2017 (day +538, 366+172)

Gauge iced up, left as is. Level at the weir -335 mm WPB (scale), a fall of 60 mm.

East Path Creek frozen except in the culvert. Thick ice on the lake. Buffleheads in numbers taking refuge in the small patch of open water near the cistern. I'll discontinue visits while they shelter there. Only other birds around are what-we-now-call Pacific wrens but used to



call winter wrens. name better.



January 18, 2017 (day +550, 366+184)

Rain after the ice finally melted 82 mm. Cistern level +86 mm SCB. Level at the weir +387 mm WPB (scale). Sill depth +100 mm. East Path Creek at estimated 18.5 L/s.



A balmy 10°C, raining. Still a very thin covering of ice on the lake. Rafts of buffleheads, and I think a few of ring-neckeds too.

Good opportunity to measure the level on both sides of the beaver dam, this time with two posts and my Suunto inclinometer. Heard a redwinged blackbird calling. Lovely rainbow - the full arc.

There is now a note on human disturbance of ducks and

geese at Coats Marsh while they are taking a break from their migrations here.

January 24, 2017 (day +556, 366+190)

Rain 15 mm. Cistern level +81 mm SCB, a fall of 5mm. Level at the weir +372 mm WPB (scale), a fall of 15mm. East Path Creek at



estimated 10.8 L/s. NE Arm spillway, a trickle, but pond to the east full. Buffleheads, ringneckeds, a few mallards, and eight or nine trumpeter swans.

January 28, 2017 (day +560, 366+194)

Rain 1 mm. Cistern level +92 mm SCB, a rise of 11mm. Level at the weir +317 mm WPB (scale), a fall of 55 mm. East Path Creek barely moving at 2.3 L/s. NE Arm spillway dry, but a trickle a little downstream on the lake side; pond to the east down quite a bit.

An altostratus kind of sky - drifting banks of high mists mostly only

thinly veiling the blue beyond. It's windy up there, but not down here, and the sun shines forth beneath the cloudiness from its winter abode low above the horizon, giving life to the carpets of mosses, some of whose ancestors once, back in Permian times, formed mighty forests.



Swans out on the lake being followed by ring-neckeds, buffleheads, a few mallards, and one or two widgeons gleaning the vegetation that the swans are digging up from the bed of the lake.

Another opportunity to measure the level on both sides of the beaver dam, this time with the addition of a laser leveller.

A nearby couple

of swans trump a warning, and unlike the ducks, start making their way toward me with cautious assertiveness. Their calls may sound like trumpets, but to me, their short blurts sound like somebody who is only trying the instrument for the first time.





A bald eagle circles overhead. The ravens are raucous and garrulous, then perfectly quiet.¹ Only an occasional frog and flicker (good name for a pub) puncture the silence.

February 2, 2017 (day +565, 366+199)

Rain gauge iced up, not much in it. East Path Creek not moving.

Walked the Ridgeway, whose fate hangs in the balance. Crisp sunny day. The SE Arm wetlands covered in thin ice. Fibrous ice crystals, known as pipkrakes, emerging like squeezed toothpaste from hollows in the trackway.

A few chickadees, unusually free of any colour on their sides, but with give-away brownish backs crossed my path. They were too busy to linger.

Ducks gather at open-water patches around the lake's margin, the bolder drakes stand on the skim of ice willing the sun to do its job. No swans today.





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There is a curious myth among Native people that ravens were all originally white. The following story recounted by "J.D." appeared in the September 13, 1860, issue of the Daily British Colonist newspaper in Victoria. The article refers to "crow", but it is more likely that "raven" was meant, so I've changed it. The story is "...One time the raven went to see an old acquaintance, a chief named Can-nook. Being tired and thirsty he asked for a night's lodgings and a drink of water. Can-nook told him he might lodge there but never a drop of water should he have. After they had gone to bed the raven got up to help himself to water; but Can-nook's wife saw him and bawled out to her husband. Can-nook aroused himself and threw some wood on the fire. The raven tried to get out of the hole in the roof cut to let out the smoke, but Can-nook kept piling on the wood; the smoke increased in volume, and for some time the raven could not get out, and when he did he was perfectly black—having been pure white before that lamentable event. And all ravens from that day to this have been jet black."



February 9, 2017 (day +572, 366+206)

A foot of snow to crump through. Deer tracks, but no sign of raccoons. Rain gauge buried. East Path Creek not moving. Weir +366 mm WPB (scale). Ringnecked ducks hiding out in the cistern. Lake frozen. How do you pass the time when you tire of looking at your feet and it's getting late? Figure out the notes in a randomly chosen scale, Bb major for example. In only three minutes, 200 plus metres, I had Bb.C.D.Eb.F.G.A.Bb. Trudge, trudge. Next problem.

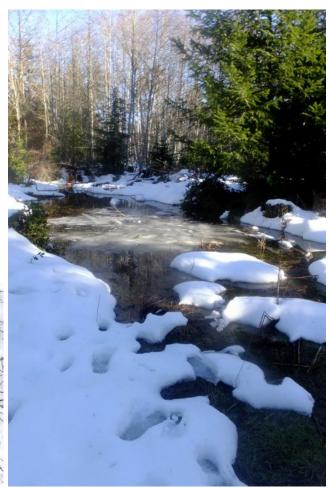
February 13, 2017 (day +576, 366+210)

Gauge full of ice and snow, some obviously lost. I'm taking the El Verano figure 88 mm.
Cistern level +94 mm SCB.

Level at the weir +399 mm WPB (scale). East Path Creek at estimated 18.9 L/s. NE Arm in full flood. A little clear water on the lake, swans, and the beaver is back too.

Frost trimmed twiggery, who knew?





<u>February 15, 2017</u> (day +578, 366+212)

A wet, grey day. Rain 38 mm. Cistern level +130 mm SCB, a rise of 36mm. Level at the weir +768 mm WPB (scale), a rise of 369 mm — no that's not a typo. The weir deck has a silvery shoulder and the protective berm, safe, but being challenged. East Path Creek in full





flood, the level 180 mm above the top of the culvert, water extending 15 metres along each side of the path, a rough estimate 85 litres/sec. NE Arm spillway also flooded.

Water shooting out of the Coats Marsh Creek stone culvert like a bullet, not something to wade in without hanging on, just shy of 300 L/s.

<u>February 18, 2017</u> (day +581, 366+215)

Back to normal after the snow melt and flood. Rain 12 mm. Cistern level +94 mm SCB. Level at the weir +427 mm WPB (scale). East Path Creek at estimated 25.7 L/s. Ducks are happier now the ice has gone: lots of buffleheads, mallards, ringed-necks, and two swans in weir bay. The paths still be-puddled, pudgy as J.C. would say, and the woodlands be-ponded.

NE Arm flowing strongly across the spillway and, unusually, still a flow across the small spillway further along East Path. No wind. Quiet, but for a few red-winged blackbirds singing away. Apart from them, get the impression nature is biding its time; paying attention to its own calendar; not risking being in haste just because the weather is mild.

February 21, 2017 (day +584, 366+218)

Rain 8mm. Cistern level +90 mm SCB, a fall of 4 mm. Level at the weir +363 mm WPB (scale), a fall of 64 mm. East Path Creek at estimated $16.1~\rm L/s$.

NE Arm flowing still across the spillway and still a trickle across the spillway further along East Path. Wind creating surf in the canopy, but it's quieter below. It still has a sting, but then by the lakeside you get a double-dose of sun, one directly, and one from its reflection in the sparkling water. Let's hear it for radiation therapy!

Usual suspects out on the water, including the pair of trumpeter swans. NE Arm soggy, hawk circling overhead.



Eagles heard in the woods along the Marsh Trail. Mallards in weir bay. Just an occasional out-of-season frog not evoking any response. Ravens quiet. The RDN maintenance people have cleared away some of the beaver debris limiting the flow over the baffle. Good plan, but as a result, the weir and creek have definitely been lacking drama this year compared to last, except that is for the post-snow flood on February 15.



February 25, 2017 (day +588, 366+222)

No measurements.

Cold, crisp, finger-chilling day, sunny but clouding over. Lots of ducks on the lake, all very busy, flying hither and thither in pairs and being very vocal. Two swans in the tawny reeds.



Tried the blue-flagged and orange-flagged rough trails along the south side. Blue-flagged route near the lake is not used much but is easy enough, but the orange-flagged trail further back in the bush is not a trail yet(and I hope it never will be). It's Sally Alley, long stretches through thick, tough salal. Tiring. This whole area should be left to itself and to the wildlife that likes snags and seclusion.

February 26, 2017 (day +589, 366+223)

Rain 12mm. Cistern level +98 mm SCB, a rise of 8 mm. Level at the weir +323 mm WPB (scale), a fall of 40 mm. East Path Creek at estimated slow 4.1 L/s. Patches of snow still. Lone American robin busily foraging in the lichen on the tree branches. Common bird but rarely seen up here.

March 3, 2017 (day +594, 366+228)

Cistern level +94 mm SCB, a drop of 4 mm. Level at the Rain 3.5mm. weir +287 mm WPB (scale), a fall of 36 mm. East Path Creek at estimated gutter-sized trickle

1.5 L/s.

Song sparrow at the cistern boldly watched me measure.

Altostratus veiling the sun like a headlight in fog; no squinting or sunspecs required. A few dropples dimpling the lake's surface.

Tranquil, except for one or two mallards making the place sound like a barnyard.

Many buffleheads on the lake, most hanging out in pairs. Some ring-neckeds too, but no swans.

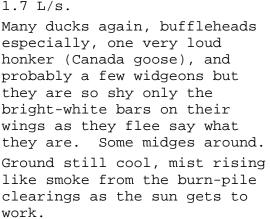
First insects of the season. Who knew that some pond skaters have wings (no jokes please about the Detroit Redwings).

March 10, 2017 (day +601, 366+235)

Rain 22mm. Cistern level +104 mm SCB, a rise of 10 mm. Level at the weir +293 mm WPB (scale), a rise of 6 mm. East Path Creek a languid

1.7 L/s.







Took a walk down the Ridgeway, the endangered trail. You can see the thickets of red alder in the wetlands on either side. Lots of wren noises from within.

Also walked, waded, and bushwhacked, by along and between, the Stump Farm Streams. Beautiful area this time of year with small tinkling waterfalls, free-flowing rivulets of crystal-clear water, and vivid-green mosses and lichens on the old stumps.





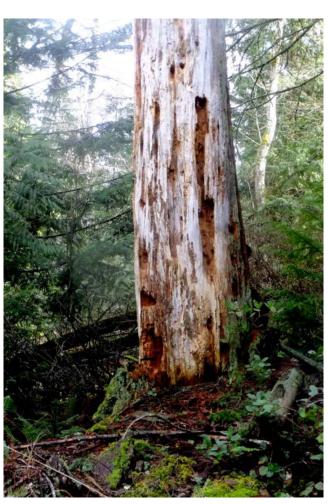


The "small spillway" on East Path, north of the NE Arm spillway, looking north. When it floods, water fills the hollow on the right and overflows across the path and down through the woods to the lake, which is on the left. It's easy to underestimate run-off on Gabriola because significant volumes of water flow unseen up to five metres below the surface through bedding-plane-parallel fractures in the bedrock. This is probably an example of a location where this happens. Water balance analysis indicates that in the wet season, volumetric flow into the lake is greater than that in the creeks alone.

March 15, 2017 (day +606, 366+240)

Rain 25 mm. Cistern level +129 mm SCB, a rise of 25 mm. Level at the weir +360 mm WPB (scale), a rise of 67 mm. East Path Creek strong at 18.0 L/s. Minor flow at NE Arm spillway.

Dozens of ducks on the lake (buffleheads, ring-necked, and a few mallards). Grandchildren helped; they found three red-legged frogs and a rough-skinned newt. Lots of bird songs and calls from the bush. Beaver dam full right to the top.



The park is lucky in that loggers of the past left plenty of snags. In some similar areas on the island, the western side of the Mallett Creek watershed for example, 100% of the trees were logged leaving nothing for the wildlife.



March 18, 2017 (day +609, 366+243)

Level at the weir +399 mm WPB (scale), a rise of 40 mm. Checked out the uppermost upper reaches of East Path Creek, which is flowing strongly at the moment



Above: McGuffies Swamp. The west "tail" end of the swamp is as close to the source of East Path Creek as you can get. Mallards.





Left: Leaving McGuffies Swamp entering High Point Meadows.

Above: Leaving the meadows in disorganized fashion, and entering the woods to begin the steep descent to Coats Drive.





Left: Step-by-step descent to

Coats Drive.

Right: At the bottom, flowing smoothly toward the half-buried culvert

beneath Coats Drive.



Below left: Ponding near the head of the SE Arm wetlands. From here, a clear run west to East Path via the Appleyard ponds.

Below: A drier route - the Ridgeway.



March 19, 2017 (day +610, 366+244)

With the insects come the birds. Almost a constant background twittering now just above your hearing threshold; mostly little guys with high-pitched tweets, always it seems deeper in the forest than you are, except that is for the chickadees who come out of their way to greet you.

Flock of yellow-rumped warblers "butter butts" and a nuthatch in the snags around the beaver lodge. Swallows are back.





March 22, 2017 (day +613, 366+247)

Rain 38 mm. Cistern level +144 mm SCB, a rise of 15 mm. Level at the weir +366 mm WPB (scale). East Path Creek at 10.6 L/s. Minor flow at NE Arm spillway.

Buffleheads, ring neckeds, and a few mallards. A golden eagle circling at the west end of the lake.



March 27, 2017 (day +618, 366+252)

Rain 22 mm. Cistern level +149 mm SCB, a rise of 5 mm. Level at the weir +366 mm WPB (scale), no change. East Path Creek at 14.8 L/s. Followed NE Arm flow up from the lake to the spillway. Although there was no flow across the surface of the track, the subsurface flow from the ponding on the east side was substantial and at the lake fully equal to that in East Path Creek.

Went looking for brown creepers (Certhia americana) that I know must be in the park because I've heard them [unlike professional consultants, who spend one day here before going off to write up their colourful reports for officialdom, I don't count a sighting unless I actually see the bird]. And I have seen one not that far away in similar wet, coniferous habitat as exists within the CP. No luck today though.



Rainbow funghi in the woods (alder deadfall).

April showers in heavy downdrafts turning the lake silvery; some drops bouncing off the surface just like photons from the sky. Over in no time. Geese somewhere out there, but I don't see them.

Failing to find creepers, resorted to looking for in-season skunk cabbage. I don't see those in the CP either.



First wildflowers of the season. Possibly hairy bittercress

(Cardamine hirsuta), tiny things on the south-facing bank of the NE Arm stream just below the spillway on East Path.











Rills and rivulets from the NE Arm just short of the eastern shore of the lake. The fabled spring that those that know like to talk about?



One life ends; another begins.

March 28, 2017 (day +619, 366+253)

Grey, spotting-with-rain day. Brown creeper hunt renewed. After about six hours altogether (today and yesterday)turned for home and took one last look at the lake. As they often do, a flock of chickadees came by, and as I held up the camera, one flew down and perched briefly on my hand. Just a few moments later as I re-directed the camera at its companions, there running up the tree next to us was a brown creeper. They scamper so quickly, almost like mice, there was just one chance for a



photograph, but I got it. It's a bit blurry, but never mind, when I find the skunk cabbage, the picture will be better.



March 31, 2017 (day +622,
366+256)

Walked, bushwhacked, and waded the area between the Ridgeway and the soggy SE Arm wetlands and East Path creek.

A sleepy owl, a lethargic snake, and sparrows, one song sparrow behaving tantalizingly like a northern waterthrush down at the water's edge, and another nearby in the trees, a sooty fox sparrow, but without a trace of tell-tale yellow on its beak.

In thigh-high salal, a rustling, just more than a towhee makes. In bear country, something to alert the senses, but here? Nah! But there it is again. Swirled around. No bear, but moving briskly up the slope, a very large raccoon.



The SE Arm wetlands, the East Path Creek reservoir of water coming down from High Point Meadows and McGuffies Swamp. The other fabled spring of the desktop explorers.



Left: Ren Yugao's picture of a 298-million year old forest with Sigillaria trees towering up to 80 feet high above tree-ferns



up to 20 feet tall. Sigillaria are related to today's club mosses.

Right: Picturing mosses on erratics in the SE Arm is now an elbows-and-knees job. Possibly copperwire moss, Pohlia nutans, but there are several other possibilities.

File: 673j March 31, 2017





Below: An Appleyard pond on East Path creek.



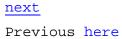


March 31, 2017

OCPs and LUBs. Whither the marsh lands?

"If I can comprehend but not control, I need not gloom my days with futile dread..."

Claude McKay ◊





April 2, 2017 (day +624, 366+258)

Rain 30 mm. Cistern level +158 mm SCB, a rise of 9 mm, a new record level. Level at the weir +366 mm WPB (scale), again no change, the pond leveller working flat out but doing its job. East Path Creek at 11.7 L/s. Steady flow at the NE Arm spillway.

A remarkable pinto sky. One moment blue with warm bright sunshine, the insects free to fly undeterred by the slightest breeze, the next grey and gloomy with spots of rain and sea-shore-sounding gusts high up in the canopy.

Many birds. Turkey vultures, swallows, hooded mergansers, buffleheads, ring-neckeds, mallards, wood ducks, two Canada geese, fox sparrows, wrens, ravens, pigeons?, and, as they say in the advertising business, much more.

Below left: my version of one of several turkey vultures. Right: how it should look (Greg Gillson).



Above: Omphalina ericetorum. Like pats of butter, said to be edible.











Above: The swallows over the lake and north-shore clearings move so fast, they're almost impossible to photograph. No doubt most are violet-green swallows, but now and then I see blue, hinting that some are tree swallows. But reflection of a blue sky can do that too and sometimes the camera lies.

Left: The only two geese on the lake, the leader (male?) was honking aggressively.





Bufflehead (left), ring-necked duck (right), hooded merganser (below). These are males, but all ducks on the lake, including these, are accompanied by females these days.







Left: Hooded mergansers, the female showing her hood. Last year, they bred on the lake. They nest in tree cavities away from the water, so the rough trail by snags along the south side of the lake needs now to be out-of-bounds to hikers.

Right. A pair of wood ducks, the male being the shy-one. They also breed in tree cavities.

April 5, 2017 (day +627, 366+261)

While trying unsuccessfully to get a picture of the swallows over the north-shore burn-pile clearings. Last year I flagged these as *Equisetum arvense*, probably right, or ?







Song sparrows looking on. They and fox sparrows are most common in the park, but there are others.

April 8, 2017 (day +630, 366+264)

Rain 48 mm. Cistern level +188 mm SCB, a rise of 30 mm, yet another new record. Level at the weir +491 mm WPB (scale), a rise of 125 mm, the pond leveller submerged and deck on the brink of being flooded. East Path Creek at 29.2 L/s. Strong flow also at the NE Arm spillway.



Left: Views of East Path Creek.

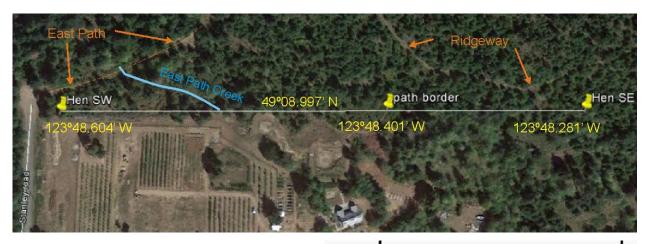
Top: Looking upstream to the Appleyard ponds.

Below left:
Looking downstream
from almost the same
vantage point just
before it reaches the
East Path culvert. At
the moment, a very
lively stream.

Below right: An Appleyard pond outlet.







Northern border of Ravenskill Orchards. See Maps Y and Z and the Field note File 673e pp. E65 and E69 for more details.

Right: Proposed road along border crossing East Path Creek. Lot 4 is the orchard land east of Stanley Road off Coats Drive.

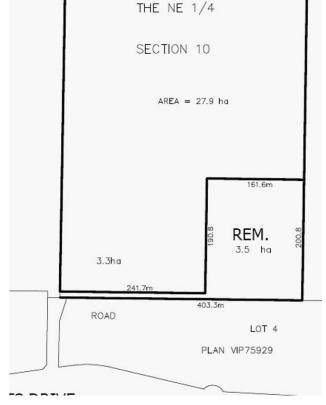
April 13, 2017 (day +635, 366+269)

Rain 41 mm. Cistern level +203 mm SCB, a rise of 15 mm, yet another new record again. Level at the weir +549 mm WPB (scale), a rise of 58 mm, almost at the deck.

East Path Creek at 27.5 L/s. NE Arm spillway flooded, 15 m wide.



Claps of thunder overhead. Pitter-patter on the salal building to a steady swoosh



as the rain bucketed down. The air in the forest bemisted. Soggy pants. Some ruby-crowned kinglets sheltering too.

Buffleheads on the lake don't seem to mind the rain or wind, but the ring-neckeds are more inclined to shelter in the reeds whenever the weather's bad.

A few days ago, there was a serious ruckus among the geese. Three of them, wings flapping, honking fiercely, crashed landed on the water

near me. Two appeared to be attacking a third, and as they paused on the water after the splashing subsided, one floated with its head



The NE Arm so flooded now there are ducks hanging out there.

underwater. Looked like it was injured or even dead. Then after quite a while, it lifted its head, shook off some water, and slinked away. Today we were back to just two geese. They confidently approached when they saw me, not threatening, just checking and making sure I knew they were there. Not honking either. But a sudden

thunderclap out of nowhere made them do that.

After the storm, sunshine, and violet-green swallows, lots of them.

April 18, 2017 (day +640, 366+274)

Brief west-end visit. Hooded mergansers and wood ducks in the weir bay. Yellow-rumped warblers still around. By the dam, a Townsend's warbler. Along Coats Marsh Creek, yellow stream violets. In the woods, fairy slippers, most hanging their heads to keep out the showery rain. In the clearings on mats







of moss, diminutive hairy bittercress, and another hairy one with tramp-on-able tiny white flowers (probably *Draba verna*).

<u>April 22, 2017</u> (day +644, 366+278)

Rain 33 mm. Cistern level +195 mm SCB, a drop of 8 mm. Level at the weir +305 mm WPB (scale), a drop of 244 mm. East Path Creek at 8.2 L/s. NE Arm spillway dry.







Another showery day. Buffleheads in interested couples, and brawls break out whenever a second male gets too close. Ringed-neckeds fewer. No geese.

Mature bald eagle scaring the heck out of ducks; a few swallows; common yellowthroat; Pacific tree frogs hanging out at the edge of the water pretending to be last year's tawny reeds; spring mushrooms, one of several a Nolanea histipes (they're on Saturna too). The woods alive with bird songs and calls.









No observations April 24 - May 20, 2017.

May 24, 2017 (day +676, 366+310)

Rain 57 mm. Weir level 213 mm WPB (scale).



Evening reconnaissance after the break. Red-winged blackbirds proclaiming their presence at their posts all around the lake. Broad-leaved starflowers and A. pantherina common. Deer. Only two ducks, probably female ringed-necks.



May 29, 2017 (day +681, 366+315)

Rain 0 mm. Cistern level +169 mm SCB. Weir level 204 mm WPB (scale). East Path Creek dry.

Blue-winged teals nesting in weir bay. Very shy and easily disturbed as always. Mallards there too.

On the East Path, a giant silk moth (Hyalophora euryalus) and what I'm sure was an arctic skipper (red listed) [later seen to be a mylitta crescentspot] but I just couldn't get the camera to focus on it.

Garter snakes swimming in the water at the edge of the lake; they hold their heads above the water just like land mammals.

Strange loud sound echoing around the lake - a bit like a whooping crane but can't possibly be

that as there is only one of whatever is making the noise and the cranes are usually in colonies. A little bit like a giant horned owl, but this was daylight; the sound wasn't strongly owl-like, more like the sounds a dog might make when not barking, but clearly not a dog; and never been heard before. From the woods; nothing visible making such a noise on the surface of the lake. [pied-billed grebes]

Blue violets, strawberry plant flowers, broom putting on a show in the burn-pile clearings, but not spreading elsewhere.



Blue-winged teals. These birds are shy and are seldom seen so close. Any passer-by will alarm them.





Broom looks bad but it's still confined to the old burn-pile clearings and somebody is making commendable efforts to keep it in check.

<u>June 01, 2017</u> (day +684, 366+318)

Mylitta crescentspot, cinnabar moths waiting for the tansy ragwort, and yes! look! the marsh has chickweed (Stellaria media).







June 08, 2017 (day 691,366+325)
Steady rain - a classic warm
front. Gauge 15 mm.

Just when you think the species list must be nearing completion, two or more pairs of pied-billed grebes on the lake. One couple clearly building a floating nest. It's them that make the very loud calls that echo round the lake. The swans/geese/ducks species

list count is now fourteen.



Lovely Nootka roses out. NE Arm wetlands drying out. The voles, mice, and owls will be back soon.

Ominous orange surveyor's tape in the meadow. The dreadful decision to subdivide this half quarter section has been made. Preserve and protect—but not when we need a road and a few more million—plus dollar homes.



Newcomers to the marsh. A pair of pied-billed grebes. They can be very noisy.

June 12, 2017 (day +695, 366+329)

Rain 0 mm. Cistern level +154 mm SCB. Weir level 183 mm WPB (scale). Coats Marsh Creek dry, but there is still a little water (one litre per secondish) drindling into the bed at the weir itself.

Gusts of cooler air from the southeast, wind-swept cirrus fibratus on high, not yet stable summer weather. Ducklings on the lake being herded by anxious mothers, I'm avoiding approaching too close these days. Black medic everywhere this year; ripe strawberries; probably an evening grosbeak; a hairy woodpecker









chopping
noisily in
the gloomy,
greenless,
under-canopy
of a thicket
of spindly
conifers; a
great horned
owl lurking
in the
shadows; red
admirals;

bluets; and buds of Indian pipes.

June 16, 2017 (day +699, 366+333)

Rain gauge 27 mm. Evening walk; sun after rain. Chattering birds everywhere, mostly unseen; a perhaps aptly-named unkindness of ravens, extraordinarily rowdy, about ten of them along Stanley Road, squabbling, partying, debating, playing some sort of game?

Ducks with ducklings among the watershield, now almost impossible to identify in their drab attire, grebes to be heard; tadpoles big enough to be mistaken for fish; purple martins basking and preening in the setting sun at the top of a snag along the east shore of the lake; salal jam in the making, almost the best in the business.



<u>June 18, 2017</u> (day +701, 366+335)

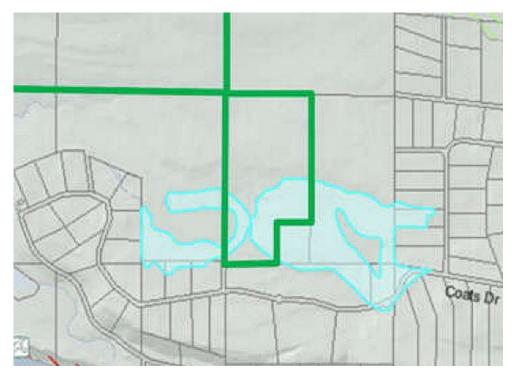
Rain gauge 5 mm.





Above: I would guess a red-legged frog tadpole not yet showing gills.

Below: Rare visitors to the marsh; purple martins, the males are all bluish-black.



Rather strange map of the Potlatch density swap donor land (GLTC GB.RZ.2016.1) (Section 10, west 1/2 NE 1/4 less 3.5 ha rem. in SE corner).

It was shown in the IT Community Information Meeting March 20, 2017. The blue sections were said to be "freshwater wetland/swamp regions" that

"form part of the Coats Marsh and 707 Park". The shallow-water wetland (a perennial lake) in the Coats Marsh RP that the western boundary cuts through is not shown in blue! and the entire remainder is! Definitely a map that could do with more than a little ground truthing. Unfortunately common these days when consultants use satellite images and fancy software to produce their cut-n-paste glossy reports instead of walking the land and talking to locals.

June 22, 2017 (day +705, 366+339)

Rain trace. Cistern level +146 mm SCB. Weir level 174 mm WPB (scale), still dribbling out of the pond leveller carrying leakage from the outer marsh through the beaver dam.

Lovely sunny day in the park with a breeze enough to stir the canopy but not enough to quell the butterfly and moth activity in sunlit glades.



Western tiger swallowtails, red admirals, Lorquin's admirals, and unidentified small white moths caught "on film" (it only takes a few hours), but possible pale tiger swallowtails and little brown ones not.







There are many examples in the park and its environs of stands that are in a stemexclusion phase of their recovery from

clear-cutting. After crown closure, individual small trees, mostly Doug. firs and balsams, touch, overlap, and exclude light, causing most to die but a few others to succeed in a process of self-thinning.



These gloomy stands, the abode of dancing midges, have no understory, small brittle dead branches that threaten to poke you in the eye, and are carpeted with a duff of "pine" needles, twigs, dried-out cones, and wind-blown dead arbutus leaves that crackle underfoot like crisps. The stands go unremarked, except maybe for the occasional giant anthill, saprophytic orchid, and fungi in the fall, but today, at noon, on the day after the summer solstice, it was noticeable how the near-overhead* sunshine came pouring into them.



A seral stage lacking in biodiversity perhaps, but one that is an essential phase in recovery from disturbance of whatever kind.

*actually only 64°18′ at this latitude but it looks higher than that.

June 24, 2017 (day +707, 366+341)

Not the most successful camera day. A red-legged frog with a bit of a







red leg showing; a red squirrel with a bit of a red tail showing; a pine siskin with mostly only a wing showing (ugly and missing the yellow); and another unidentified small dusky moth (cutworm? Protodeltote albidula) with only the silvery underside showing.

<u>June 25, 2017</u> (day +708, 366+342)

Another day. Coralroot orchids.



And a
Pacificslope
flycatcher,
a reward
for sitting
still for a
while
instead of
traipsing
along the
trails.





Meanwhile, oxeye daisies, smooth cat's ears, oceanspray, and in the neighbouring Canary Grass Meadow a few days ago, foxgloves:











<u>July 1, 2017</u> (day +714, 366+348)

No rain. Cistern level +102 mm SCB. Weir level 88 mm WPB (scale). Leakage in the range 0.5-1 L/s, not reaching the stone culvert, which neatly explains the "negative" creek input in the budget calculations.

July 2, 2017 (day +715, 366+349)

Mallard pair and a hooded merganser female each with about five ducklings, and a blue-winged teal couple, looking at ease as they foraged among the watershield, but without any youngsters.

<u>July 3, 2017</u> (day +716, 366+350)

Small flocks of adults and fledglings about, sometimes mixed species, all charmingly curious about intruders: "Oregon" juncos "click-click"-ing, chickadees "seet-seet"-ing, and nearer the water, song





sparrows "tchiptchip"-ing. They all seem very happy.

Grasses in seed; most too difficult for me to identify down to the species level.

<u>July 6, 2017</u> (day +719, 366+353)





Small white moths in the grass are pale glyph moths (Protodeltote albidula). They're easily disturbed and fly during the day. Photo (left)shows contrastenhanced top view; in real

life they're often paler and the pattern invisibleit rubs off easily. They settle on grass stalks head down, often with folded wings (photo far left).

The small orange-and-black Essex skippers (*Thymelicus lineola*) are around as well.



I hear pied-billed grebes at the lake.

July 17, 2017 (day +730, 366+364)

No rain. Cistern level +30 mm SCB, murky. Weir level -40 mm WPB (scale). Leakage stopped now that the level is below the baffle, but still minor flow from the pivate property drain just below the weir. Can this really not be leakage under the berm? The owner thinks not, but it's been dry for a whole month now, hard to believe there is still some flow in even subsurface creeks.

Evening. Still, save for the gentlest wafts now and then to relieve the air of its summer sultriness. A few ducks on the lake, leisurely looking for a roost among the reeds. They're all drab brownish at this time of year, hard to tell one species from another at a distance.



Orange-crowned warbler watched me wade out to make my water-level measurement.

The beaver dam is doing its job in keeping a good reserve of water for the two or three dry months yet to come.

Reports of a canoe on the lake: Community Bulletin Board

https://www.facebook.com/groups/105764696161763/entry July 12 9.29 pm. No harm meant, but need to firmly discourage that.

THAT CONCLUDES THE SECOND YEAR OF OBSERVATIONS AT THE MARSH

For the second year in a row, the rainfall at the marsh has been more closely matched to that at Nanaimo Airport than at the Environment Canada site on Boulton's Farm or at a similar recorder on El Verano. This is evidence that rainfall is not uniform over the island; the Environment Canada Gabriola figures almost certainly underestimate the island-wide average with higher than average precipitation in higher land away from the coast.

August 10-11, 2017.

Tansy ragwort duty. Cleared in two passes all the Marsh Trail from the gate at the west end to the 707's Mainline Trail at the east end plus spurs: West Entrance Spur, two Weir Trails, and the 707's Fisher Road Spur. Also cleared all of East Path. Did a third pass a few days later. Mostly confined to the 4-foots and within 5 metres or so of the path, but on the second pass all of the most infested patches as far as could be seen in the woods from the trail. Notes: File 657.

<u>August 22, 2017</u> (day +766, 731+35)

Cistern level -120 mm SCB. Weir level -170 mm WPB (scale), no drainage into Coats Marsh Creek. NanRG cum. 2.8 mm.



Since July 17, main marsh has dropped 150 mm, weir bay 130 mm. Allowing for about 4 mm of rain in that time, the evapotranspiration rate has been 4.3 mm/day with an average flow of roughly 50 litres/hour from east to west through the beaver dam.

A few hard-to-see ducks dabbling among the watershield. Mostly, but not all, mallards. Quiet; not the best time of year for wildlife viewing.

August 28, 2017 (day +772, 731+41): Lone large duck/small goose acting skittishly in the distance; not aware of me. Possibly an American widgeon or gadwall judging by vivid white wing-patches as it flew off. I wish my visual memory were better! [though gadwalls seen October 7]

<u>August 30, 2017</u> (day +774, 731+43): Cistern level -151 mm SCB. NanRG cum. 3.4 mm.

So where do Pacific tree frogs like to hang out on such days? This crowd, not unusually, chose salal, not the healthy green plants, but ones whose cankered leaves are the golden-orangey colour of sunsets smoked by mainland wildfires.





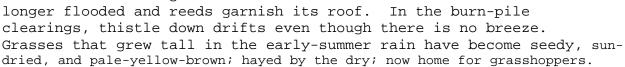
Other healthy wildlife: lovely deer ferns near the water's edge; raven; a sharpshinned/Cooper's hawk flying low over me; redlegged frogs,



Steller's jays (seasonal visitors only to this part of the island); garter snakes; occasional song sparrows and towhees in the underbrush; dragonflies still; and a family of hairy woodpeckers (male, female, and a youngster) working the same tree.

When the wind blows hard enough for the tall, but still young, Douglas-firs to sway, a few rub their trunks together and sound as if they're rutting, which in a way, I suppose they are.

September 2, 2017 (day +777, 731+46):
Weir -184 mm WPB (scale). NanRG cum.3.4
mm. The beaver lodge has entrances no







September 7, 2017 (day +782, 731+51): Cistern level -180 mm SCB. NanRG cum. 3.4 mm. Gadwalls on the lake. Only two identifiable in the far distance, or caught by the camera topsy-turvy, but I counted probably eight more in flight. Curious rather eerie light of late - thin overcast cloud with smoke below.

September 12, 2017 (day +787, 731+56): NanRG cum. 13.2 mm.

September 14, 2017 (day +789, 731+58): Cistern level -194 mm SCB. NanRG cum. 13.2 mm. Stealthily circumnavigated the lake. A light



breeze to sway the reeds and fir branches hiding movement along the shore from the usually-wary ducks relaxing on the water. Several groups, mostly females with juveniles but a few males in non-breeding plumage - piedbilled grebes, northern shovelers, maybe gadwalls, a couple of ruddy ducks (dubious), and others? Unperturbed by my presence, but then, at the limit of my vision and optical aids. About 20.











Clockwise from top: grebe; two hen shovellers; grebe; two gadwalls?? pigeon-grey heads; two ruddy ducks?, drake's head on the right; drake shoveller (eclipse plumage).

<u>September 24, 2017</u> (day +799, 731+68): Cistern level -202 mm SCB. NanRG cum. 39.0 mm.



Checked the rain gauge for the last time (I'm going to use Environment Canada Nanaimo figures in future—the Environment Canada Gabriola and El Verano figures are too low for the marsh).

Some rain but the presence of a western long-toed salamander in the water confused the gauge reading! This subspecies only dwells in the lower Fraser Valley and on Vancouver Island, so how they crossed the strait and Nanaimo Harbour is a mystery. It was very relieved to be released into the lake.





Adding to the excitement, a large beetle floating on the surface of the water in the gauge (male wood borer: Prionus californicus).

It was dead.

A raccoon kit watched from a tree while mother and a second kit waited for it to come down into the salal below.

Meanwhile, out on the lake...



Three very vocal small ducks I'd not seen a week or so ago. Dabbling in the watershield. I'm going to say they were green-winged teals, but it is possible they were blue-winged teals. Eclipse plumage makes these determinations really difficult.

[dabblers, no upending; smaller than average; dark bills; short or long bills?; yellowish undertail; pointed tails; very vocal among themselves, muted short quacks, a bit like out-of-season frog bleats, no whistles; hints of a blue speculum? supposed to be green, no blue otherwise; mottled brown with some grey; dark eyeline; no white markings; no white base of bill; occasional hint of chestnut colouring on dark heads seen against the light; far less concerned with my presence than widgeons.]

Below: Internet picture NOT at the marsh (Don Freiday 2010). Green-winged far left, blue-wingeds right.



<u>September 26, 2017</u> (day +801, 731+70): Weir -185 mm WPB (scale). NanRG cum. 41.2 mm.

September 28, 2017 (day +803, 731+72):





Another tight-knit flock of 8-12 small ducks in the watershield. Teals? Heads often underwater. No coloured speculum. Yellow linear face markings? Short quiet quacks, no whistles.

Lighting terrible, hard to tell what is a true colour and what is just a wet-feather—in-sunlight effect. This is as bad as trying to photograph the Loch Ness Monster. ◊

Next File: 673m Previous: 673j

October 2, 2017 (day +807, 731+76):

A flock of ring-necked ducks, resting, and a lone, American widgeon. Earlier arrivals still here.





October 9, 2017 (day +814, 731+83):

Very quiet, almost silent.

There are probably over twenty species of grasses in the park, many introduced.

One of my favorites is bentgrass (Agrostis capillaris). It catches light like a mist and has a touch that's lighter than that of any feather. In parts of Britain, "bent" was once a





word for ungrazed sunbleached grass, or a landform covered with same. I'd like to think bentgrass is so named because it's so easily flattened by wind and rain in the fall, but it isn't.

M205

October 11, 2017 (day +816, 731+85): Cistern level -214 mm SCB. Weir -145 mm WPB (scale). NanRG cum. 54.2 mm.

Banded-woolly-bear caterpillars. Everybody more vocal after autumnal showers-flickers, jays, frogs, squirrels, towhees, sparrows, juncos, wrens. Families of American widgeons foraging together on the lake.







October 16, 2017 (day +821, 731+90): Cistern level -218 mm SCB. Weir -150 mm WPB (scale). NanRG cum. 69.0 mm.

Quiet. Everything waiting for something to happen. Dabblers on the lake again, mostly drabby-browns but one or two easily recognized ring-neckeds. Also possibly a grebe and even remotely possibly a ruddy duck in winter plumage.



Curious things, the size of midges, on the Marsh Trail near the clearings, drifting like thistle down until you try to catch one, and strikingly blue, as if they were miniature damselflies. Perhaps a smokywinged ash aphid (Prociphilus americanus), but, living on what? Doug-fir, grand fir, alder, arbutus? No ash trees here (Fraxinus sp.). More likely, I'm reliably told, a cotton alder psyllid (Psylla floccosa).



Clumps of reed canary grass are common in the park. Some of the stems are over two metres high, which means I cannot reach up to their tips, unless of course they're "bent".

Mid-October isn't the usual time to find a new species



of wildflower, but here along East Path were a few not-noticed-before northern goldenrods in bloom; in the south of the province, more often found on mountain slopes.



October 20, 2017
(day +825, 731+94):
Cistern -157 mm SCB
(+61). Weir -56 mm
WPB (+94). NanRG
cum. 140.8 mm
(+72). Heavy rain,
but creek beds dry.
American widgeons
and ring-neckeds.

Fall colours intense this year - the days get shorter and the wavelengths get longer - rosy gomphidius; ailing salal; blushing leaves of oceanspray and black hawthorn; bird-plucked arbutus berries; and the hanging fruit of honeysuckle. Bryophytes on the forest floor growing green while the luminous golden leaves of bigleaf maples add to the litter and those of all the deciduous bushes yellow away. Only season-denying alders stubbornly hold on to their green.



October 23, 2017 (day +828, 731+97): Pileated woodpecker. I know they're around but don't see them very often.

Leaf blight, a fungal infestation of arbutus (Arbutus menziesii), as prevalent as it was last year up here. It afflicts all the leaves on the smaller trees, but mostly leaves below the canopy on taller ones.





On a more cheerful note, chanterelle, unusual in that their caps are lemon-yellow and their stipes white (Cantharellus cascadensis?).

October 24, 2017 (day +829, 731+98): Cistern -123 mm SCB (+34). Weir -21 mm WPB (+35). NanRG cum. 165.0 mm (+24). Widgeons, fox sparrows, juncos, ravens, transient Canada geese, bald eagle, ring-neckeds, occasional small clouds of midges on the Ridgeway and a few dragonflies still in the clearings. All creeks dry.

October 30, 2017 (day +835, 731+104): Weir -30 mm WPB (-9). NanRG cum. 165.4 mm (0). Discharge from private property drainage pipe into Coats Marsh Creek. It's been running since October 20 but the creekbed at the culvert is still dry.

October 31, 2017 (day +836, 731+105): Cistern -125 mm SCB (-2). NanRG cum. 165.4 mm (0). Recharge is late this year.



More than a dozen ring-neckeds and a few watchful widgeons. Flushed a hawk in the snags along the eastern margin, young Cooper's maybe. Old Pacific ninebark there too, prone but thriving. Don't often notice them, some leaves maple-like.

Robin's pincushions on baldhip roses in the clearings; they're hosting

the larvae of mossy rose gall wasps (Diplolepis rosea).









M210

November 6, 2017 (day +842, 731+111): Weir -7 mm WPB (+23). NanRG cum. 187.2 mm (+22). Frosty. Patches of snow.

November 7, 2017 (day +843, 731+112): Cistern -104 mm WPB (+21). NanRG cum. 187.2 mm (+22). The buffleheads have arrived for their winter sojourn. A dozen or more joining the ring-neckeds.



November 11, 2017 (day +847, 731+116): Weir -6 mm WPB (+1). NanRG cum. 203.2 mm (+16). Light rain, drifty wind, chilly and dunkel. Only the sound of footsteps and soughing in the canopy. Nothing flowing.

November 12, 2017 (day +848, 731+117): Cistern -79 mm SCB (+25).

NanRG cum. 239.2 mm (+52). Heavy rain. Lots of ring-neckeds, counted twenty-five in a raft on open water but there were more; a few buffleheads, and a solitary mallard.



In clearings in the understory of the fir-forest, willows suddenly stand out, speckled with yellow teardrops as if by an artist's brush; alders finally surrendering their leaves creating carpets of olive brown... and pictures ideal for jigsaw-puzzles; Indian-plums with leaves, mostly saffron, sometimes wine-red,



emerging from the trail-side shrubbery where they've gone mostly unnoticed by passers-by since early spring.

Puddles, bare branches, brown bracken, but over all, the ever green evergreens with seas of green salal below.







 $\underline{\text{November 14, 2017}}$ (day 850, 731+119): East Path Creek has begun to flow.

November 15, 2017 (day 851, 731+120): Weir +219 mm WPB scale (+225). NanRG cum. 310.2 mm (+107). Heavy rain. Coats Marsh Creek has begun to flow.

 $\underline{\text{November 17, 2017}}$ (day 853, 731+122): Cistern +130 mm SCB (+209). NanRG cum. 313.6 mm (+74).

I wonder why some Oregon grape leaves (Mahonia nervosa) turn brilliant red? Turning bronze (or burgundy, take your pick) might be a seasonal



effect (the cold), but I'm doubtful that explains the red. It sometimes affects only part of a leaf, and most of the neighbouring plants commonly retain all of their healthy green. Salal leaves do this occasionally too. Is there a pathogen at work here? ¹

Autumn red foliage is not common within the park. Apart from the O.G. there's minor contributions from trailing blackberries, thickets of hipped wild roses, and occasional individual leaves of huckleberries, Indian plums, and other shrubs, but from infrequent to completely absent are the hawthorns, Pacific crab apples, Douglas maples, red-osier dogwoods, and (dream on) vine maples whose reds would nicely complement all the yellows.

November 18, 2017 (day 854, 731+123): Trumpeter swans arriving.

November 22, 2017 (day 858, 731+127): Weir +445 mm WPB scale (+226).

NanRG cum. 399.8 mm (+90). Heavy rain. Coats Marsh Creek flowing strongly.

¹ Probably not. In other parts of the island nearer the sea, reddening is less often seen. For an expert discussion of this question with no definitive answer see: Nicole M. Hughes, *Winter leaf reddening in 'evergreen' species*, New Phytologist (2011) 190: 573–581. http://onlinelibrary.wiley.com/doi/10.1111/j.1469-8137.2011.03662.x/pdf.

² Douglas maples have a reputation for being colourful in the fall, but the few I have seen on the island have been golden yellow, but with no red.

This has been such a good year for fall colours. For the past few weeks, you can walk the trails and without leaving them spot deciduous trees deep in the woods that you had no idea were there. Some you can even identify from afar by their shade of yellow and size of leaves.







Today, three otherwise easy-to-miss species in the park: cascara, choke cherry, and Pacific crab apple.

November 24, 2017 (day 860, 731+129): Weir +366 mm WPB scale (-79). NanRG cum. 404.2 mm (+4).

November 26, 2017 (day 862, 731+131): Cistern +179 mm SCB (+49). NanRG cum. 431.2 mm (+128).

East Path Creek and NE Arm spillway flowing robustly. Usual ducks hanging out together, but the swans have moved on.

Into the NE Arm, a soggy sodden swampland; tawny reeds and grasses; one or two willows and struggling firs but mostly alders, leafless, catkined, and dappled with grey lichen; a few frogs and wrens; deer trails







that have become rivulets; shallow puddles aspiring to be ponds; in the salal margin a lone evergreen blackberry bush, a bashful intruder compared with its aggressive cousin.

"The day but a thin solution of night."



November 28, 2017 (day 864, 731+133):

A hunt for redosier dogwood.

Score? Wild roses 185: Dogwoods 0.

Nutty! remarked one spectator from his seat



among the briars.

November 29, 2017 (day 865, 731+134): Weir +329 mm WPB scale (-37). NanRG cum. 439.8 mm (+36). Buffleheads and ring-neckeds. East Path Creek not flowing.



December 7, 2017 (day 873, 731+142): Weir +280 mm WPB scale (-49). NanRG cum. 451.6 mm (+12). Buffleheads and widgeons in fog being burnt off by the latemorning sun. Skims of ice in the shade. The lake unackered by the slightest movement of the air. A perfect inversion.



December 8, 2017 (day 874, 731+143): Cistern +169 mm SCB (-10). NanRG cum. 451.6 mm (+20). Fog lifting, now but sun-pierced misty wrack. White cheese polypore, Phlebia tremollosa, I think, Tyromyces chioneus, on living alder.





<u>December 12, 2017</u> (day 878, 731+147): Weir +259 mm WPB scale (-21). NanRG cum. 451.6 mm (0). Not much water from the pond leveller now, just a drindle, most of the water in Coats Marsh Creek is flowing over the sill. NE Arm is only flowing as it approaches the lake. East Path Creek bed is dry.





Further down the path where the undergrowth is thicker, flock of ruby-crowned kinglets, charmingly

unperturbed by my presence, cheerfully foraging among the oceansprays' gone-to-seed brown

The white cheese is maturing nicely.

Ravens garrulous, rather disquietingly so when combined with slow swooshing wingbeats overhead as they move purposely from one treetop to another. But their world is not mine and the raucous mob soon moves on.



blossoms.



December 22, 2017 (day 888, 731+157): Weir +378 mm WPB scale (+119). NanRG cum. 524.2 mm (+73). Pond leveller working flat out. Saplings along the trails arched over with the weight of ice-filled snow. A bauble tree.



December 29, 2017 (day 895, 731+164): Weir +366 mm WPB scale (-12) NanRG cum. 553.8 mm (+30).

December 30, 2017 (day 896, 731+165): Cistern +190 mm SCB (+21) NanRG cum. 553.8 mm (+102). East Path Creek running at near capacity with meltwater. Ring-neckeds and transient mallards together in sizeable groups on the open-water margins of the iced-up lake. A few buffleheads here and there too, but being less sociable. \Diamond



Next <u>file</u>.
Previous <u>here</u>

2018 NOTES

Regular visits ended, but not ceased altogether. Trying to lessen disturbance in duck breeding season.

May 3, 2018 Trilliums, common enough on the island, but not



noticed in the park before. Not far from Coats Marsh Creek at the western entrance.

May 13, 2018 GaLTT broom bash in the western burn-pile clearing. Pied-billed grebes very vocal as we worked; a few mallard quacks. No visual observations.



Scotch broom (Cytisus scoparius) is widely regarded as a nuisance on Gabriola; yet, nobody-inparticular has responsibility "to do something about it". It has showy flowers, most sulphur yellow, but those of some plants have attractive bright blood-red patches, and others notquite-white creamy flowers and still

others an autumnal-looking blended red and gold colour.

Nice, but on the other hand, broom is a noxious invasive weed with a very bad attitude to native ecosystems. It spreads rapidly and uncontrollably in disturbed areas, often forming near monocultural thickets. That said however, in the two clearings on the north side



of the park it shares the space with several other invasive foreign weeds, notably thistles (Canada and bull), tansy ragwort, and ox-eye daisies. There are also substantial patches of stinging nettles (Urtica dioica) but I won't mention them because some say they're native plants.

During the GaLTT broom bash, while on my hands and knees cutting yet another broom plant, I fell to





wondering what ecosystem exactly these particular plants were threatening. The clearings are not natural. Left completely to themselves



The infestation of broom does, here and there, encroach beyond the greenswards into the bordering

Am I



The original purpose of the clearings was for burning tree stumps and other unusable logging debris. Though I doubt there'll be any more burning here, piling up broom cuttings is just carrying on the tradition.

domain of salal, sword ferns, and mosses, but not at the moment alarmingly so. And there's also here a Himalayan blackberry, another villain that was noted in the 2011-2021 Park Management Report. has spread hardly anywhere despite the species' reputation for

aggressively so doing, and despite being pretty-much left alone for many years.

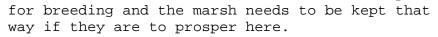
Is it fair, I pondered on as I piled up my cuttings, to regard all ecosystems dominated by exotic species with derision? I no longer think so. Of the ninety plus species of wildflowers I've noted in the park, over sixty were found in grassy open areas like the clearings. And with these flowers come insects and seeds, and with the insects and seeds come birds and rodents. The clearings are the best places to see dragon and damsel flies; grasshoppers and an occasional alligator lizard; honeybees and bumblebees, butterflies (the exotic Essex skipper for example); finches that love the thistledown; flocks of towhees foraging for seeds; deer that rest in non-native grasses; and soaring swallows that hunt en masse there on summer evenings. And not everything is non-American, the bicolored flaxflowers do as well on bare patches as the dovefoot geraniums.

Exotic-species ecosystems or just weedy patches of wasteland? Who's to say? The case deserves scrutiny, and, as John Stilgoe says, "...sustained scrutiny can engender wonder and energize nascent curiosity. Exploring landscapes, however casually, is a therapy and magic of its own." And John Manley Hopkins, who wasn't but could have been thinking of something like the clearings and their flooded-by-beaver margins:

What would the world be, once bereft
Of wet and of wildness? Let them be left,
O let them be left, wildness and wet;
Long live the weeds and the wilderness yet.

 $\underline{\text{May }25,\ 2018}$ (day 1042, 731+311): Cistern +217 mm SCB, Weir +116 mm WPB scale, NanRG cum. 1090.7 mm. No creeks running.

In the evening, about eight couple-of-week-old ducklings near the cistern, no parents around. Made measurement without frightening them out of their hiding place in the reeds, then out of nowhere two female hooded mergansers flew in headed directly for the cistern, apparently not noticing me in the woods. All looked well as I beat a furtive and somewhat apologetic retreat. These birds need secluded woodland ponds



A few other ducks around, only mallards recognizable at a distance. Red-winged blackbirds. Pied-billed grebes heard occasionally. All very peaceful.

Swallows above the reeds near the entrance. Violet-greens, but some looked more like tree swallows to me although it was hard to tell they moved so fast in the evening light. They perched more often than the violet-greens of previous years and showed clearly at times a metallic blue. But I'm wrong; the one left shows white around the eye; it at least isn't a tree swallow.



June 3, 2018



Pojar and MacKinnon, "Plants of Coastal British Columbia" is an indispensible guide, but it does sometimes present challenges. Try finding this one by flipping through the illustrations. It grows along the banks of Coats Marsh Creek. It's Nemophila parviflora, grove-lover, merely a footnote in my edition of the book.

It could be worse though, Joseph K. Henry's, "Flora of Southern British Columbia and Vancouver Island", published in 1915 and prescribed for use in B.C. Schools contains not a single illustration in all of its 365

pages; but the glossary has 480 very technical entries. For me, using it is like trying to read a sheet of music as opposed to listening to somebody play it.

<u>June 5, 2018</u> (day 1053, 731+322): Weir +110 mm WPB scale, NanRG cum. 1093.3 mm.

Solitary hooded merganser in the weir pool. Female, small, busy but what doing not obvious. Blue-eyed darners.

June 6, 2018 A few red columbines alongside East Path Creek, now dry. No field guide needed! Foamflowers along Stump Farm 1 Stream, easily overlooked.

Water level in the lake not measured but high. A beaver seen at the east end of the lake. First time ever.







Pied-billed grebe in breeding plumage. Like all the ducks, very wary. You can only see them this close by standing stock-still while they're on the surface and then moving slowly while they are submerged.



Above: Several large families far off across the lake. These are almost certainly Probably mallards, but not for sure. Gadwall hens look similar and have grey heads like this mother.

Below: Gang of juvenile dabblers? At the limit of my telephoto lens. Species?





Almost all grasses are unidentifiable species to me, but this one in the clearings is one exception. It stands in clumps, its culms over a metre tall. I'm venturing a guess that it's orchard grass (Dactylis glomerata), originally introduced and cultivated for making hay; a reminder that the lake was drained and farmed in the last century.

Another agronomically important species there, I think, is soft brome (*Bromus hordeaceus*, *B. mollis*) which was cultivated for hay and pasture.

Plants were introduced to Vancouver Island from Europe and Asia by farmers and by gardeners and landscapers, both deliberately and unintentionally. While some garden species were ornamental, had an attractive scent, or were used for flavouring food, others, like the herb-Robert in the park, were probably chosen because they were medicinal. They may now be just a weed that nobody needs anymore, but I still like them.











June 13, 2018

Yerba buena, always wondered about this native plant with its Spanish name. Found in the catchment area of the Stump Farm One Stream near the southern gate of the the Three Gates Trail. Nice find.

American robin, actually rare in the park. Occasionally you see a solitary one in summer being quite secretive. They appear year after year in the same location near the weir; a favourite nesting place I guess.

June 14, 2018



Duck families doing well this year. Are these guys gadwalls by any chance? Or "just" mallards? Probably the latter.

June 15, 2018

Work on grasses - addendum.



July 6, 2018 Lake water still high. Cinnabar moth caterpillars more numerous on the tansy ragwort than in previous years and doing a thorough job destroying plants they attack.

Tansy ragwort retains its toxins even after being uprooted and left to die, which it does within a couple of days, so while it's alright to clear the grassy verges of roads and well-used trails leaving the plants behindplaces where there's little chance of cattle, horses, sheep, goats, pigs, or deer foraging—it's not a good idea

when tackling pastures or solitary woodland clearings. Animals tend to show little interest in living plants probably because of their bitter taste; contamination of hay is of most concern to the farmers and horse-owners that I've spoken with.

Close-knit family including seven half-grown ducklings on the lake. Mallards? most likely but not sure, white patch on flank but no obvious blue speculum, grey bill.

Flock of cedar waxwings.

July 17, 2018 (day 1095, 731+364): NanRG cum. 1143.3 mm.

THAT CONCLUDES THE THIRD YEAR OF OBSERVATIONS AT THE MARSH

<u>July 22, 2018</u> (day 1100, 1096+4): Cistern +31 mm SCB, Weir -40 mm WPB scale, NanRG cum. 0.0 mm.



Many dabbling ducks; twelve in the weir pool alone. Mallards or gadwalls? Odds are in favour of mallards, but... bold white patches on wings in flight and no sign of blue specula or green heads. Short quacks. Orange on bills at the sides, and some with all-grey bills; however, steep foreheads usually lacking. No clear view of black undertails. Possibility of

eclipse plumage no help. Juveniles around. Strong possibility I believe that both mallards and gadwalls breed here.

No grebes heard or seen.



August 3, 2018

Finally, a blue speculum. A mallard without doubt.



Both purple-flowered Origanum marjorana (margoram, sometimes called oregano as it was on p.F108) and white-flowered Origanum vulgare (oregano) blooming in the west burn-pile clearing.

The hedge-parsley, *Torilis* sp., in flower again in its customary place in the NE Arm spillway. No signs of it spreading elsewhere in the

park, but in the last couple of years it has transitioned from "absent" or "rare" to "frequent" all over the island. There is a particularly large "infestation" in Drumbeg Park. It is clearly being spread along trails by trail users. The species is Torilis japonica, hooked bristles on the fruit and occasionally over a metre tall, not as earlier surmised Torilis arventis (pp.G116-117).







In Wisconsin, you are not allowed to introduce, possess, or transport this plant without a permit. At the present rate of spreading it will be common on Gabriola long before any action is taken to control it.



Burdock, another natural velcro, a sort of soft-leaved thistle. An exotic nuisance in some parts of Gabriola, but not in the park where it is rare. The burrs stick to the manes and tails of horses and become entangled in the wool of sheep; however, sheep find it more palatable than cattle or deer and help control it.

<u>August 21, 2018</u> (day 1130, 1096+34): Cistern -139 mm SCB, Weir +140 mm WPB scale [NOTE?] -50 mm [baffle], NanRG cum. 1.2 mm.

Drainage pipe below the weir flowing. Weir scale reading odd. Too high? Beaver dam leaking maybe and there's an obstruction preventing water reaching the baffle. Levels at the baffle and at the pipe show no change in scale datum. Will sort out later. The level in the weir pool is in any case not important. The level maintained by the beaver dam has to ensure there's enough water in the lake to see it through a severe summer drought given that there's no water to replace evapotranspiration losses other than occasional summer showers.

All quiet wildlife-wise. Pileated woodpecker foraging among cones beneath the fir trees. Tree frogs. Hairy cat's ears blooming again - autumn dandelions? but I know as much about dandelion-like microspecies as I do about knitting socks. Sharp-shinned hawk.



<u>August 24, 2018</u> (day 1133, 1096+37): Weir +198 mm WPB scale, 0 mm baffle, NanRG cum. 1.2 mm.

Traversed dam. Surface is firm, dry, and intact but there is a leak about half-way across, deep down. Easily heard but not seen.

Weir pool is rising 20mm/day according to the scale. Assuming $2300 m^2$, inflow of about 0.5 litres/sec neglecting all losses. Debris is holding water back from the baffle, but the level is now at the sill (50 mm rise in 3 days).

Baffle has sprung a small leak about a foot down on the left side. Private property is still draining, usually drying-up this time of year. Coats Marsh Creek is running 250 m downstream of weir but not at the observation-point-culvert beneath the Marsh Trail.

<u>August 27, 2018</u> (day 1136, 1096+40): Cistern -163 mm SCB, Weir +174 mm WPB scale, -160 mm baffle, NanRG cum. 2.4 mm.

Weir pool level falling again. Level now well below the sill again. Cistern fall of 4 mm/day is normal for this time of year. Have the beavers plunged the leak in their dam? Coats Marsh Creek still dry.

<u>August 30, 2018</u> (day 1139, 1096+43): Cistern -183 mm SCB, Weir +219 mm WPB scale, +5 mm baffle, NanRG cum. 3.0 mm.

Major revision to the cistern datum (SCB)relative to the primary weir datum using a professional transit (see File 673 for details). Coats Marsh Creek running. About 30 American widgeons on the lake, small and extraordinarily shy.

August 31, 2018 (day 1140, 1096+44): Cistern -190 mm SCB, Weir +223 mm WPB scale, NanRG cum. 3.0 mm. No flow in Coats Marsh Creek. Guy and

Cheryl Moreau repeated yesterday's transit measurements and got essentially the same result (within two millimetres).

<u>September 3, 2018</u> (day 1143, 1096+47): Cistern -207 mm SCB, Weir +230 mm WPB scale, NanRG cum. 3.0 mm. No flow in Coats Marsh Creek. Private drainage pipe still flowing, hinting to me that this water is coming from the marsh despite disagreement with property owner who stresses great care was taken in building the berm to ensure no seepage. The water is not heavily mineralized.



Widgeons, juvenile mallards, and a few solitary others including one male northern shoveller.

Several yellowlegs (*Tringa* sp.) in the reeds, observed for some time. Too far off and poor light for good photographs but little doubt that's what they were. Waders with bright white rumps in flight, long bills. Greater or Lesser? Couldn't tell.

<u>September 11, 2018</u> (day 1151, 1096+55): NanRG cum. 27.4 mm. Rainy season has begun. No flow in Coats Marsh Creek.

September 12, 2018 (day 1152, 1096+56): Cistern -227 mm SCB, Weir +210 mm WPB scale, NanRG cum. 27.6 mm. No flow in creeks. Nothing



seen on the lake. All very quiet; just conversing ravens, and an occasional piercing call from a flicker or a pre-occupied here-I-am call of an out-of-sight towhee punctuating the silence.

September 18, 2018 (day 1158, 1096+62): Cistern -211 mm SCB, Weir +226 mm WPB scale, NanRG cum.62.0 mm. Has rained last few days. No flow in creeks, but Coats Marsh Creek ponding with sporadic trickles. Nothing seen on the lake except insects, lots, especially bright red meadowhawks, some of which were in tandem while the female laid her eggs.

A good rose-hip harvest. Biophony full of the soft tweeting of busy little-birds-in-the-bush. Many more than before the rains. Some flocks mostly juncos, others mostly chickadees.

<u>September 24, 2018</u> (day 1164, 1096+68): NanRG cum. 111.2 mm. Lethargic red-legged grasshoppers (*Melanoplus femurrubrum*) in the patches of now broom-less "wasteland" in the clearings.

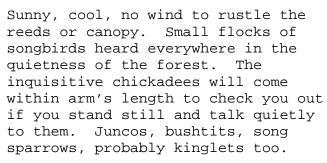
<u>September 28, 2018</u> (day 1168, 1096+72): Cistern -173 mm SCB, Weir +143 mm WPB scale, NanRG cum.111.2



The lake level rising while the weirpool level is falling and no flow in Coats Marsh Creek; perhaps the beaver dam leak has been plugged.

American widgeons in the weirpool, about eight. Wood ducks scattered over the lake, some solitary, some in couples, some in groups.

October 4, 2018 (day 1174, 1096+78): NanRG cum.121.2 mm.



Snowy inkcaps (*Coprinopsis nivea*) on old horse dung on the Marsh Trail.



Still some dragonflies and damselflies about, mostly white-faced meadowhawks.



October 5, 2018 (day 1175, 1096+79): NanRG cum.125.6 mm.





Rain. Wood ducks out on the water.

Beautiful cluster of lepiota near the creek at the west end. Shaggy parasols, white spore print, single rings (Chlorophyllum brunneum). Salal making up for the lack of vine maples.





Mushrooms are almost always tricky to identify, but growing on old Douglas-fir cones? A cinch. Strobilurus trullisatus.

Mats of moss, Juniper haircap (Polytrichum juniperinum), dotted with the orange moss agaric (Rickenella or Omphalina fibula). This common mushroom only grows on moss. Opinions vary as to whether this is because it's saprotrophic (living off dead moss), symbiotic (to their mutual advantage), or the fungus is parasitic.







Staghorn jelly fungus (Calocera cornea) between the two southern gates on the Three Gates Trail enjoying the rain and a tree brought down in a snowfall last spring.

October 14, 2018 (day 1184, 1096+88): Cistern -170 mm SCB, Weir +101 mm WPB scale, NanRG cum.143.0 mm.

Lake level steady, weirpool level falling, no flow in creeks.







(I think I too frequently puzzle over these), northern shovellers, one or two wood ducks, and some ruddy ducks.

Juvenile mallards

Only time ruddy ducks seen previously was September 14, 2017, (lower photo) and then only once, and so far off and in such bad lighting conditions that I hesitated to list them. But here today, more, although in equally far-off, poor photographic conditions. Same distinctive white male cheeks though, and one still with

some summer reddish-brown (middle photo) and faint blue on his bill, so they've now on the list.

Sulphur tufts (Hypholoma fasciculare) on buried wood. Fresh, but note the dark veil remnants on the cap's margin. These are nasty toadstools, best left alone.





October 23, 2018 (day 1193, 1096+97): NanRG cum.143.0 mm.

Wood ducks still around. Break in the weather today.

Mushroom time. I wish people, presumably looking for edible ones, wouldn't just destroy those that aren't. Others might enjoy seeing them doing whatever they do in the ecosystem. Just replace them gills down, leave them be, show some respect, it's their world too.



The black elfin saddles (Helvella lacunosa) are suffering badly this year with mould (Hypomyces cervinigenus). The assaulted specimen below had a hollow stalk. My guess Lactarius sanguifluus.



October 24, 2018 (day 1194, 1096+98):
NanRG cum.145.5 mm.

If that's not a rosy russula (Russula sanguinea), it ought to be. Wood ducks seen.



October 25, 2018 (day 1195, 1096+99): NanRG cum. 158.7 mm.

Violet cortinarius (*Cortinarius violaceus*) adnate gills, small erect fibres on cap.





Common cute orange ones, smooth, no-brim pithhelmet caps, gills light orange, adnate, stalks a bit fibrous, initially pale, darker with age, a guess, common laccaria (*Laccaria laccata*).



Common but puzzling. Like violet cortinarius but without the deep violet. Pale-greyish-rose caps turning brown, folding right up with age,

gills mauve, widely spaced, ascending adnate/short decurrent. Maybe western amethyst laccaria (*Laccaria amethysteo-occidentalis*), but then maybe not. Common laccaria again? Too many choices.

October 27, 2018 (day 1197, 1096+101): NanRG cum.178.0 mm.

A fairy ring, just before halloween. But I don't think they're fairy ring mushrooms. Long decurrent white gills, grey-brown cap, club-foot maybe (Ampulloclitocybe clavipes). Its relative Infundibulicybe geotropa is more often

associated with fairy rings but I don't think they grow in BC.





October 31, 2018 (day 1201, 1096+105): Cistern -74 mm SCB, Weir +195 mm WPB scale, NanRG cum.206.4 mm.

Coats Marsh Creek full of connected puddles, but flow weak.



Lichens on the red alder under scrutiny. The continuous crust patterns on the bark are bark barnacle (Thelotrema lepadinium). The small greenish-grey with black undersides leafy lichens are waxpaper lichen (Parmelia sulcata). The tufts are probably Ramalina farinacea (top and bottom surfaces same, oval soralia along edges, no black tips) but they just might be Evernia prunastri.

November 4, 2018 (day 1205, 1096+109): NanRG cum.229.5 mm.

Probably western amethyst laccaria (Laccaria amethysteo-occidentalis), the last of them; all the other mushies are sodden and dead-bracken brown.

Much-tangled strands of what might be Methuselah's beard (*Dolichousnea longissima*). Good to see if it is, they



prefer living in oldergrowth forests.

In the NE corner of Coats
Marsh RP, off the Three
Gates
Trail near the Stump
Farm site.

Close-up picture next page.





For wary lichenologists, I don't think this (above and previous page) is witch's hair, but I'm no wizard. Some hanging lichen however I think is (left and below). This species (Alectoria sarmentosa) is frequent on dead, standing saplings that did not survive the natural thinning process, and it's delightfully soft to the touch!



November 7, 2018 (day 1208, 1096+112): NanRG cum.229.5 mm. Weir +223 mm WPB scale.

Coats Marsh Creek ponded, but flow only of the order of 1 L/s.



A veteran cedar that I regularly pass on the West Entrance Spur measured at 4.9 metres circumference. Like all the cedars, showing redflagging at the end of summer.

November and still dragonflies in the clearings, settling on my coat and in my hair as they tried to catch some sun; I can sympathise, it was only 7°C. Autumn meadowhawks (Sympetrum vicinum).



Mushrooms not done yet. Dirty trichs (*Tricholma pardinum*), rather handsome, at the west

entrance. Some pale-yellow, white-warted, and faintly-ringed jonquill amanitas (Amanita gemmata). Turkey tails (Trametes versicolor) worth a second look.







November 13, 2018 (day 1213, 1096+117): NanRG cum.251.8 mm.

Ring-necked ducks and at least one bufflehead are back.

November 14, 2018 (day 1214, 1096+118): NanRG cum.252.8 mm.

Coats Marsh Creek flowing more strongly. Pathway at the park entrance is flooded.

November 15, 2018 (day 1215, 1096+119): NanRG cum.253.0 mm. Weir +274 mm WPB scale.



November 16-22 (to day 1222, 1096+126): NanRG cum.269.6 mm.

Pacific willow at the Stanley Place entrance to Coats Marsh East submitted to the GaLTT Big-Tree Register. Time spent measuring height of trees, looking at the geology of gravel on the trails, mapping accurately the Ridgeway. All in preparation of a report to be submitted when it comes time to re-visit the Coats Marsh RP and 707 CP Management Plans.

Mycena purpurofusca? on bark of a Douglas-fir. Appressed-leaf lichen, Hypogymnia physodes? and lots of small white mushrooms, Inocybe sp.?







This one at least is easier. Orange jelly, Dacrymyces chrysospermus, on an alder brought down by heavy snow last winter.



Possibly antlered perfume, Evernia prunastri. but don't quote me. On an alder twig, blown down from on high.

There are more than a thousand species of lichen in BC, but not to panic if you're nervous about showing off your backcountry skills.

You're only likely to come across a few hundred of them!

December 4, 2018 (day 1235, 1096+139): NanRG

cum.382.6 mm.
Weir +366 mm
WPB scale.

Coats Marsh
Creek, East
Path Creek,
Stump Farm
Number 1 and 2
Streams, all
running. NE
Arm flow but
not over
spillway
surface.



Final view of the old Stump Farm farmhouse. Once a home.

December 17, 2018 (day 1248, 1096+152): NanRG cum.500.8 mm. Weir +439 mm WPB scale. Very few ducks, but some noisy frogs.

<u>December 18, 2018</u> (day 1249, 1096+153): NanRG cum. 515.1 mm. Cistern +295 mm SCB, Weir +475 mm WPB scale.



Lake level higher than ever seen before. Measured indicates +0.450 m relative to the weir datum using the old +0.155 m calibration for the height of the cistern datum above the weir datum, but more correctly this 0.450 m should be 0.662 m as noted in File 673 page C9. At the same time, the level in the weir pool at the scale was 0.172 m below the weir datum, so the beavers are holding back 0.834 m (hip level) of water.

Flow over the top of the beaver dam, outflow (pond leveller) pipe submerged, but the weir deck still dry. East Path culvert completely submerged. NE Arm spillway flowing strongly. "Nearly" a flood. A few more ducks than yesterday, buffleheads and widgeons.





Mosses of every hue called green

thriving as they do every winter. Spongy cushions of it on dead alder especially striking, *Dicranum* sp.? As a good friend of mine once said of forest greenery, "Emily Carr got it right".

December 20, 2018 (day 1251, 1096+155): NanRG cum. 541.4 mm.

Windstorm. Trees down all over the island blocking roads and driveways, bringing down power lines, but in the forest, only twigs, small branches, and lungwort (*Lobaria pulmonaria*) cluttering the pathways despite the vehemence of the gusts overhead.

Next file. Previous file.

2018 Addendum on grasses (all bract and no petal)

Please be aware that I am not an expert botanist, even an amateur one, and mistakes in the following are not just likely, they are certain.



Mostly weeds eh! But without fields of unmown grasses, we'd have little chance to see the wind.

There are over 200 species of grass (Poaceae) in British Columbia and botanists have identified just shy of 50 of them on Gabriola. Only a minority of the 200-plus species province-wide are said to have been introduced, but here on the Gulf Islands where farming was once the mainstay of the economy and human disturbance of ecosystems is rife, the

proportion of non-native species of grass is much higher.

Of the approximately 50 species identified on the island, some 25, 55%, were introduced for seeding hayfields and pastures, mainly from Europe.

The consultants who compiled the 707CP Management Plan in 2010 found of 20 grass species in the park, 75% of them, were

agronomic species. The number for the Coats Marsh RP must be similar.

All of the grasses included in this addendum are from Coats Marsh, but most if not all can now be found in roadsides, footpaths, clearings, lawns, ditches, meadows, grassy verges, and unkempt fields almost anywhere on the island.

Grasses differ from most other wildflowers in that they use the wind rather than insects to distribute their pollen and so have no need for attractive petals. Many grass plants contain both stamens, which produce pollen, and ovarybearing pistils, which produce the stigmata (stigmas) that are the receptive surfaces for pollen.

Having these organs maturing at different times by the same plant is one strategy for reducing self-fertilization and promoting cross-fertilization, and hence genetic diversity. However, some self-fertilization is inevitable with this arrangement, and weedy species are the ones that do a lot of this when provided with disturbed habitats they've already evolved to thrive in.

Colour, other than green, is provided briefly by the anthers — the part of the stamen suspended on a filament that waves in the wind and releases pollen — and by the bracts that enclose the flower while it is in bud. Anthers in our area are commonly pale yellow, orangeybrown, brown, or purplish, turning white or whitish when they've done their job. It may be that the colouring of anthers

and pollen is a protection against ultra-violet light.

The bracts (glumes, lemmas, and paleae) turn white, off-white, tawny, or straw-coloured as they become seed-bearing husks after fertilization.

Colour however is almost never used by botanists for identification purposes. They rely on structure which has its own peculiar and initially intimidating vocabulary, but there is an exceptionally good illustrated key to *Poaceae* (grasses) in Pojar and MacKinnon, "Plants of Coastal British Columbia", 1994, pp.358-361.

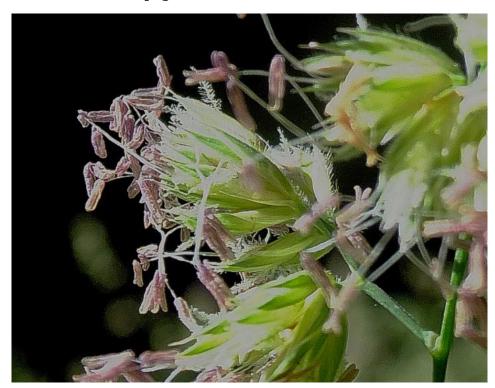
9789 Orchard grass, cocksfoot (Dactylis glomerata, Fescue tribe)? Introduced.





If it's waist-high and your feet are dry, it's orchard grass. But if it's au dessus de ta tête, and your feet are wet, it's reed canary grass.

Above right: Purple anthers (male) dangling on very slender filaments are shedding pollen to the wind.



Left: flowers showing a few fish-boney stigmata (female), the plumose (feathery) white structures on short stalk-like styles. Stigmata bear the receptive surfaces for pollen.

9833 Reed canary grass (*Phalaris arundinacea*, Canary grass tribe)? Probably indigenous but spread by humans, but some say introduced.



Very tall. Grows best in meadows that are flooded in winter. In summer, it forms extensive, crowded, single-species stands. Also provides privacy screens for ducks.

Inflorescence quite varied depending on its reproductive stage. Initially a spike-like panicle, but becoming more open later. Some plants have a distinct reddish tinge.



9650 Soft brome (Bromus hordeaceus, Fescue tribe)? Introduced. As school children were once expected to know, the margins of the lemmas are hyaline. Hairy. Unusual brown anthers.





9643 Ryegrass (Lolium perenne, Barley tribe)? Introduced. Showy anthers and curious stigmata that resemble tufts of cotton wool. Used in seed-mixes for lawns.





9664 Columbia brome (Bromus vulgaris, Fescue tribe)? Native. Droopy panicle. Very common in verges alongside trails and in the 4-foots, even in shade. Anthers yellow.





9644 Smooth brome ($Bromus\ inermis$, Fescue tribe)? Introduced. Widely used for hay and pasture.





9667 Common velvet-grass (Holcus lanatus, Oat tribe)? Introduced. Patches in the clearings, many not yet in flower (early June), but those that are quite showy with pale-yellow anthers and open purplishtipped bracts ripening to copious off-white husks. Distinctive greygreen leaves.



9677 Creeping velvet-grass (Holcus mollis, Oat tribe)? Introduced. Patches in the clearings, although a woodland plant preferring damp places. Food for the Essex skippers (introduced). Young plants form a spike-like panicle before flowering, not always mentioned in descriptions, but then few try to identify wildflowers from their buds alone so why grasses. Hairy nodes. Some awns abruptly bent.



9753 Colonial bentgrass (Agrostis capillaris, Bentgrass tribe) and/or 9952 Redtop (A. gigantea)? Introduced. Likely lawn-grass escapees. Delightful grasses, like star clusters, that invite your touch and defy your camera's attempts to capture their three-dimensionality.



9930 Slender wheatgrass ($Elymus\ trachycaulus$, Barley tribe)? Native. Uncertain id.





9760 Blue wild-rye (Elymus glaucus, Barley tribe)? Native.



9982 Timothy ($Phleum\ pratense$, Bentgrass tribe)? Introduced. Said to be common in fields everywhere, but seldom seen in the park. \Diamond





Next file. Previous file.

2019 NOTES

<u>January 4, 2019</u> (day 1266, 1096+170): NanRG cum. 697.9 mm. Weir +732 mm WPB scale.

Water over the deck at the weir.

January 10, 2019 (day 1272, 1096+176): NanRG cum. 746.6 mm.



Stump Farm buildings all gone. Curious bat house structure atop a metal pole on a concrete pad at the site. Wonder if the bats will approve. It's good there is at least one shed, shack, or dilapidated cabin in the yards bordering the southern boundary of the marsh housing bats (Myotis californicus).

<u>January 19, 2019</u> (day 1281, 1096+185): NanRG cum. 773.5 mm. Weir +347 mm WPB scale.

About half a dozen trumpeter swans. Group with unleashed dog at the water's edge at the East Path viewpoint wondering why all the wildlife was so far off! East Path Creek a trickle. NE Arm spillway appearing dry.

<u>January 22, 2019</u> (day 1284, 1096+188): NanRG cum. 798.8 mm. Cistern +275 mm SCB.

Rain and mist; nobody about. Ducks all along the east shore. Buffleheads, widgeons, mallards, and ring-neckeds. East Path Creek flowing very

gently.

GaLTT prematurely flagging two potential trails from Coats Marsh East into the 707 CP along the NE Arm Trail extending into a high-usage deer fawning area at the east end of the NE Arm wetland, and from the 707 SW Golf Course Trail to the Coats Marsh RP Stump Farm Trail through an area identified in the current management plan as being of high wildlife value, sufficiently so that it was recommended by consultants that this area not be identified on park maps and that trails not be located in its immediate proximity.

No public or member information or discussion of the flagging and this while there are pending revisions to the 707 CP and Coats Marsh RP Management Plans, pending new management plans for the newly acquired 707 SW and Coats Marsh East, and the pending creation of a P4 zoning option as a priority item by the Islands Trust LTC.

GaLTT, while otherwise serving the community well, appears to have a "trails everywhere" policy with little regard to the needs of wildlife and preservation of at least some areas of Gabriola that do not have human use as the prime focus of their management.

<u>January 24, 2019</u> (day 1286, 1096+190): NanRG cum. 798.8 mm. Weir +402 mm WPB scale.

Large flock of boisterous Canada geese. Measured depth of bed of Coats Marsh Creek immediately adjacent to the downstream face of the baffle. Two points, -3.23 and -3.15 m.

February 18, 2019 (day 1311, 1096+215): NanRG cum. 882.5 mm.

Lake has been iced over last week or so. Trails still snowy, packed by a few sets of bootprints (what! no skis?) and icy-snow still covering the salal understory despite the daytime temperatures being a few degrees above zero. Deer tracks surprisingly common; not a lot, always solitary, but you seldom see deer up here in the winter.

Small birds very vocal, winter wrens, fox and song sparrows, chickadees. Coats Drive resident reports varied thrushes. This is the second report of them I've heard in recent days. I've never seen a varied thrush on the island in all the years I've been here, flocks of them in winter invariably turn out to be robins, nor have I heard more than once their mournful hi-lo pitched calls with languid in-between pauses that are so common in summer in the otherwise silent coniferous forests on the North Shore Mountains.

March 8, 2019 (day 1329, 1096+233): NanRG cum. 903.2 mm.

Geological survey. On the face of it, Coats Marsh RP is not where you'd go to see interesting geology, unless that is hydrogeology is your interest. A few threadbare patches of Gabriola Formation sandstone (Cretaceous) around 65-million



years old on the trails, and that's it. But what's usually missed is the glacial till. It represents what might be loosely characterized as a "disseminated mélange", rocks of differing sizes, differing lithologies, differing geographical origins, and differing ages going back over 300 million years from the Paleozoic to almost the present.

The two main players are first the numerous, admittedly unremarkable, basalt pebbles from the east coast of Vancouver Island, likely the Karmutsen Formation (Triassic); and second the giant plutonic erratic boulders that you can't avoid noticing, likely from the Coast Mountains (Cretaceous or more recent). But it's the minor players that provide the challenges.

Vancouver Island did not arrive off the west coast until around 100 million years ago and it had a rich history as part of Wrangellia while still drifting across the Pacific Ocean from tropical climes. Wrangellia actually stretches across beneath the Strait of Georgia and surfaces most obviously around the entrance to Howe Sound, from where ice has brought interesting samples of metamorphic and metasomatic

rocks associated with its docking with the North America mainland as it was then. Ice has also brought us equally interesting samples of the oldest rocks of Wrangellia underlying the Karmutsen pillow lavas



and exposed on the Nanoose Peninsular as part of the Sicker Group (Devonian).

The picture left is just one example you can easily pick out of the till that has a very long and complicated history, impossible to unravel without geochemical and petrographic analysis, which I hasten to add I haven't done.

The white clusters are soft and powdery, a zeolite perhaps, possibly heulandite, but appearing to be just aphanitic

feldspar. The dark groundmass is mostly black, rather fibrous amphibole. Minor biotite is ragged and coated with limonite, and there are scattered small patches of colourless translucent quartz, some with fracture edges that are well-rounded, almost mammillary.

The odds are high that the amphibole is hornblende but it looks suspiciously like the less-common actinolite to me despite it being black rather than green. Amphibole is an alteration product of pyroxene, which is an essential components of basalt, so this could be a hydrothermal metamorphic, an amphibolite perhaps from Nanoose.

Inside however, the picture is rather different. Amphibole and fresh biotite are abundant, the white mineral is no longer soft and is clearly a feldspar, and quartz remains present but sparse, so this could be a well-weathered hornblende diorite grading into a hornblende tonalite. Stones like this can be picked up on the beach at Porteau Cove in Howe Sound.

Lots of questions that only more investigation can answer, too easy to be glib, and this is just one pebble.

There's more like this in https://nickdoe.ca/pdfs/Webp691.pdf.

March 15, 2019 (day 1336, 1096+240): NanRG cum. 916.8 mm.

re. Feb 18 note. Finally, the unmistakable call of a varied thrush in the forest at the west end of the RP.

March 21, 2019 (day 1342, 1096+246): NanRG cum. 916.8 mm.

Stump Farm No.1 Stream, the outlet from Canary Grass Meadow, is dry.

<u>March 29, 2019</u> (day 1350, 1096+254): NanRG cum. 917.6 mm. Weir +277 mm WPB scale.

Coats Marsh Creek running feebly. Water is coming mostly from the pond leveller with just a slight spill over the sill. With no precipitation of late I guess there's equilibrium between the flow in the creek and the leakage through the beaver dam. The private property drain (Lot 5) is still running.

March 30, 2019 (day 1351, 1096+255): NanRG cum. 917.6 mm. Cistern +265 mm SCB, only a 10 mm drop since January despite the fact that it looks like this month will be very close to a record for lack of precipitation. Not since March 1965 has there been so little.

Sunny today. East Path Creek dry; probably has been for some time.

Dozens of ducks and a few geese out on the lake. Quite a busy place. The buffleheads have nearly all moved on, but there are ring-neckeds everywhere, plus a few mallards, the drakes looking splendid with their glossy green heads. I'm sure I heard a pied-billed grebe but couldn't see it. There were some, what I take to be Canada geese, in









twos and threes, on the small side and uncharacteristically mild mannered. There could be other species around, but one of the hazards of viewing diving ducks is that their wet plumage glistens in the sunlight and the camera falsely records it as white.

Quite proud I was that by using foliage as a blind, standing perfectly still most of the time, moving very slowly, and occasionally sinking to my knees,

I raised only a few alarm calls and avoided any "we're-out-of-here" flights. A bonus was visits from friendly and curious chickadees, song sparrows, wrens, and kinglets as I surveyed the scene, skulking amongst the snags at the water's edge.

April 5, 2019 (day 1357, 1096+261): NanRG cum. 928.3 mm. March was a near record low for lack of rain, and this winter's sixmonth total (Oct.2018 - Mar. 2019) has also been below average (811.1 vs. 871.2 mm since 1944), but at -7% it's well within the one-sigma range of +/- 21% variation. In the 1976/77 winter it was down to 505.7 mm.

Coats Marsh Creek close to ponding. Swallows are back over the lake. Violet-greens, lots of them. One pair of Canada geese and some buffleheads still here.

Some of the duck species that over-winter here are also seen on the sea. Interesting that the numerous American widgeons are not nearly so nervous these days of people passing by on the beach at False Narrows as they once were, and still are at the lake. They hang out on the seashore when all is quiet, and take to the water when anyone approaches, whistling to themselves, but if you give them time, they paddle out a bit, but don't take off in the startled fashion they do at the lake.

April 14, 2019 (day 1366, 1096+270): NanRG cum. 964.9 mm.

Politics! RDN-GaLTT busy downgrading the Coats Marsh RP trails by posting them as if they were 707 CP multi-use main trails. Expect a lot more traffic. Solitude, tranquility, and breathing room for wildlife appear these days, as it does globally, to count for little.

File 690 Notes on the 707 CP Potlatch additions

File 691 Geology of the extended area summary

File 668 Hydrogeology of the extended area updated

File 692 Flora of the extended area summary

File 693 Fauna of the extended area summary.

<u>April 19, 2019</u> (day 1371, 1096+275): NanRG cum. 978.0 mm. Weir +213 mm WPB scale.

Stump Farm No.1 Stream has been flowing again after the March drought.

Snakes looking very miserable in the cold rain showers. Fairy slippers likewise.





My wildflower species count is approaching 100, so I'm taking what I can to bump up the count, even purple dead-nettles. I've never claimed the marsh is a biodiverse wonder; all such places can't be David-Attenborough show-pieces. Besides, I'm a secret admirer of weeds, so here it is.

<u>April 23, 2019</u> (day 1375, 1096+279): NanRG cum. 980.7 mm.

Another type of violet in the gutter beside the trail just north of the

regional park boundary and near the end of the Stump Farm Trail, round-leafed violet (no runners, and yes, round leaves). Hooded false morels not far away. Fairy slippers at their best.

<u>April 20, 2019</u> (day 1372, 1096+276): NanRG cum. 978.0 mm.

Beavers getting serious about damming the flow over the sill. They're using mud to plug the gaps between their sticks.

Duck in the weir pool, not shy. ID? Buffleheads around still, often among the snags, the males definitely becoming rambunctious. Although they're not likely to breed here, you never know.









OK here comes No.97, and it is a "weed" (meaning from England even though it has become quite rare there). Common this year. It grows in open mossy areas and looks a bit like Whitlow-grass. Tiny. Teesdalia nudicaulis, shepherd's cress. Especially abundant just outside the CM park along South Boulevard.



April 27, 2019 (day 1379, 1096+283): NanRG cum. 980.7 mm.

Woods awash with wind, the dappled shadows of the trees dancing, and every approaching gust sounding more ominous than the last as it roars through the treetops. Unusual bracket mushroom on an old-growth alder snag, with gills and appearing to have a stalk. Crepidotus sp., probably flat crep (*C. applanatus*).







chickweed, wild strawberries, lichen agaric, little western bittercress, anemones (Lyall's), plus cherry blossom, miners lettuce, candyflowers, English daisies, and more.







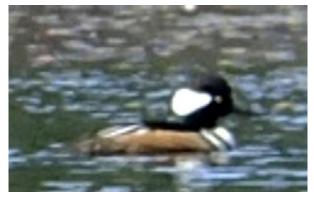
May 3, 2019 (day 1385, 1096+289): NanRG cum. 980.7 mm. Cistern +280 mm SCB.

Lake level high despite less than average rain this spring. The norm for this date is NanRG cum. 1016 mm. East Path Creek dry.

Pair of bald eagles circling the lake, not a duck in sight but I could hear mallards, pied-billed grebes, and Canada geese.

Soon after the eagles left, the ducks and geese appeared. Very

handsome looking hooded merganser drake, not well-captured by the camera. Pair of buffleheads. Pair of mallards. On shore, a flock of white-crowned and golden-crowned sparrows foraging in the grass together. English bluebells somebody has planted - could be worse.





May 5, 2019 (day 1387, 1096+291): NanRG cum. 980.7 mm. Weir +238 mm
WPB scale.

Pond leveller barely trickling, Coats Marsh Creek dry at the observation point - probably has been for a while.

May 7, 2019 (day 1389, 1096+293):
NanRG cum. 980.7 mm.

Saprophytes in and around the Stump Farm site found while broom bashing. Apparently not rare, but I don't see them every year.







Called spotted coralroot (Corallorhiza maculata ssp. maculata).

Red-flowering currant on the banks of the Stump Farm Number 2 Stream.

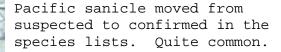


May 11, 2019 (day 1393,
1096+297): NanRG cum.
980.7 mm. Weir +229 mm
WPB scale. Cistern +258
mm SCB

No rain this month. Levels falling at roughly 2mm/day, about normal for this time of year. Guess the beavers have patched their dam.

Pond leveller just trickling still, probably no more than 1 L/s or so. The private property drain (Lot 5) still running. The

weir bay level at the baffle is now an inch or two below the sill, and no sign of any leakage. No ducks in the weir pool; unusual.



Two eagles again over the main marsh. Only activity a pair of Canada geese that came right over to the cistern to investigate, but didn't see me standing among the snags stock-still. Shortly after the eagles left, a mallard drake and a wood-duck couple ventured out. Interesting as they nest in tree cavities like the hooded mergansers.

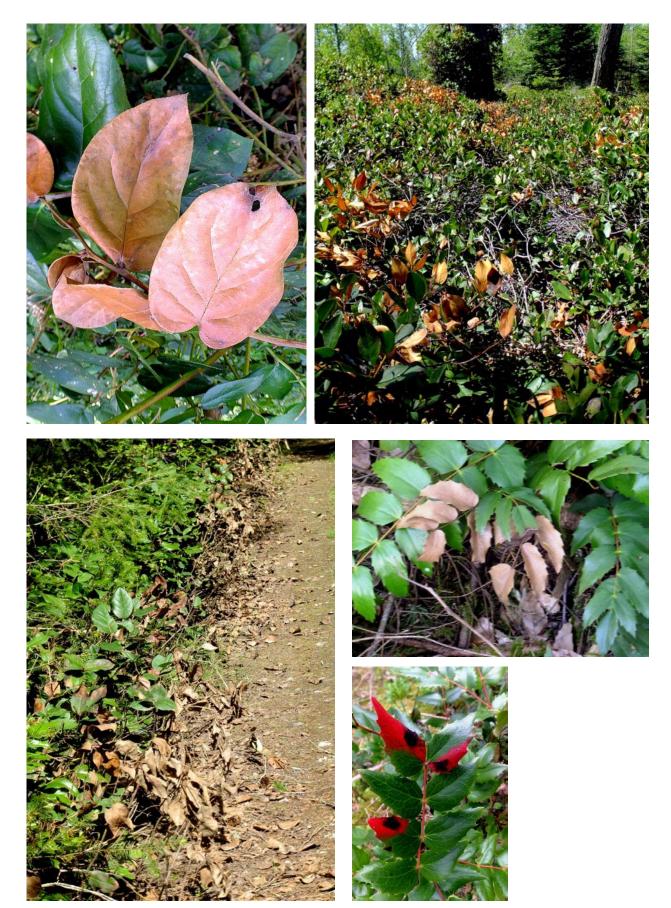
Something new afflicting the

salal, and to a much lesser extent the Oregon grape too. Whole leaves turn a uniform tan colour and die, their stalks dried-out. Widespread, but not ubiquitous. On the Oregon grape it does the same; a sharp contrast with the pathogen that's always been around that creates brilliant red and orange patches and dark spots on their leaves.

Related to exposure to the sun? It appears to be more prevalent along trails and in clearings than deep in the woods, but more study needed to prove that. Reported widely on Vancouver Island so more likely to be climate related than the spread of a disease.







May 18, 2019 (day 1400, 1096+304): NanRG cum. 990.5 mm.

GaLTT and the RDN have recently installed 45 posts in the area defined by the 707 CP, the Potlatch donor lands, and the Coats Marsh RP. These are additional to the existing 33 posts in the 707 CP. This project is one GaLTT and the RDN have planned together without public discussion or the involvement of POSAC.

Each post is 6 x 6 inches and 4 to 5 feet high. No signage attached as yet, but they are located at trail intersections, some being 707 CP MAIN trails, some 707 CP SIDE trails, some within Coats Marsh, some trails not yet assigned a status in the two donor parcels, and some trails within the old 707 CP that have been constructed "informally" by mountain bikers.

From left to right in the photos below, the sites of the posts are the 707 CP, 707 SW donor land, Coats Marsh RP, and Coats Marsh East donor land (see <u>File: 690</u> for more detail, and <u>File 680</u> if you're interested in the politics of all of this).











Something else to worry about is that there still is one pair of Canada geese on the lake. The lake does not need any non-migratory Canada geese right now. They can be very aggressive, usually not toward humans outside of urban areas, but toward other wildfowl species; they will harass ducks and kill their ducklings. I've heard the geese often in the evenings this last week while broom-bashing in the western burn-pile clearing. Geese are also becoming a problem in McGuffies Swamp at the headwaters of East Path Creek.

Also discovered and not welcome is sweet vernal grass, imported for lawns, invasive, and becoming notorious on southern Vancouver Island for reducing the biodiversity of grasslands.



Three new wildflower species after a slow start this spring. Thyme-leaved speedwell, blue-eyed grass, and largeleaved avens (easily overlooked as yet another kind of buttercup); we have at least six Ranunculus (buttercup) species on Gabriola, which may be close to the number of botanists on the island who can reliably identify them all.







May 22, 2019 (day 1404, 1096+308):
NanRG cum. 993.9 mm. Weir +213 mm WPB scale.

Pond leveller just a drindle. Graphs in File 673 show the intake about 50 mm lower than it currently is. Corrected for the 2018/2019 season but left as is for earlier times.

Creeping buttercup confirmed. They're more robust-looking than the native species, but prefer meadows and grassy river banks so there're only



limited places in the park where they thrive.

Eagle in the weir pool.

Geese continue to be a disturbance. Saw three today, honking and hollerin' not sure what the threesome relationships are; I'm not an expert on such matters. The ducks certainly keep out of their way.

Less broom in the western burnpile clearing and none now at Christine's old place.





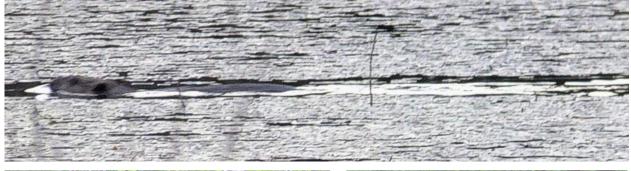
May 25, 2019 (day 1407, 1096+311): NanRG cum. 998.0 mm.

Mindless logging at the Stanley Place entrance of Coats Marsh East CP and inexplicably at the waterside within the Coats Marsh RP.

This is a good bird-watching area used by swallows, cedar waxwings, brown creepers, chickadees, red-winged blackbirds, and others for roosting, nesting, and sheltering among snags from hawks. Close to the entrance and as far as some visitors will want to go. I find this hard to distinguish from vandalism.

A beaver towing a long pole, moving like a freighter through the watershield. If humans do it, why not beavers.

Two families of mallards (three hens, one drake) together with a small brood of four to five ducklings; many fewer than usual. A lone hooded merganser, a hen, no brood, and a pair of wood ducks also without young. No sign of geese this evening. Violet-green swallows and plenty of insects after the rain earlier today.







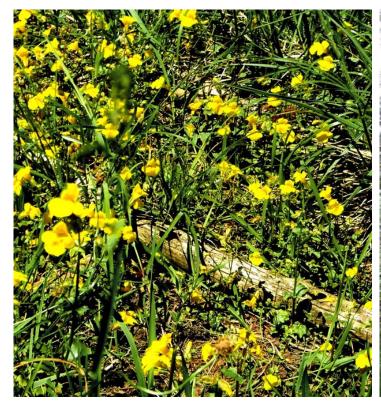




Tears?











Monkey flowers and forget-me-nots out in abundance together, as they commonly are, in the now-dry watertracks of East Path Creek near the ancient willow tree.



May 29, 2019 (day 1411, 1096+315):
NanRG cum. 998.0 mm.

Off the beaten path in Canary Grass Meadow and in the SE Arm Wetlands a new rose species. Aptly named swamp rose (Rosa pisocarpa).

Surprisingly not off the beaten path, a lone rather bedraggled camas, along

the Marsh Trail. Wonder how it got there all on its own.



Another find, bur chervil (Anthriscus caucalis). Tiny flowers and finely cut leaves needing a loupe to appreciate them.

One person's description of the leaves is: "basal and cauline, with short, stiff hairs, gradually reduced upward, petiolate, the blade bipinnately dissected, with small ultimate segments".

Another's, JCG's choice, is "fretty" :

See, banks and brakes Now, leavèd how thick! lacèd they are again With fretty chervil...

John Manley Hopkins

Perfect.

May 31, 2019 (day 1413, 1096+317): NanRG cum. 998.0 mm. Weir +171 mm
WPB scale. Level at baffle 235 mm below sill.

Pond leveller now dry and level at the baffle well below the sill but private property drain still flowing gently. Another low rainfall month, but not exceptionally so, 17.3 mm compared to May's average of





45.2 mm. It has been less in ten of the last 75 years and has varied from 5.0 mm (2015) to 145.7 mm (1984).

Bat house is a success (see January 10). Feces on the concrete pad belong to bats, not mice (cm scale). Full of chitin from fragments of the undigested exoskeletons of insects, some chitin straw-like but articulated, and some making the stools shiny, the stools crumbling when crushed. Just needs a bit of landscaping around the pad now.

<u>June 1, 2019</u> (day 1414, 1096+318): NanRG cum. 998.0 mm. Cistern +211 mm SCB.

Lake loss due to evapotranspiration starting to exceed replenishment by precipitation, as is usual this time of year.

Sunny with a soft cooling breeze. Not a lot to see on the lake; several solitary ducks way off, only a wood duck and a mallard recognizable among them but several smaller diving ducks scattered here and there too. Pied-billed grebes abditive as always; heard but not seen.

June 7, 2019 (day 1420, 1096+324): NanRG cum. 998.0 mm.

Explored Little Creek, a tributary of Stump Farm Number 1 Stream, which in turn flows into Coats Marsh Creek and on into Hoggan Lake.



Some of Little Creek's reaches have banks and support hydrophytes; some reaches are poorly-defined watertracks difficult to follow in summer; and it flows just below the surface over sandstone bedrock at the Three Gates Trail. There's a culvert beneath the Mainline Trail at Randy Hollow.

As a consequence of this diversity, I've just known

various spots on woodland trails over the years as "a little creek" without recognition that they are all linked. Bikers have built a small wooden bridge across Little Creek and a cobble causeway across the Upper Little Creek which follows the floor of a dell down to Randy Hollow. Both useful and unobtrusive.





Found skunk cabbage, surprisingly rare in the RP, and yellow-flags (obnoxious weeds!) in the wetland around where Stump Farm Number 1 Stream meets Coats Marsh Creek, and a new species of sedge (Scirpus microscarpus) in Little Creek. Small though it is, Little Creek has

standing water in places, just follow the deer trails to find it.

Confirmed that Stump Farm Number 2 Stream is a tributary of Stump Farm Number 1 Stream. Not perfectly clear where the source of Stump Farm Number 2 Stream lies. Its upper reaches have been ditched as part of logging road construction at some time in the last century, and watercourses are now obscured by thick bush.

The confluences are:

Little Creek into Stump Farm #1 = 49°09.400'N, 123°49.065'W Stump Farm #2 into Stump Farm #1 = 49°09.373'N, 123°49.075'W Stump Farm #1 into Coats Marsh Creek = 49°09.366'N, 123°49.165'W.

<u>June 13, 2019</u> (day 1426, 1096+330): NanRG cum. 998.4 mm Weir +91 mm WPB scale.

No surface water at the baffle; mud 340 mm below sill. Private property drain still dribbling.

<u>June 15, 2019</u> (day 1428, 1096+332): NanRG cum. 998.4 mm Cistern +151 mm SCB.

Lake level perfectly normal for time of year despite lack of rain. Reeds in flower and going to seed; several newly-identified sedges including Falkland Island sedge and beaked sedge (I think, I'm not an expert) in the Coats Marsh Creek catchment area.

Purple finches joined me among the snags; staying long enough and close enough for me to make perefetly sure they weren't house finches.



Top: *Carex macloviana*; Bottom left: *Carex rostrata* (in standing water); Bottom right: *Carex obnupta*. Next page bottom: *Juncus bufonius* (toad rush, common).



Blue dashers common even away from water, more females than males, their lack of blue belying their name.

A patch of kneeling angelica in the boggiest section of a minor drainage channel in the Little Creek/Stump Farm #1 Stream catchment area.

Bikers are admonished for making ruts in trails, but some ruts, water-filled in winter, are becoming microecosystems. Larger ones are places to look for American brooklime.













<u>June 24, 2019</u> (day 1437, 1096+341): NanRG cum. 1003.4 mm Weir +49 mm WPB scale. Ocean spray putting on quite a show this year. A bride expected at any moment...







snag to launch their forays on the numerous insects; three new species

...but not this painted lady.
Pied-billed grebes at the lake

Pied-billed grebes at the lake still. A bold squirrel on the Marsh Trail.

<u>June 29, 2019</u> (day 1442, 1096+346): NanRG cum. 1022.8 mm Weir +47 mm WPB scale.

Delightful evening spent wet-footed and hidden among the canary grass, rushes, and snags at the water's edge in the east burn-pile clearing. Forewent the end-ofmonth lake level measurement for

> fear of flushing some of the ducks not all yet in post-breeding mode.

A small flock of wood ducks only partially visible among the reeds (seen were two females, one male, and some juveniles, so close I daren't even reach for my camera for fear of alarming them); western kingbirds (?) using a tall



of wildflower (all escapees), rose campion, musk mallow, and one new to me, hedge bindweed (*C. sepium*) near the water, its flowers much bigger, over three inches across, than the too-familiar neglected-garden pest (*C. arvensis*).







Beavers active, one startlingly puncturing the serenity by making an extraordinary series of three loud splashes, akin to splashes made by cobbles tossed high in the air before hitting the water. In the sea, you'd say it was the work of a small harbour seal. Why? a mystery. Otherwise, the beavers quietly browsing among the watershield and water smartweed doing a fair imitation of ducks seen at a distance.

The air off the lake noticably more sultry than in the forest. Not a lot of rain this month, but not exceptionally dry, 24.8 mm compared to June's average of 41.4 mm. It has been drier eighteen times in the Junes of the last 75 years (25%) and rainfall for the month has varied from 4.8 mm (1950) to 128.3 mm (1946).

Told by the RDN Parks that number of bats they counted at Stump Farm site bat house was 42. \Diamond

Next file.

Previous file.

2019 NOTES

July 2, 2019 (day 1445, 1096+349): NanRG cum. 1023.2 mm.

The watchers and the watched. Two bald eagles and a lone, young hooded merganser shown below picture of one of the eagles. No sign of duckling's parents or siblings.



<u>July 4, 2019</u> (day 1447, 1096+351): NanRG cum. 1023.2 mm Cistern +83 mm SCB.

No eagles and ducks way off at the west-end enabling me to get a lake level reading at the cistern. Level is declining due solely to evapotranspiration exactly as it has in previous years.

Five ducks enjoying being out in the open. All hooded mergansers, two adult females and two youngsters looking several weeks old and a third

rather younger. They're diving ducks so they don't always appear together in the same photograph.







July 5, 2019 (day 1448, 1096+352): NanRG cum. 1023.2 mm.

New source of inflow to the lake in the northeast corner. Runs into the lake corner from the NE, accessible from the Marsh Trail starting west of where it meets East Path and bushwhacking south through



alders. Map 2.20 updated in the atlas (File: 661). The flow merges with that of the NE Arm flow from the east in a ponded area with multiple watertracks and rivulets close to the lake shore. Not noticed before because of heavy going through reeds, dense salal,



deadfalls, and a snarl of rose thickets.
Beavers very active here.

This new part of the catchment area probably includes the flow across and under East Path at the minor spillway north of East Path's junction with the NE Arm Trail and south of its junction with the Marsh Trail. Marked by alders. Photo of

East Path, left, taken at this point November 28, 2016 looking north. There's a pond to the right of the visible track in winter.

<u>July 12, 2019</u> (day 1455, 1096+359): NanRG cum. 1038.6 mm. Weir +49 mm WPB scale. Cistern +89 mm SCB.

July rain halting the decline in lake levels. Private drainage at the weir still running. No sign of baffle leakage. All fairly quiet.



Deer with one spotted fawn close behind her. They are very shy within the park in curious contrast to how they are on people's lawns in summer.

Pacific-slope flycatchers, almost impossible to capture with the camera, seem very common this year as they

forage for insects among the branches of shady trees, only their almost-whistled drawn-out "wheep" or more pithy aspirated "whit" calls to companions making their presence known, more languid than some sound bites on the web.

<u>July 16, 2019</u> (day 1459, 1096+363): NanRG cum. 1043.0 mm. Weir +30 mm WPB scale.



July 17, 2019 (day 1460, 1096+364 = 1461-1): NanRG cum. 1043.2 mm.

THAT CONCLUDES THE FOURTH YEAR OF OBSERVATIONS AT THE MARSH

Interesting to see that despite the rainfall being below average, the levels of water in the marsh are not. This is because the amount of precipitation is not the limiting factor; it is essentially the

storage capacity of the lake, which in part is determined by the activities of the beavers.

Date	NanRG	Weir pool	Lake level (cal.)
Jul. 17 2016	1306 mm	-660 mm	.027 + .212 = +239 mm
Jul. 17 2017	1277 mm	-687 mm	.185 + .212 = +397 mm
Jul. 17 2018	1143 mm	-671 mm	.202 + .212 = +414 mm (extrapolated)
Jul. 17 2019	1043 mm	-619 mm	.225 + .212 = +437 mm (extrapolated)

 $\underline{\text{July 21, 2019}}$ (day 1464, 1461+3): NanRG cum. 2.6 mm. Weir +18 mm WPB scale. Cistern +54 mm SCB. Sunny. No sign of ducks on the lake and

any birds in the woods very quiet. Private drainage below the weir has finally ceased.

<u>July 22, 2019</u> (day 1465, 1461+4): NanRG cum. 2.6 mm.

The small patch of Torilis japonica (Japanese hedge parsley, an invasive species) at the NE Arm spillway discovered in summer of 2016 is still there, but shows no sign of spreading aggressively; however, an entirely new patch found today on a six-metre stretch of the Stump Farm Trail's 4-foot. Clearly being spread by trail users. Their seeds are like Velcro; they stick to clothes, fur, hair, and whatever else brushes against them. Unlikely to be being spread by horses here, unlike on the old Kensington Lands where it has now become common. Perhaps by deer, or bikers who travel further afield than walkers and who use the RP trails oblivious (understandably) of the fact that

they're meant to be pedestrian only. A few small plants also found at the Stump Farm site itself, again where they've never been seen before. There are also a few plants in the western burn-pile clearing in an area frequented by deer, first seen in 2016, but these remain unobtrusive and hard to find.

Tansy ragwort cull in previous years appears to have been effective, not 100% of course but significantly so, especially along the Marsh Trail, East Path, Ridgeway, and in the burn-pile clearings. Although the cinnabar moth caterpillars help, they only seem to be damaging around ten percent of the plants.

<u>July 31, 2019</u> (day 1474, 1461+13): NanRG cum. 3.9 mm. Weir -18 mm WPB scale. Cistern +11 mm SCB.





More tansy ragwort culling. Major trails are clear, though there are more plants scattered about in clearings in the woods, but only occasionally in dense patches.

Much more Japanese hedge parsley found. It clearly likes trails, especially narrow woodland trails, but it is also found in places I imagine only deer frequent. Some also seems to be being spread by water; commonly seen in dry watertracks, along grassy banks of creeks, and in trail gutters.

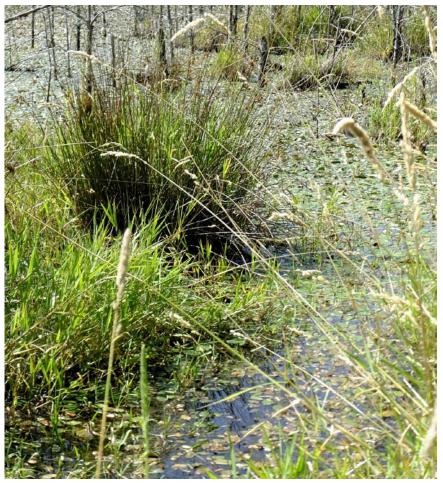
Not much else going on.

Woodland tarweed (Madia madioides, lacking a few tri-fingered petals) and hempnettle (Galeopsis tetrahit).

A newt larva, presumably a rough-skinned newt the only newt in BC, shortly before becoming an eft (no gills, legs visible but not yet fully developed) in the cistern.

July rainfall was average but so far this calendar year we've had only 440 mm while the 75-year average is 578 mm.

August 3, 2019 (day 1477, 1461+16): NanRG cum. 6.4 mm.



With the seasonal sinking of the level of the lake, a chance to explore its muddy parafluvial fringe, the lake's intertidal as it were.

Found two (make that four) new plant species there, small bedstraw (Galium trifidum), enchanter's nightshade (Circaea alpina), water minerslettuce (Montia fontana), and lesser spearwort (Ranunculus flammula), all absent in the upland, but said to be common in "marshes, fens, bogs, swamps, and on the banks of sluggish streams"





[Pojar & MacKinnon].

Also American brooklime previously found only in rain-filled ruts made by bicycles, and small-flowered forget-me-nots along the watery edges of understoryless thickets of dead and spindly saplings.







These marginal communities of plants with the tiniest of flowers remind me of those I once saw in the stony polar desert of Cornwallis Island. They thrive on the lee side of cobblestones where the sparse drifting snow finds shelter from the cold dry winds that blow unhindered over the flat treeless landscape. In the month-long days of summer, these small pockets of snow melt and provide moisture for dwarf shrubs, miniature wildflowers, mosses, lichens, hypoliths, and a host of tiny insects, forming isolated habitats in the otherwise seemingly lifeless arid vastness beyond.

<u>August 9, 2019</u> (day 1483, 1461+22): NanRG cum. 6.4 mm. Weir -44 mm WPB scale.

Move away slowly. That's a hornets' nest (Dolichovespula maculata). They were actually disinterested in my presence.



Meanwhile, clump of musk monkeyflowers (*Erythranthe moschata*) in a drying-out muddy inlet. Hairy.

All very quiet.

<u>August 12, 2019</u> (day 1486, 1461+25): NanRG cum. 19.8 mm.









New signage in the 707 CP and CM RP offers a choice of numbers: Post Number, Location Number, Signage Number (always 1 because it's a photocopy), and a GVFD Access Number (why two #10s?). Oh! and the number to report on your cell phone in emergencies (good luck) is the Trail Marker Number.



<u>August 18, 2019</u> (day 1492, 1461+31): NanRG cum. 19.8 mm. Weir -35 mm WPB scale. Cistern -35 mm SCB.

Very quiet still, though the ravens are back. There are birds around but they busy themselves without calling or singing. No ducks on the lake that I can see or hear.

Spent time trying to distinguish black medic (Medicago lupulina) from



lesser trefoil (*Trifolium dubium*) when neither have gone to seed. Opinions vary among experts on how best to do it, exceptions to their rules appear to me to be common, but since both, besides being trail weeds, are common lawn weeds, for present purposes, it doesn't really matter. I'd just like to know.

Meanwhile, back at the lake shore, not only a new species of plant but one in a new division (phylum), a liverwort, *Pellia neesiana*. Liverworts, I gather, have been around for over 500-million years and recent research has given them and hornworts venerable standings separate from mosses, which were formerly all grouped together, and still are informally, as bryophytes.



Stranded duckweed nearby (Lemna sp.). Relatively uncommon on the lake, substantial parts of which host dense canopies of water shield.

Small patch of dagger-leaf rushes and a frog or two. The parafluvial fringe is where it's at.







<u>August 30, 2019</u> (day 1504, 1461+43): NanRG cum. 24.0 mm. Weir -66 mm WPB scale. Cistern -75 mm SCB.



Sunny days. All the summer tasks are done. All the world is just quietly waiting.

Add water smartweed (*Polygonum amphibium*) to the species lists. Picture taken end of last June but according to Lyons and Bill Merilees, this aquatic plant is "often not noticed".

September 2, 2019 (day 1507, 1461+46):
NanRG cum. 24.0 mm.

The verges of trails and their 4-foots, disturbed ground, bare and waste places is where weeds flourish. And nowadays, the Stump Farm site, Christine's old place, there are plenty of those, but among them,





some left-behind lobelia that has survived the winter and a feverfew plant, a perennial, in bloom despite the dryness.

<u>September 7,</u> <u>2019</u> (day 1512, 1461+51): NanRG cum. 26.1 mm.

This summer has been a little unusual in that there appears to have been no

summer resident ducks; usually there're a few mallards that stay over. First duck sighting today for several weeks was not a mallard but a lone male wood duck in summer plumage.



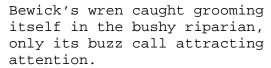
Eaton's asters out along the shore.



<u>September 10, 2019</u> (day 1515, 1461+54): NanRG cum. 28.5 mm. Weir -74 mm WPB scale. Cistern -98 mm SCB.

The water's retreating, but no more than usual this time of year.





Diverse-leaved water-starwort with different floating and submerged leaves, and picture-perfect bur-reed.







<u>September 24, 2019</u> (day 1529, 1461+68): NanRG cum. 88.4 mm. Weir +24 mm WPB scale. Cistern -44 mm SCB.

Mixed clouds and sunny breaks. Lots of rain recently, almost twice the average for the month, making up for the dryness of the spring and summer. Creeks not running but private property drain at the weir is. All very quiet. No ducks and what small birds there are, are moving in flocks so unless you're near one, you don't hear them at all. Mushroom season underway.



Many webs hung between the dead thistles in the clearings, the work of cross orb-weavers (Araneus diadematus).

<u>September 29, 2019</u> (day 1534, 1461+73): NanRG cum. 95.8 mm.

First of the fall migrants. Canada geese, flock of about eight, quiet and very shy, so it's unlikely they're city types. Unusually large number of jays around.



October 2, 2019 (day 1537, 1461+76): NanRG cum. 95.8 mm.

Three mature alders down across East Path, all due to rot. A couple of days ago it was jays making noise, today it was mostly flickers.

More migrants, a few ducks, mallards and five or six of another dabbling duck species not easily recognized.

Rain last month, but the year-to-date's at 532 mm still below the 649 mm average.

The geese have left.

October 21, 2019 (day 1556, 1461+95): NanRG cum. 168.7 mm. Weir +91 mm WPB scale. Nothing seen on the lake.

November 8, 2019 (day 1574, 1461+113): NanRG cum. 169.9 mm. Weir +107 mm WPB scale. Cistern +108 mm SCB.

October another drier than average month, the year-to-date at 606 mm compared to the average 754 mm. Long spell of high-pressure weather, sunny intervals, no wind, calm waters, and no rain beyond a morning of "heavy mist". Creek beds mostly dry; nothing is yet running.

Ravens and frogs the only creatures making noise. Some of the bigleaf maples have been a spectacular golden yellow this fall. Mushrooms everywhere.





The usual winter residents are slowly assembling on the lake, about two dozen ring-necked ducks, one lone male bufflehead with a few females.

November 18, 2019 (day 1584, 1461+123): NanRG cum. 227.2 mm. Weir +201 mm WPB scale.

November 21, 2019 (day 1587, 1461+126): NanRG cum. 227.2 mm. Coats Marsh Creek is running. Thanks to the beaver dam this is fairly normal in spite of unusual dryness this year. In 2015, flow start was November 25 (day 130); in 2016, October 15 (day 89); in 2017, November 15 (day 120); in 2018, flow initially started August 30 (day 43) due to a breach in their dam but this was repaired and flow stopped, restarted October 31 (day 105).

December 1, 2019 (day 1597, 1461+136): NanRG cum. 230.4 mm.

Coats Marsh creek still running, and some ponding and trickling in Stump Farm Number 2 Stream and Little Creek, but nothing yet in Stump Farm Number 1 Stream or in East Path Creek. Water level in the weir pool is now above the sill and running but very little from the pond leveller.

Rain last month least since 1979 and year-to-date's at 666 mm well below the 932 mm average. November has only been drier in eight of the last 75 years.



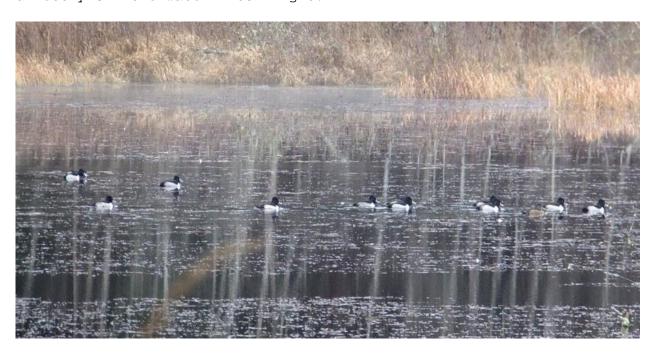
No sign nor sound of wildlife on the mist-shrouded wintry lake. Only a lone raven calling. Drizzle dimpling the small patches of clear water in the covering of frosted ice, and drizzle adding to the sparse soundscape as it drips from the trees.

No ducks this year? A sign of dwindling wildness? or just another of the weather's vagaries?

December 6, 2019 (day 1602, 1461+141):

NanRG cum. 239.1 mm.

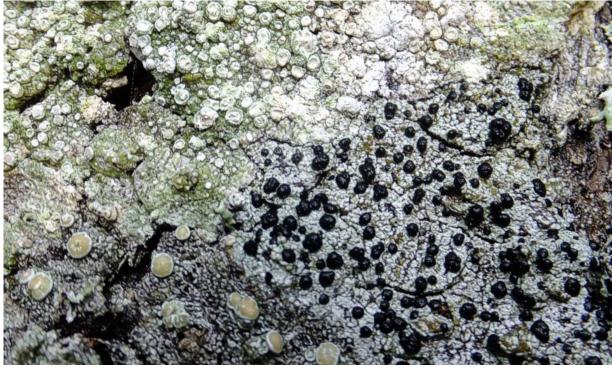
..... the latter. Flock of thirty ring-necked ducks. All but one of them males. The smallness of the marsh and its confining trees don't bother ring-neckeds. They can, if need be, like mallards, spring directly off the water into flight.



This time of year, I like to stop now and then by an old cedar or Doug.-fir when its bark is illuminated by the slanting sunshine, and peer at the bryophytes flourishing there. These forests are not noted for their biodiversity; yet, this looks like a jungle to me, although I don't think I can reliably name even one of the species, except perhaps for that lipstick one.







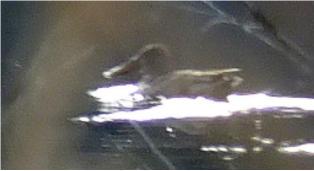




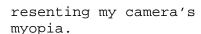
<u>December 8, 2019</u> (day 1604, 1461+143): NanRG cum. 240.0 mm.

All of a sudden, ducks galore, and four trumpeter swans thrown in for good measure. Two flocks of ringneckeds; buffleheads; a small group of northern shovelers; a few mallards; and some widgeons.

An entertaining half-hour skulking in the woods, far enough away to avoid alarming them but thereby restricting my view and leaving me







Lobaria oregana, a wrinkled lettuce-leaf-like lichen with bald white undersides. And





snowberries, common enough on Gabriola, but seldom seen in the park. December 12, 2019 (day 1608, 1461+147): NanRG cum. 253.0 mm.

Stump Farm Number One Stream running. Not much "proper" rain this fall. The barometer is unusually high when it rains instead of being depressed, and as a consequence the rain is short-lived, more like a passing heavy shower than a prolonged deluge.

<u>December 23, 2019</u> (day 1619, 1461+158): NanRG cum. 323.4 mm. Weir +354 mm WPB scale.

<u>December 31, 2019</u> (day 1627, 1461+166): NanRG cum. 340.7 mm. Weir +344 mm WPB scale. Cistern +335 mm SCB.



A blustery day, racked puffs of clouds, the lower ones massed mafic-greys, laden with darkness, shedding sooty ragged whisps that race ahead, the higher ones shiny white, like piano keys scudding across the sky allowing only the briefest glimpses of sunshine between smatterings of rain. Curious down-drafts, the surface of the lake coruscating as ackers and cat's paws slide across it snake-like, hither and thither, as if they were alive. A skein of honking geese passing by, heading nor'west on the wind. A new small beaver dam in the NE Arm. Buffleheads and ring-neckeds out and about.

The lake at its highest level I've ever recorded; yet, only twice has this year's rainfall on Gabriola been less than it was in all the years since 1944. East Path Creek is dry! \Diamond Next file Previous file.

2020 NOTES

<u>January 10, 2020</u> (day 1637, 1461+176): NanRG cum. 421.0 mm. Weir +424 mm WPB scale.

Small patches of wet snow.

<u>January 16, 2020</u> (day 1643, 1461+182): NanRG cum. 466.9 mm. Weir +366 mm WPB scale.

Deep snow. Lake frozen over. Only one or two deer tracks.

<u>January 22, 2020</u> (day 1649, 1461+188): NanRG cum. 527.4 mm. Weir +454 mm WPB scale.

<u>January 25, 2020</u> (day 1652, 1461+191): NanRG cum. 531.9 mm. Weir +442 mm WPB scale.



Lots of orange-jelly fungus (Dacrymyces chrysospermus) on the alders this winter. It flourishes after rain.





Unusual flow over East Path from the NNE Arm. This minor spillway is north of the one at the Ridgeway junction and water usually seeps unseen under the path from a pond to the east. There's a similar spillway on the Three Gates Trail where Little Creek usually flows unnoticed under the trail.



NE Arm wetland living up to its name. Frogs to be heard here all winter and occasionally you see mallards. The beaver dam is overflowing in two or three places, but no flooding at the weir deck yet. The pond leveller is just holding its own.



<u>January 27, 2020</u> (day 1654, 1461+193): NanRG cum. 534.7 mm. Two long-sought-after springs discovered in the East Path Creek delta. Account written up in <u>File:668</u>. Emerging from among cedar tree roots at the bottom of the 1-2 metre incline marking the shoreline of the paleo-meltwater-lake. East Path Creek in full flood, the most likely source. Photographs show the NE spring *left* and the SW spring *right*.

The late-Pleistocene lake level, as marked by thick gleysol, was slightly higher than the present level even though the lake is flooded at present and the level has been raised by the beaver dam. Possibly indicates that the meltwater lake was at the time of its formation around 11500 BC dammed with ice at the western end.





The delta has many dead or decaying trees that are good habitat for wildlife, especially cavity nesting for birds and maybe even ducks. Among old cedars that are more than a century old, there are mature Douglas firs and deciduous trees, including a veteran willow tree.

This is one of the best locations for bird watching, although, technically, it is

outside the Coats Marsh RP and within the 707 CP (Coats Marsh East).

<u>January 29, 2020</u> (day 1656, 1461+195): NanRG cum. 537.1 mm.

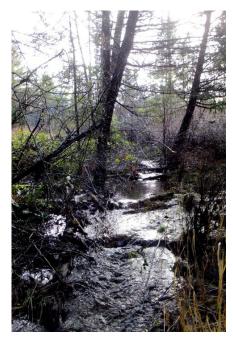
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weathered glacial flour rich in quartz and feldspars





Below: East Path Creek near where it crosses under Coats Drive after its steep descent from High Point Meadows and joins and leaves the SE Arm wetland, another often overlooked riparian area.





February 11, 2020 (day 1669, 1461+208): NanRG cum. 650.7 mm.

Gemel (inosculated) trees, trees that have self-grafted themselves together, are common in the park and the adjoining 707 CP though



they're mostly a result of logging rather than any more-interesting natural process or cultural modification.

Logging has created stumps from which two or more, equal-sized trees grow with a common root stock. Gemels with two trunks sharing the same base are what I call "tuning-fork" trees.

Older cedars often consist of a round of small trunks that have fused together to make one large tree, most often seen as discarded logs with rotten cores in former clear-cut areas of the park, but a few such trees have survived. They sometimes grow that way because, in the rainforest, cedar roots splay out rather than forming a deep central taproot and the shallowly-buried roots send up saplings of their own or recruit smaller saplings around them. Nursery stumps also encourage the growth of siblings in the same way.

I guess tuning fork-trees are monozygotic (identical twins) while the more usual sense of "gemels" is dizygotic (fraternal twins, trees rooted independently but conjoined higher up). I'm still looking for good examples.





February 16, 2020 (day 1674, 1461+213): NanRG cum. 652.4 mm.

Creek flows becoming much less everywhere after the January deluges and falls of snow. The originally-observed two springs discovered in January have stopped flowing, but the character of the SW one has changed. The SW spring location now shows a patch of silty-clay mud, the colour of dark chocolate, located a little below the originally observed hole, from which numerous small seepages are "boiling" up. The flow from the puddle they create, possibly around 10 litres/second in all, is in poorly-defined, trinkling watertracks leading from the forest into the reedy margin of the lake.



<u>February 18, 2020</u> (day 1676, 1461+215): NanRG cum. 652.4 mm. Weir +314 mm WPB scale. Lots of duck and geese sounds from the lake.

February 21, 2020 (day 1679, 1461+218): NanRG cum. 652.4 mm.

East Path Creek almost dry, no flow, but SW Spring seepage patch still flowing, only slightly less than 5 days ago. Now I know exactly where it is, it seems amazing that it has been undiscovered for so long.

February 26, 2020 (day 1684, 1461+223): NanRG cum. 668.5 mm.

SW Spring seepage patch still flowing.

<u>February 27, 2020</u> (day 1685, 1461+224): NanRG cum. 668.5 mm. Cistern +308 mm SCB.

February 28, 2020 (day 1686, 1461+225): NanRG cum. 673.8 mm.

Whispering in the canopy, like the hushed sound of surf on a distant seashore; but almost no wind down below, only occasional wafts to ruffle hair and bring a chill to the recently-trim-bearded cheek on the windward side of the face.

Heading for lowest February rainfall since 2008, 53% <u>less</u> than the 75-year average for the month. In January, it was 61% <u>more</u> than that month's average. This month, rain in showers, as often from the summery northwest as from the wintery southeast, average barometric pressure higher than it normally is in summer.

Another interesting difference is that while we are receiving rather less precipitation than average, Vancouver is receiving more. Currently, for January and February this year, they are +26% relative to their long-term average, while we are only +13% relative to ours. This is a continuation of the trend seen last year.

The weather is not normal any more.

March 6, 2020 (day 1693, 1461+232): NanRG cum. 678.4 mm.

East Path Creek dry; yet, SW Spring still running, tho' now only about 25% of its former volume. Little Creek running. Many ring-neckeds scattered over the lake. Canary Grass Meadow very soggy. Impossible to avoid getting a boot-full of water now and then. Greening up. No flowing water. Large flock of flickers.



March 15, 2020 (day 1702, 1461+241):
NanRG cum. 681.8 mm.

Dry weather continuing, cummulative is 25% below normal for the July 2019-to-July 2020 records. Long-term average NanRG for this date is 904 mm.



Twittering and chirping of mobs of small birds, as if in a playground, moving unseen through sunlit groves of spindly alders.

Robins, chickadees, hairy woodpeckers, nuthatches, and likely others abound.

WATER QUALITY TEST on SW Spring Lake pH 7.6, Spec.EC $88\mu\text{S/cm}$ Spring pH 7.6, Spec.EC $83\mu\text{S/cm}$

The spring is subsurface runoff not groundwater. Still flowing but now just a drindle.







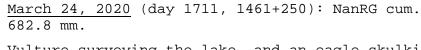
March 21, 2020 (day 1708, 1461+247): NanRG cum. 681.8 mm.

Buffleheads, ring-neckeds, and mallards on the lake. Many in interested-looking pairs including two Canada geese.

Although there are mallards around, they are not as common as they used to be. Often out-

numbered by other wildfowl as they are today.





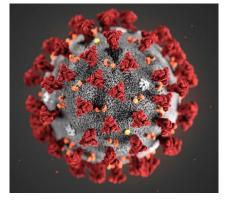
Vulture surveying the lake, and an eagle skulking at Stump Farm.

Although Canada geese are not welcome, they do trigger a great chorus of alarms whenever either of these big birds appears overhead.





Ruins overlooking Canary Grass Meadow.



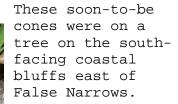
Red, la couleur du jour. Actually, only one of these four pictures was also taken in Canary Grass Meadow, the red alder catkins (right).





Image(top left) is an oftseen-these-days cryogenic electron microscope picture of 2019-nCoV, the virus that causes COVID-19. The red is a false colouration of the spike protein(S-protein) that the viruses use to attach to and breach the membrane of cells within which they reproduce.

Although Douglas-fir trees are common everywhere on Gabriola, their flowers quickly lose their colour and go to seed and so are easily missed.





The what-looks-to-me-like-a pathogen that commonly afflicts the leaves of Oregon grape plants when stressed creates striking reds among all the greenery.





Is that a foot path? Is that an invasive species? Oh! is that just a sparrow?

March 31, 2020 (day 1718, 1461+257):
NanRG cum. 697.3 mm. Rainfall in March has only been lower twice in the last 76 years, in 1965 and last year.

Our annual rainfall (YCD) so far this



year is 12%
below our
average; yet, in
Richmond (YVR)
just across the
water it is 2%
above their
average. The
rain shadow we
live in is
having its way.

April 4, 2020 (day 1722, 1461+261): NanRG cum. 701.5 mm. Cistern +260 mm SCB. Weir +326 mm WPB scale.

Violet-green swallows are back, swooping and swerving over the water! Rufous hummingbird nearby. Pair of wood ducks. Only hope RDN, TNT, and GaLTT get to understand the need to keep disturbance in the RP down while these birds search for a tree cavity around the lake to nest in.



Coats Marsh Creek running but struggling.



<u>April 8, 2020</u> (day 1726, 1461+265): NanRG cum. 701.5 mm.

Couple of firsts. An anglewing butterfly (*Polygonia satyrus*) showing interest in the stinging nettle patch at Stump Farm. First insect only if we neglect the midges in





the sunbeams, the tiny white moths,



and the numerous hymenoptera? skimming back and forth a few inches above bare ground at the farm site, all of whom have been around for more than a week. And at the edge of the woods, yellow violets (V. sempervirens), first only if we ignore

the weedy riff-raff there; daisies, dandelions, dead-nettles, and mats of hairy bittercress.



April 10, 2020 (day 1728, 1461+267): NanRG cum. 701.5 mm.



Conspicuous shrubby tree in the marsh, in standing water, from a distance looking like it was in blossom. Turned out to be leafless and adorned with catkins. For Gabriola, an uncommon willow, Hooker's willow.

Coats Marsh Creek is ponding and no longer flowing.







You still need a bikers' bridge however to get over Little Creek which is still alive and cheerfully trinkling away.

Curious lack of wildflowers so far this year. No spring mushrooms either I'm told. No April showers?

April 16, 2020 (day 1734, 1461+273): NanRG cum. 701.5 mm.



Dryness becoming serious. At this time of year, the average cumulative precipitation since the previous late-July is around 1000 mm. We're a lot short of that this year.

Owl on the Ridgeway, barely interested enough to turn its head to see who's passing by.

Wildflower search in Coats Marsh East found almost nothing, one daphne-laurel (yellowing, hooray); a bigleaved sandwort, not easy to spot when not in flower; and a patch of unusual tiny white-flowered bittercress that I have to assume were Cardamine hirsuta but doing a very credible imitation of their alpine relative C. bellidifolia







plants of the mustard family, genus and species unknown[see April 23]

And just a few hundred metres more along the Marsh Trail another "what's that?". Maybe woodland bittercress *Cardamine flexuosa*? If so, a European import, uncommon in BC.

<u>April 17, 2020</u> (day 1735, 1461+274): NanRG cum. 706.6 mm.

Skunk cabbage, quite rare within the RP, maybe due to the loss of O- and A-horizons during past logging operations, who knows? These were in the





Stump Farm Number 1 Stream watercourse.

On the 2019-nCoV virus, red pom-pom theme, red spots on the flowers of Oregon grapes that are clearly being stressed by drought, these on the south-facing Foxglove Down



between Contemplation Hill and Witch Doctor (WT-5).

Hawk determinedly on its way off the slope being harangued by a raven.

<u>April 20, 2020</u> (day 1738, 1461+277): Weir +271 mm WPB scale. NanRG cum. 706.6 mm.

Broom bash begins, though broom up here not yet in flower. Little sign of the usual candyflowers (Claytonia sibirica) or slender toothworts (Cardamine nuttallii) either despite them being out at the south end of the island. Red-flowering currant in the ponding of



Stump Farm Number 2 Stream. Just 4-5 mm of rain has brought out the calypso orchids, a compelling reason (hello GaLTT/RDN/TNT) for keeping bikers off the narrow mossy Weir Trails where they flourish.

The beavers are building a new hydrogeological feature at the weir. For several years there has been an accumulation of flood debris there, but the beavers are engineering the obstruction into a formal dam using mud as mortar.

There is still water draining from the leveller but the creek at the Marsh Trail culvert is dry. See Table Note 11 in File 673u.



<u>April 23, 2020</u> (day 1741, 1461+280): NanRG cum. 730.8 mm. It's been raining.





Candyflowers everywhere among the alders. Loud assertive noises from

pied-billed grebes, red-winged blackbirds, varied thrushes perhaps (disyllabic calls), and more.

On the red pom-pom 2019-nCoV theme, a familiar flower on a familiar trail (Mainline Trail in the 707 CP), but are there more of these with red tips this year than usual....?

On the identity of those tiny Brassicaceae (mustard family) plants, what we used to call Cruciferae, April 16, been studying them and getting quite fond of them but making little progress in identifying them despite hours of sleep-depriving Googling. Early rejects, much easier for local experts than for me, were Cardamine bellidifolia (alpine bittercress), Idahoa scapigera (pepperpod), Cochlearia sp.(scurvy-grass), Draba sp.(Whitlow-grass)...often some



characteristics fitted, but never all of them. Doesn't help when field guides describe one species in detail and then casually go on to mention that there are 30+ more of them. Hornungia procumbens (oval purse) became one hot favourite, but suspiciously I consulted E-flora BC experts and found (thank you Frank Lomer) what may be the best bet since it is known to grow in the area, depauperate Teesdalia nudicaulis (shepherd's cress). For the record, this is how I saw it:

Coats Marsh East, CDF zone, 110m AMSL, crowded in moss on rock, 4-7 cm high, April, tap root, uncommon. Fls 3-4 mm across, 4 white petals, 6 yellow stamens, 6-8 fls in terminal clusters. Stems no lvs, slightly hairy, more so near the base. Basal lvs rosette with 2-3 mm petioles, fleshy, most circular, 4 mm dia, entire, less often with deep ear-like lobes at the base, sparsely hairy especially round the edges, turning reddish-purple with age. Fruit a silicle, green with brown-purple







patch, central vein, shallow
mustard-spoon shape,
slightly notched tip.

<u>April 25, 2020</u> (day 1743, 1461+282): NanRG cum. 732.9 mm.

Western buttercups, strawberries (Fragaria virginiana), spotted coralroot, and early blue violets.

Mushrooms appearing after the rain, Amanita pantherina, turkey tails,







false morels, actually dark brown but appearing coal-black to the eye

(Gyromitra esculenta), and other smaller stuff.

I'm finding it much easier to cut back the broom that is not yet in



flower. I don't get distracted by individual plants that'll be showing an unusual bronze colour or having vivid redlips. In death, they all look the same.

<u>April 30, 2020</u> (day 1748, 1461+287): NanRG cum. 737.9 mm.

Speedwell (Veronica arvensis). You only see them when you sit down for a while and then notice them growing beside you.

Spots of rain from looming clouds with dark undersides; yet, not numerous enough to fill the sky, nor cause me to pull on the hood of my jacket, nor yet to close up the daisies.

Rain this month 35% below normal, and for the calendar year down 15%.



May 4, 2020 (day 1752, 1461+291): NanRG cum. 743.8 mm.

The ducks have ducklings so I'm not going to the lake too often.

RDN have an engineer looking at the baffle, beaver dam, and pond leveller, I suspect at the direction of lawyers, but I'd hope with the idea of coming up with a water management plan that takes into consideration ecological needs and a schedule for replacing the baffle, which is made of wood and will eventually rot out.

Meanwhile, May flowers. "Die liebe Erde allüberall, Blüht auf im Lenz und grünt aufs neu!" [Mahler's Song of the Earth]. Arbutus; dogwood; small blue butterflies never resting, always flitting hither and yon (Celastrina echo); devil's matchstick (Pilophorus acicularis) and a couple of other lichens on sandstone. Nothing rare, but so good to

see them.









The Dog Drink Sidetrack that leads down to Canary Grass Meadow, a hidden-away micro-wetland as it always was.











Broom bash completed at Stump Farm. Not aimed at eliminating it entirely from the burn-pile clearings, far from it, just keeping it in the corners out of harm's way.

These may be "waste ground" in some people's eyes, all thistles and stinging nettles, but the biodiversity of these greenswards is high; more dragonflies, butterflies, song birds, snakes, bats, and swallows than anywhere else in the park. And so what if most plants are imports, so am I.

May 12, 2020 (day 1760, 1461+299): NanRG cum. 750.7 mm.

Mallard ducklings, about ten following along behind a proudlooking but very wary mother. Lie down in the grass, ignore the stinging nettles, and move only your fingers on the camera buttons.

Wood duck. Pied-billed grebes are difficult; they move fast and submerge like submarines.







Pair of assertive geese, no goslings though.



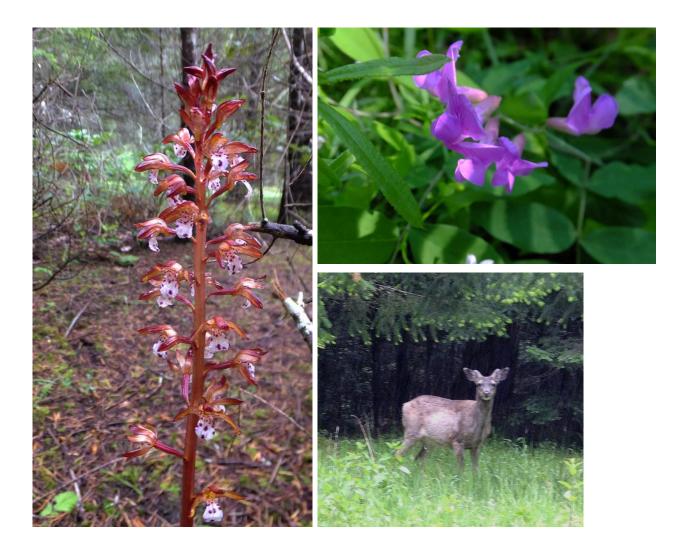






The bright flush of new growth on the firs striking this year, l'emeraude du printemps someone I once read said they called it in Québec, but out here it's more like l'olivine.

Coralroot and venust vetch, flourishing fodder in pattering showers of rain.



May 18, 2020 (day 1766, 1461+305): NanRG cum. 774.5 mm.

Especially delightful blue-eyed Marys (*Collinsia parviflora*); they are rarely seen in the park. Not only that, they were growing alongside camas (*Camassia quamash*), also not a speciality in the park's forest.



Flaxflowers (Leptosiphon bicolor) small not-well-known flowers that are native, and yet, on sunny days, manage to rival the hop-clovers, black medics, and English daisies in that they make up for their smallness by their numbers in grassy-gravellymossy places; the trail sides and 4-foots.

These all along South Boulevard.











Strawberries are ripening and may is out; time already to cast a clout? For nearly half-a-million dollars, parts of the wetland in Coats Marsh East and a riparian area along East Path Creek are yours. What a deal ... but for whom?

May 23, 2020 (day 1771, 1461+310): NanRG cum. 777.8 mm.



Community volunteers have been taking on the task of clear-cutting the broom in the western burn-pile clearing. I can't help wondering if this is such a good idea.

By all means stop it spreading from its long-established enclaves along the Marsh Trail into the meadows, as has been done for many years, but these meadows are not native habitat; the grasses, wildflowers, and insects there are nearly all exotic species, "invaders"

if you will just like the broom, and many enhance the biodiversity of the area by providing resources for birds, bats, voles, and mice not available in the surrounding Doug-fir forest.

So why not selectively manage the broom rather than clear-cutting it? I can think of several reasons.

An ecology is not uninteresting just because it is exotic, always provided of course that it is managed to maintain biodiversity. My species lists for the park would be seriously depleted if the burnpile clearings were not there.

There are no underlying geological, pedological, or ecological reasons for the clearings' existence; in time, they will revert to forest. In the meantime, keeping the broom in check by destroying every last veteran plant will just provide additional habitat for the other exotic species that are there. The chemistry of the soil in these enclaves has been irrevocably changed to ensure that.



The broom provides an abundant flora resource for bees. The cutters must have noticed this. I'm not an expert, but it seems to me that many of the bees busy buzzing about have white rumps making it likely that they are western bumble bees (Bombus occidentalis), a blue-listed taxon, a native species of special concern in BC.

And in addition, the thickets of broom provide a natural barrier between the increasingly heavily-used Marsh Trail and the margins of the lake where human and dog disturbance if not checked in the wildfowl breeding season will

seriously degrade the marsh as an ecological reserve. More effective than another notice not everyone will read; a natural good-looking fence providing habitat for an endangered species, what more can one want.



Two experts at disguise. An all-green lacewing with transparent wings (Chrysoperla spp.) and groundcones (Boschniakia hookeri).

The orange plant is actually in the Cox CP not Coats Marsh RP, but its picture is included here because the colour variations are not seen every day.

It's curious that the groundcones and coralroots are more numerous than





usual this year and readily seen along trails in the RP. Weather of course a possible factor, but could it be that human and dog traffic on the trails are keeping the deer away thereby preserving these fairly

rare plants? Helping the native species makes a change from trails being just conduits for lawn weeds.

May 26, 2020 (day 1774, 1461+313):
Weir +268 mm WPB scale. NanRG cum.
783.4 mm.



Another saprophytic plant I've trained my personal neural network to watch out for is candystick (Allotropa virgata), so far without success. My network training input has been examples seen in Cox CP.

These types of plant, which live on dead organic matter, are indicator plants for nitrogen-poor soils and their proliferation ties in with the surprising lack of skunk cabbage and thimbleberries in the RP; plants that need nitrogen-rich soil.









Amongst the "oddball" category of plants are

aquatics with flowers so tiny that the plants, perhaps unjustly, miss being catalogued as "wildflowers" at all. Some flowers not having petals (being apetalous) doesn't help either.

Two seen today at the marsh were what might be awlwort (Subularia aquatica) and water-starwort (Callitriche sp.) (see June 13), the latter a genus that is notoriously difficult to identify at the species level when not gone to seed.

The awlworts had no flowers yet, but were instead adorned with teeny rafts of palish-green duckweed (*Lemna minor*). The water-starworts, if



that's what they are, were still completely submerged growing up from the muddy bottom.

American brooklimes abundant in the shallow water there too.

Mallards with ducklings dabbling unperturbed nearby. It helps to be down on your knees showing the same interest that they do in the botanical minutiae.

May 31, 2020 (day 1779, 1461+318): NanRG cum. 784.2 mm.

RDN have been inspecting the weir and beaver dam, mainly I think from the safety issue. Hope if this is so, a plan for the future of the wooden baffle will emerge that takes into account the necessity of maintaining the lake's winter water storage capacity so that it doesn't dry out at the end of summer. The beavers, being the good engineers that they are, have this all figured out.

Rain this month 5% above long-term average but so far this year, rain is 13% below average for the time of year, which is pretty normal given that the one-sigma variation is $\pm 24\%$.

For my own dry-to-dry-season recording starting July 18, 2019, thus



far, 26% below average, which is notably dry given that the one-sigma variation of this annual average is ±17%. We had a dry fall as well as this year's dry spring, January and now May being the exceptions.

June 11, 2020 (day 1790, 1461+329): NanRG cum. 814.9 mm. Pale swallowtail perfectly poised on the shubbery.

Broom has all gone and the bats have not returned this year.

<u>June 13, 2020</u> (day 1792, 1461+331): NanRG cum. 832.5 mm.

ID problems.

The awlwort (May 26) has failed to flower as it should, I guess it could instead be submerged toad rush, Juncus bufonius.

Water-starwort (May 26) is more likely, but not definitely, Hampshire purslane, Ludwigia palustris (Frank Lomer). The leaves are showing red, no flowers yet.



<u>July 1, 2020</u> (day 1810, 1461+349): NanRG cum. 848.4 mm. Weir +238 mm WPB scale. Cistern +235 mm SCB.

Rain in June 58% above long-term month's average, very welcomed by the plant life. Annual total still 8% below average for the time of year but that's pretty normal. \Diamond

Next file.

Previous file.

<u>July 1, 2020</u> (day 1792, 1461+331): NanRG cum. 848.4 mm. Weir +238 mm WPB scale. Cistern +235 mm SCB.

Rain in June 58% above long-term month's average, very welcomed by the plant life. Annual total still 8% below average for the time of year but that's pretty normal.





These are the awaited 1-2 mm flower buds of Hampshire purslane (June 13, 2020), four sepals, apetalous (no petals), and sessile (no stalk).

Ducklings now juveniles, maybe in three weeks they'll be ready to fly.

Still no bats.



Purple-leaved willow-herb (*Epilobium ciliatum*) found at the lake side added to the species list.





Indian-pipe very common this year. Often wonder if their flowers droop because someone has unkindly told them that they're parasites.

Oxeye daisy time. Prolific. They don't attract bees in the way does broom, nearly all the few insects on them are dark-coloured thrips with only occasional bright-yellow crab spiders or a very few tiny

gnat-sized flies (2-3 mm), delicate, dark, and harmless.



<u>July 11, 2020</u> (day 1802, 1461+341): NanRG cum. 864.1 mm.

Just beautiful displays of self-heal this year. Our OED 1971 defines weeds such as this as: "herbaceous plants not valued for use or beauty, growing wild and rank, and regarded as cumbering the ground or hindering the growth of superior vegetation".

I like them, just so long as you don't include bindweed.

A rare chipping sparrow hanging out with a bunch of dark-eyed juncos at Stump Farm. The juncos, more often seen in summer than they used to be a few decades ago, make clicking noises just like those old-fashioned tin clicker toys. Maybe that's why this chipper was enjoying their company.

<u>July 17, 2020</u> (day 1826, 1461+365 = 1827-1):
NanRG cum. 864.1 mm.

THAT CONCLUDES THE FIFTH YEAR OF OBSERVATIONS AT THE MARSH

Again, despite rainfall being substantially below the annual average, the levels of water in the marsh are not. [NanRG = Nanimo Airport rain-gauge chosen because its recordings more closely match rain-gauge readings up at Coats Marsh than those at Somerset Farm.]





Date	NanRG	Weir pool	Lake level (cal.)
Jul. 17 2016	1306 mm	-660 mm	.027 + .212 = +239 mm
Jul. 17 2017	1277 mm	-687 mm	.185 + .212 = +397 mm
Jul. 17 2018	1143 mm	-671 mm	.202 + .212 = +414 mm (extrapolated)
Jul. 17 2019	1043 mm	-619 mm	.225 + .212 = +437 mm (extrapolated)
Jul. 17 2020	864 mm	-473 mm	.336 + .212 = +548 mm (interpolated)

 $\underline{\text{July 21, 2020}}$ (day 1830, 1827+3): NanRG cum. 0.0 mm (norm. 4 mm), Weir +158 mm WPB scale. Cistern +168 mm SCB.

[cal. datum: weir -0.489 m, cistern +0.535 m, Δ = 1.02 m]



Pond leveller has stopped running and the beaver(s) have stopped flow over the baffle. All very quiet.

Wood nymphs (Cercyonis pegala ssp. incana) which are red-listed in BC. In the clearings, very dark brown. They flutter from place to place rather slowly and are easy to follow through the tall grasses, "winking and blinking" when they alight before the camera is ready and then closing their wings "like hands held with their palms together" [Who has seen the wind, W.O. Mitchell].

In just a few days it seems the

hairy cats-ears and kindred species have taken over the invasion from the oxeye daisies. Buzzing bees and hover flies (Syrphidae) moving busily from flower to flower very much liking the change.

<u>July 28, 2020</u> (day 1837, 1827+10). NanRG cum. 0.0 mm (norm. 16 mm).

Water-level observations
reduced, I don't need
more data and taking
regular readings
sometimes creates
unnecessary disturbance.

The RDN are going to add another pond leveller.





Some people call the Syrphidae, those colourful flies that mimic bees and wasps, "flower flies", but others call them "hover flies" and here perhaps is one left demonstrating why. With yellow fuzz on its face it might be Eristalis flavipes, but then again with an uncountable number of wings and long antennae it might actually be a bumble bee. All I know is that the flowers are tansy ragwort in a burn-pile clearing.

Below are a couple more no-common-name visitors to these unwelcome plants. Once in a while they'll encounter a camouflaged web-less all-yellow crab spider (Thomisidae) seen here crawling out of my tansy ragwort collection bag.

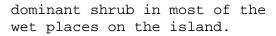






Another "wort" often seen these days is feverwort, better known as centaury (Centaurium erythraea). Its lilac-pink flowers in the margins of trails are a welcome sight.





Lorquin's admiral that's been in the wars, one hind wing missing, other wings ragged, but with vital organs intact and able to fly like a pro, sharing the stage with cinnabar moth caterpillars.

There is still at least one pied-billed grebe together with a few mallards on the lake though they're not easy to spot now they're in their drab summer plumage.

Very few dragon- or damselflies, and no bats or swallows in the summer evenings. island-wide phenomenon.





Hardhack (*spirea*) still very common but less so it seems than a few decades ago when its impenetrable thickets were the



Odd. Doesn't appear to be an

<u>July 31, 2020</u> (day 1840, 1827+13). NanRG cum. 0.0 mm (norm. 19 mm).

Rain in July 33% below long-term month's average, but variations this time of year are commonly large.
Annual total so far 9% below average.

Some days on these hot sunny days, crushed dead leaves underfoot are all that breaks the mid-day silence.

<u>August 5, 2020</u> (day 1845, 1827+18). NanRG cum. 0.0 mm (norm. 23 mm).

Yellow-faced bumble bees (Bombus

vosnesenskii), looking white-faced to me, are becoming common. This
one is on chamomile (Anthemis arvensis), which despite its familiar
name and sporadic appearance on the island, is rare in the park.
Probably from a long-gone garden. Maybe these newbie bees will change
all that.





Another newbie, Japanese hedge parsley (Torilis japonica), practically unknown five years ago, is beginning to show its invasive potential in clearings in the 707-SW CP just north of the park.

First seen on Gabriola in the Drumbeg parking lot, it now occurs along hiking, biking, dogwalking, horse-riding, and deer trails everywhere on the island.

Its seeds are covered in hooked hairs like Velcro.

Rather elegant for an invader, though they don't think so in places like Minnesota and Wisconsin where their response is "if you see it, kill it".

September 3, 2020 (day 1874, 1827+47): NanRG cum. 43.7 mm (norm. 37 mm), Weir +46 mm WPB scale. Cistern +55 mm SCB. [cal. datum: weir -0.601 m, cistern +0.422 m, Δ = 1.02 m]

Rain in August 58% above long-term month's average but annual total so far 6% below average. Nothing extraordinary.



Lake looking good. Insects back to their more usual abundance. Dragon flies hunting among drifting thistle down.



Seems like more summer resident ducks than usual, but hard to see them when they're among the watershield in bright sunlight; most or all are mallards, the grebes no longer to be heard.

Common bladderwort (*Utricularia macrorhiza*) flowering at the edges of the lake. Such a curious plant; floats with no roots, traps aquatic invertebrates for food, and is pretty with it.





Townsend's vole at the edge of the trail, not the best place for it to be.

September 9, 2020 (day 1880, 1827+53): NanRG cum. 43.7 mm (norm. 43 mm)

Neighbour report:

"...insects and land birds fewer this year. Some bats over the lake in the late evening. Also a few swallows, one pair breeding, but fewer than normal. No red-winged

blackbirds for some time [second such report]. No mosquitoes to speak of this year, unusual. Pollinators may also have been reduced in numbers. Cool wet weather earlier in the year to blame? Beaver(s) absent for a few weeks but that sometimes happens."

Blue smoky haze yesterday from extensive wildfires down south.

<u>September 11, 2020</u> (day 1882, 1827+55): NanRG cum. 43.7 mm (norm. 45 mm)

Speaking of blue, more smoke again today, a pleasant surprise, chicory. A common flower of dry waste places to be sure and very



common on Vancouver Island but not over here. By the roadside in the East Path Creek catchment area.

Visited the two springs (re)discovered early this year at the east end of the lake near the park entrance (File: 668). As expected, neither was flowing and the area was dry, but standing water could be seen in the holes about 60 cm below the soil surface, about level with the lake. SW spring on the left; NE spring on the right.



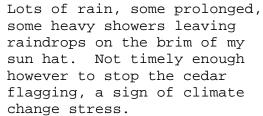


September 19, 2020 (day 1890, 1827+63): NanRG cum. 47.2 mm (norm.
57 mm)



More than a dozen ducks out on the water - maybe widgeons, and a juvenile wood duck. Having wood ducks breeding at the marsh is a significant indicator of the need for vigilant protection of the riparian areas of the park because along with the hooded mergansers they nest in tree cavities away from the water.

<u>September 28, 2020</u> (day 1899, 1827+72): NanRG cum. 100.3 mm (norm. 76 mm)



Once in Jamaica I saw a traffic controller, ill-equipped for the job, using branches of foliage like this in lieu of stop-and-go red and green flags.

Rose hips and arbutus berries on display, but both outdone by the honeysuckle. They ought to be edible, though as far as I know, they aren't.

October 1, 2020 (day 1902, 1827+75): NanRG cum. 100.3 mm

(norm. 83 mm), Weir +61 mm WPB scale. Cistern
+42 mm SCB.

[cal. datum: weir -0.586 m, cistern +0.409 m, $\Delta = 1.00$ m]



Rain in September 32% above long-term month's average but annual total so far 4% below average. Despite the rain, the lake level is still falling with no inflow yet and losing 2-3 mm/day in evapotranspiration in the warm sunny days.

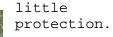
Of the two "minor" species of coniferous trees in these woods, grand fir (Abies grandis) and

western hemlock (*Tsuga heterphylla*), it's hemlock that is easiest to overlook.



Grand fir, or balsam as some call it, is easily recognized even at a distance by having dark glossy-green needles all growing in horizontal planes, not poking out of the twigs in all directions like those of the Douglas-firs. They're not deep-shade trees and are frequently seen along the edges of the open-to-the-sky "highways" through the parks where it's too dry for cedars. Grand firs are flourishing, thanks in part to the absence of even low-intensity wildfires

against which their thin bark offers





Western
hemlock
contrastingly
are scarce
and you often
have to trek
through the
salal to find
them in
places to
their liking;
not too dry
and not too
wet.

They can be as tall as Douglas-firs, but their droopy tops are only

occasionally seen on the skyline.



Deep in the forest their form is harder to see, and looking for feathery foliage with stubby unequal-length needles, whitish on the underside, is the way to ensure you're looking at a hemlock.

They appear to be a species in decline, possibly due to climate change; they prefer the cooler places on Gabriola; they also like rotting logs and stumps for their seedlings and past logging

operations in the park have not left enough of those.



With pink on my mind, attention-catching bracket fungus on a decaying fir stump. Leptoporus mollis.

I can't leave this topic without mentioning a third minor coniferous species that likely does grow in the park, but I just haven't found an example yet. This photo was taken about a kilometre away from the end of the Marsh Trail. It's a western yew (Taxus brevifolia). Its ragged, graceless form and peeling bark with a purplish-red inner bark is a dead give-away.

October 6, 2020 (day 1907, 1827+80): NanRG cum. 100.4 mm (norm. 97 mm).



fungus on a decaying fir stump. White, but with pink tint. Perhaps



Another white mushroom I see this year that I'm not that familiar with is, what I think is a western pine mushroom (Tricholoma murrillianum). I hesitate to be sure because there is on Vancouver Island and may be here too a deadly poisonous close look-alike Amanita smithiana.

With peeling bark in mind, came across a small group of trees right by the lake side with just that.

Twenty plus feet high. No idea what they were.

Seeing the leaves only deepened the mystery. They looked like Douglas



maple leaves; but the bark of Douglas maple trees doesn't look anything like what I was looking at.

Experts who kindly responded to my call for help were sure it wasn't a native tree, and an uneasy-consensus settled around sycamore maples (Acer pseudoplatanus), which are occasional escapees from botanical gardens and city parks. But that didn't seem right for these very old trees.



Back to the site for more observations. No evidence anywhere on the trees, in the litter, and from being on my hands and knees for ten minutes and scraping through the duff with my fingers, no evidence of even s single helicopter seed.

No evidence either of pendulous inflorescence, the flowers were in hemispherical clusters. And the leaves were alternate. In short, the trees I



was standing under were not any kind of maple (Acer spp.), domestic or foreign.

The only explanation, confirmed by the helpful experts at E-Flora BC, was that these are not trees at all, but are very exceptionally large shrubs, namely, ninebarks (*Physocarpus capitatus*).

Fall colours are usually the end-of-life colour of leaves, but it's been a strange year, and the showy orangey-pink tips of a few evergreen huckleberry plants are looking like the newgrowth of spring. These on Foxglove Down.

There are a few ducks on the lake, summer residents, but too far away to identify.

October 15, 2020 (day 1916, 1827+89): NanRG cum. 182.5 mm (norm. 127 mm).





Lots of activity at the lake. Flock of around thirty to forty very-healthy-looking Canada geese in transit from habitat that's frozen and snow-covered in winter. They're the "western" subspecies, originally native to the interior of the continent. They usually only stay for a few days. They're noticably more shy and less vocal than the locals.

Ring-necked ducks, three of them, resting after their long migration from back east. Not at all interested in having their picture taken.



These are the first to arrive. They and more will be with us all winter.

And the wood ducks still here. Two that were seen foraging together, both females.





Fall means funghi. The perspective from down on knees on the 4-foot of East Path was interesting.

Two very small saprotrophic species, one looked from above the same size, shape, and colour of the ripe seeds of an arbutus tree; <10 mm across, probably vermillion waxy-caps, *Hygrocybe miniata*. The other species only slightly bigger

(15 mm) but still young, conifer tuft, again "probably", I'm no expert, Hypholoma capnoides.

October 20, 2020 (day 1921, 1827+94):
NanRG cum. 194.4 mm (norm. 146 mm).

Laccaria lacata described in one of my field guides as being very common, with inferior taste, and growing on

poor soil in waste places. Hmm... oh! what the heck! I photographed them anyway.

On mossy ground in open woods, scattered but sometimes strikingly numerous in patches.

November 5, 2020 (day 1937, 1827+110): NanRG cum. 268.2 mm (norm. 219 mm).





Rain in October 9% above long-term month's average bringing annual total so far 2% above average.

Coats Marsh Creek and Little Creek are running. Haws, ruby-red and the colour of Burgundy wine. On them exotic hawthorn trees.

November 9, 2020 (day 1941, 1827+114): NanRG cum. 275.2 mm (norm. 239 mm).

Buffleheads on the lake. Gloomy, and squelchy underfoot.



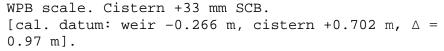


November 18, 2020 (day 1950, 1827+123): NanRG cum. 384.8 mm (norm. 288 mm).

Every creek in the district running strongly. It's raining like it used to do in the old days.

The beavers have stuffed the end of the pond leveller with carefully placed pointed sticks. Engineers and environment managers too! Bully for them.

November 22, 2020 (day 1954, 1827+127): NanRG cum. 391.5 mm (norm. 311 mm), Weir +381 mm



Soft rain. No sign of any ducks on the lake. Just a large swooping, swirling, dense flock of small song-birds passing by. Pine siskins in transit.

Flocks of small birds in winter are becoming more common than they were twenty years ago. Often see groups of dark-eyed juncos now flirting their white tail flight feathers, and often hear a flock of cheeping chickadees and co. hidden away among the trees, sometimes curious and quite fearless if

you stand still and greet them. They're smart birds. Rough-skinned newts wandering I'm told and frogs still croaking.

November 27, 2020 (day 1959, 1827+132): NanRG cum. 397.9 mm (norm. 340 mm).

Raft of ring-neckeds on the lake. At least twenty. Unusual behaviour though, moving as a pack, like a crowd of tourists following their tour guide, not spread out over the lake with the readers-in-a-library look of the usual winter residents.

December 6, 2020 (day 1968, 1827+141): NanRG cum. 413.1 mm (norm.
394 mm). Weir +347 mm WPB scale(-0.300 m).

Rain in November 13% above long-term month's average bringing annual total so far to 1% above average.

<u>December 25, 2020</u> (day 1987, 1827+160): NanRG cum. 564.2 mm (norm. 499 mm). Weir +402 mm WPB scale (-0.245 m).

Ring-neckeds and trumpeter swans. Water everywhere.



January 2, 2021 (day 1995, 1827+168): NanRG cum. 670.8 mm (norm. 548 mm). Weir +579 mm WPB scale (-0.068 m), has been within inches of flooding the deck but it's staying dry. Water

flowing freely over the beaver dams, they should be on the RDN payroll they do such a good water management job.

Rain in December 16% above long-term month's average bringing annual total for 2020 to 4% above average, which is average, the normal onesigma variation being about ±17%.

Many ring-neckeds but only one bufflehead to be seen.



January 3, 2021 File: 673v



Little Creek, which usually seeps out-of-sight through the sub-grade of the Three Gates Trail, occasionally gets pushy, but it usually only lasts a few days. Here, it's seen flowing west (right) where it will join the Stump Farm Number 1 Stream before joining Coats Marsh Creek on its way to Hoggam Lake and to the sea whence it came.

An inconvenience to no-one but those who prefer *ordentlich* city parks and who can't afford a pair of good Canadian-made Wellington boots. ◊

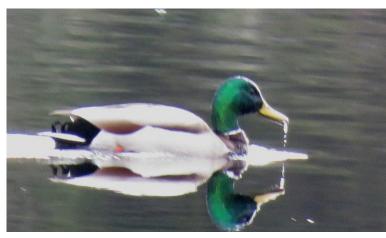
Next file.
Previous file.

December 31, 2020 (day 1993, 1827+166): NanRG cum. 630.9 mm (norm.
535 mm).

<u>January 31, 2021</u> (day 2024, 1827+197): NanRG cum. 860.8 mm (norm. 723 mm).

Rain in January 33% above long-term month's average. A wet month. Trails a veritable quagmire in places.

<u>February 28, 2021</u> (day 2052, 1827+225): NanRG cum. 926.3 mm (norm. 849 mm).





Rain in February 46% below long-term month's average. You win some, you lose some.

A disappointing development is the decision by the Local Islands Trust Committee (LTC) to drop the creation of a P4 Land-Use Zone from its high-priority work list. P4 would have been a Park zone, which unlike all the existing Park zones (P1-P3), would give priority to wildlife habitat over human recreational usage, the Coats Marsh RP being among the three candidates on the island for such a new zoning, the other two being S'ul-hween X'pey (Elder Cedar Nature Reserve) and a littleknown Burren's Acres Nature Reserve.

That the LTC with a "preserve and protect" mandate on "environmentally-friendly" Gabriola does not have such a zoning tool is a depressing anomaly.

In the view of the park managers of the Regional District of Nanaimo (RDN); the Nature Trust (TNT) of BC; the Gabriola Land and Trails Trust (GaLTT); and seemingly by omission the Parks and Open Spaces Advisory Committee (POSAC), there isn't enough of Gabriola's forested areas set aside for human usage, and Coats RP they maintain should make 50% of its area available for dog-walkers, bikers, horse-riders, and the potential for establishing new trails regardless of loss of undisturbed wildlife habitat, and in spite of a Park Management Plan for the RP that in spirit at least unmistakably sets aside Coats as primarily a nature reserve ideally suited for P4 protection.







Look forward to fewer breeding blue-winged teals, fewer breeding wood ducks, fewer breeding hooded mergansers; more non-migratory mallards and more Canada geese from the mainland habituated to human activity; less solitude; more lawn-weeds along the edges of trails and in the 4-foots; less interest in the natural history of the place as it becomes to be seen more as a fresh-air gym; and more special-interest groups, including I guess people like myself, arguing about their right-of-usage on over-crowded, rutted, de-facto "multi-use" trails named and signed like city streets, as Coats Marsh RP progresses toward becoming, not a wilderness area given over to the needs of nature, a place to explore and discover, but just another urban-style park.

Dropping the P4 project for the time being has meant no progress on eliminating the boundary that makes absolutely no sense ecologically between Coats Marsh East (now in the 707CP) and Coats Marsh RP which runs right through the eastern end of the lake.

On the other hand, welcome progress was made when the leftover remainder section (REM) of Coats Marsh East, potentially hosting a residence deep in the woods with a driveway through to Stanley Place, was added to the park by handing over money to the developer.

Top: REM NW corner looking from the east. Now redundant.

Middle: From the REM SE corner looking north. East boundary of Coats Marsh East.

Bottom: Enigmatic flagged point 50m NE of the REM NE corner, which puts it just outside the REM in the middle of the NE Arm wetland, which is not a good place for a trail.

Sincere thanks to the RDN and to GaLTT for quietly getting on with this and protecting at least a part of the East Path Creek catchment area and eliminating the need for a new trail around this anomalous REM.

The REM boundaries have been heavily taped over the years. Developers' surveyors like red and orange; the realtor surveyor pink; the RDN blue with a second reddish colour; and GaLTT usually uses yellow. GaLTT does nowadays thoughtfully mark the tape to indicate who owns it. People who put up plastic tape in the woods anonymously for no readily identifiable purpose are not always very interested in taking it down again when it's done its job, whatever that was.

Arbutus is suffering badly this year and the NE Arm wetland is unusually dry for March.

March 31, 2021 (day 2083, 1827+256): NanRG cum. 957.3 mm (norm. 969 mm).

Rain in March 72% below long-term month's average. This winter (last six months) precipitation has been 2% below long-term average, but the total for the first three months of this year has been 19% below average despite the heavy rainfall in January. February and March have been very dry.

Ominous news is that Canada geese seem to be settling in on the lake. They can become very aggressive toward other waterfowl in the breeding season, worthy of being regarded as an invasive species.

<u>April 8, 2021</u> (day 2091, 1827+264): NanRG cum. 958.3 mm (norm. 986 mm).

...speaking of which, it's not just salal and Oregon grape that are threatened by <u>daphne laurel</u>, which thankfully I've yet to see in the park. These are white fawn lilies whose habitat is threatened



elsewhere on the island. Fairy slippers are threatened this way too.



The violet-green swallows have arrived at the lake.

<u>April 18, 2021</u> (day 2101, 1827+274): NanRG cum. 963.6 mm (norm. 1002 mm).

All creeks and the two springs dry, probably have been for several days.

No sign of bats at the bathouse at Stump Farm though they are on Phyllis Reeve's place near-by.

The fairy slippers (calypso orchids) are in flower but seem smaller than usual.

Ravens being remarkably conversational at the western

entrance. Need a microphone rather than a camera.

About ten Canada geese on the lake. These are not shy, they swim toward you, so they're unlikely to be migatory stop-overs. Aggressive urbanites? accustomed to being fed?



<u>April 30, 2021</u> (day 2113, 1827+286): NanRG cum. 979.5 mm (norm. 1011 mm).

Rain in April 64% below long-term month's average. For a while there it looked like we were going to break the record set in 1973 when it was 92% below average. Total for the first four months of this year now 25% below average.

 $\underline{\text{May 2, 2021}}$ (day 2115, 1827+288): NanRG cum. 979.5 mm (norm. 1014 mm).





The few-millimetres-at-a-time showers in late April have brought out May flowers and a welcome buzz of 4-winged bumble bees and their 2-winged mimics (*Eristalis flavipes* with tell-tale reddish-orange band; you try counting wings to detect the difference). Violets yes, but the park lacks the sandstone flats and rocky bluffs that are the abode of shooting stars, sea blush, blue-eyed-Marys, and white fawn and chocolate lilies this time of year.

Band-tailed pigeons, most often seen along South Boulevard just across the border in the 707-SW CP. Shy but given to chattily cooing.

I've taken down flags between Posts 75 and 83. Old (brittle and faded) orangey-red tape. Probably put there before the REM purchase.

May 5, 2021 (day 2118, 1827+291): NanRG cum. 981.9 mm (norm.
1019 mm).

Pied-billed grebes are back. Their attention-grabbing calls unmistakable; sometimes rivalling those of peacocks.

I remember two years ago there was concern over the die-off of salal with no consensus as to what was causing it (May 11, 2019). I had the impression back then that salal along the edges of trails was suffering more than plants deeper in the woods. At the time my speculation was that perhaps the trails were acting as wind funnels carrying the fungal spores.

This year it's arbutus (Pacific madrone, Arbutus menziesii) that is suffering badly. Perhaps caused by a leaf-spot fungus like Elsinoë mattiroloanum (in BC?) or Phacidiopycnis washingtonensis (in WA for sure); more than a dozen other possibilities. It's not a new foliar blight, just very bad this year. Maybe worsened by the well-above-average, but not exceptional, rain in January followed by a very dry February, March, and April. Mean spring temperatures have been normal with a brief -7°C low on Feb.12 with snow for a couple of days after.

Clues: — it starts as dark leaf spots, each becoming visible on both sides of the leaf as the tissue between the veins is thinned;

- the veins are also afflicted;
- the discoloration spreads from the spots and turns the whole leaf dark-brown;







- the leaf eventually drops off, usually intact but shriveled;

- the dead leaves and leaf-litter are sometimes "dusted" grey;

- the pathogen seems to affect both leaves and their stems (petioles);

- the lower leaves on the tree suffer most. Could be that it spreads upwards from the ground, but then again it might just be that the micro-climate at the crown of the tree is not so pathogen-friendly, or alternatively, the resistance and annual growth at the top is more vigorous. Less-than-knee-high seedlings are devastated; - similar but not identical spots are seen on salal (Gaultheria shallon) but salal isn't suffering anywhere near as much this year and it may be due to a different species. Many leaf-spot funghi are

narrowly hostspecific; badly affected branches may still bear healthy flowers - new growth is only lightly affected which bodes well for the survival of the taller trees;

- it seems to be everywhere, no tree seems unaffected no matter how isolated it may

Note in this view, which is fairly typical, bare branches at the bottom, brown leaves further up, and the year's new growth at the top.

Picture of leaflitter and duff next page.

On closer examination describing dead leaves you sometimes see as being "dusted"

is misleading. The "grey" is more like the crustose lichen that you see on alder bark; impossible to rub-off with your finger. The leaves most affected are desiccated and brittle. Under a microscope, the "grey" looks like surficial flakes made up of grains of powdered sugar (epidermal cells on the remains of the cuticle) and on soaking in water and drying you see hairs (fungal mycelium?), still only coating the surface though.





A secondary dead-leaf decomposer perhaps? A distraction? I'm out of my depth here.

Microscope snap shots next page.



Fine "hairs" like this only observed in the "grey" areas. The "red fringe" opposite middle may or may not be the same; my microscope is not good enough to be sure of that.

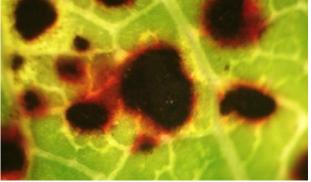


Some spots look tar-like but smaller and less so than those caused by *Rhytisma arbuti*.



Above: Not apparent in this 2-D picture is that some of the darker-brown areas have been hollowed out leaving veins standing proud (spongy mesophyll gone?).

Below: Features on the floor of the hollows viewed from the top surface of the leaf may be surviving remnants of the guard cells that were around the stomata on the lower surface.





Above:seen in transmitted light Below the same area in reflected light.



CAUTION: I am NOT an expert on plant biology. Please do not cite me as one. Comments are speculation only and may be completely inaccurate and have not been reviewed by anyone who is an expert. Help would be appreciated.

May 15, 2021 (day 2128, 1827+301): NanRG cum. 988.8 mm (norm.
1036 mm).

A delightful, brisk day, the unruly wind strong enough to buffet the shubbery and sway even the lowest branches of the trees thereby hiding my movements from watchful eyes out on the lake. A duck with ducklings, balls of fluff scuttling about in all directions but tied to mother as if by the force of gravity. Without alarming them, I watch her and her family busy among the reeds at the water's edge. A hooded merganser, the sun in my face isn't helping me see and my camera is useless in this light. Dragonfly wings are coruscating.

The ever-present danger this time of year is that if you force the



young ones out into the open, they become easy prey for the eagles. Humans, including myself, need to severely ration their presence here.

Looking at last May's pictures, I noticed one that might have been a blue-winged teal. But no, the blue on her wing too blue, a MS WINDOWS bluescreen blue. More likely a mallard. Haven't seen a teal at the marsh for two or three years now.



Very scarce this year are monkey flowers, and I've yet to see a river of blue forget-me-nots that usually grow in the dried-out rivulets.



The bat house at Stump Farm is vacant again. The bats preferred the cottage and old barn. Swallows seem fewer than in earlier years too; not sure about the insect population, which was definitely down last year. Have to ask the redwings.



Wild strawberries (Fragaria virginiana) are doing well though increasingly having to compete for their share of the trail-side habitat with English daisies and other lawnloving miscreants.



Blossoms on the Oregon grape are "noticable" this year, but strangely, there're hardly any on the big-leaf maples.

May 20, 2021 (day 2133,
1827+306): NanRG cum. 989.0 mm
(norm. 1044 mm). Evening.



















Lots of grebes, song sparrows, mergansers, swallows, and redwings (that's a female). The swallows appear to be constantly on the move, but they do make brief stops on snags, usually always the same one in shallows not easily accessible from the shore. They all share the same snag, so there can be quite a gathering there from time-to-time.

 $\underline{\text{May 24, 2021}}$ (day 2137, 1827+310): NanRG cum. 990.2 mm (norm. 1050 mm).

Spots of rain pitter-pattering on the salal. Camas blooming, just a few plants, but a cheery sight nevertheless. Surviving arbutus shrugging off the fungal infection. Pond leveller is dry.







Broom, a shrub of heaths and moorlands, and on Gabriola the fringes of soil-less sandstone plains, anthropogenic wasteland, roadsides, and sandy infertile soil left by the rivers of meltwater at the end of the last ice age. We're lucky to have broom here rather than gorse (furze). Gorse, a similar species to broom, grows in similar habitats, but comes armed with vicious thorns. I remember it with great hostility on the Commons of my childhood in England.

Picture taken in May 2016 in one of the burn-pile clearings in the park before being bashed by that other invasive species. There's very little broom blooming anywhere in the park this year, but undeterred seedlings continue to push up through the grass in the clearings and at the Stump Farm site.

May 30, 2021 (day 2143, 1827+316): NanRG cum. 1001.0 mm (norm. 1059 mm), Weir +195 mm WPB scale. Cistern +171 mm SCB. [cal. datum: weir -0.452 m, cistern +0.538 m, Δ = 0.99 m].

Water levels at the lake quite normal. Beavers are good water managers.

<u>June 1, 2021</u> (day 2145, 1827+318): NanRG cum. 1001.0 mm (norm. 1062 mm).

Rain in May 51% below long-term month's average. Total for the first five months of this year now 28% below average.





No, not another picture of a dead leaf; some kind of Geometrid moth, a *Pero mizon* maybe, looking a bit uncomfortable in the broad daylight.

Small grey-to-brown mouse, very long slate-grey furry tail with some white underneath. A Keen's mouse? Been killed, possibly by an owl or raven. It was gone the next morning.

Not just Oregon grape blooming prolifically this spring, are too the wild roses and the salals with their bell-flowers arrayed like dropples on a twig or the brim of

sun-hat caught out in a sudden shower.



<u>June 4, 2021</u> (day 2148, 1827+321): NanRG cum. 1001.1 mm (norm. 1067 mm).

To develop a knowledge of moths I'd need another lifetime. The Pacific coast alone has over three thousand species. This time of year, the most oft-seen in daylight-visits is the small white glyph moth, Protodeltote albidula. They hang out in numbers in wet grassy places, especially where canary grass grows.



Not the best of fliers; easy to follow when disturbed; but they seldom settle after a short flutter in a way that suits the camera's eye.

Another I see is the ocean-spray fairy moth, Adela septentrionella, with its ridiculously long antennae; what use are they? Right now, ocean spray is not yet out, but oxeye daisies appear to do while they wait.



From the trees an aspirated "hwit" from a Pacific-slope flycatcher (I think), but will it pose for the camera? no it won't.

A lone male wood duck, and a mallard supervising a large family on the lake.

Heard a sad tale of how within living memory there were hundreds of ducks and other water birds on Gabriola's wetlands.





Occasional duck hunting by long-time residents was not unusual. Now all gone because of drainage, development, and loss of undisturbed habitat.



What's left in Coats Marsh is just a vestige of what used to be.

<u>June 14, 2021</u> (day 2158, 1827+331): NanRG cum. 1036.7 mm (norm. 1082 mm).

A female wood duck (next page) with two, possibly three, young ones.
Proof positive that they breed here. Wood ducks nest in tree cavities away from the water, so





maintaining a generous protective buffer zone around the lake is an important habitat conservation issue for them.

Twin flowers everywhere; tropical-looking honeysuckle; and a blue dasher, a name



that is a little behind the times, the "blue" being the colour sported only by mature males. And if you were wondering about the blue dasher's scentific name Pachydiplax longipennis, it refers to their "long wings".





Although common in North America, blue dashers are a dragonfly species whose survival is of concern in BC (blue-listed).

And woodland tarweed (Anisocarpus madioides), a strange alien





but native plant, this one with fifteen separate fully-functioning florets in the disc of the ray flower (in bud left, flowering right). Unmistakably tidier and pleasingly coiffed compared with that unkempt dandelion tribe. It's said to have a pungent smell but I've never detected that. My nose only senses a faint whiff of tree-sap with overtones of licorice and something they put in Pears soap.

Common along trails in the park but rare in BC outside of the Gulf Islands and adjacent Vancouver Island.

<u>June 19, 2021</u> (day 2163, 1827+336): NanRG cum. 1041.1 mm (norm. 1088 mm).

Yellowthroat warblers are back for the summer, nesting in the verdant, snaggy, and swampy fringes of the lake. New plant species in small patches amongst the towering and flowering canary grass, which is a major threat to all of Gabriola's wetlands. Bog St. John's wort (Hypericum anagalloides), a native marsh plant not to be confused with the common garden-escapee sort (H. perforatum).









<u>June 25, 2021</u> (day 2169, 1827+342): NanRG cum. 1041.1 mm (norm. 1096 mm).

A lovely strong smell of mint at the old Stump Farm site, near the water hole in the now-dry stream-bed.

A red clover blossom near-by, just one not headline news, but I





almost never see the red variety away from the farms at the south end.

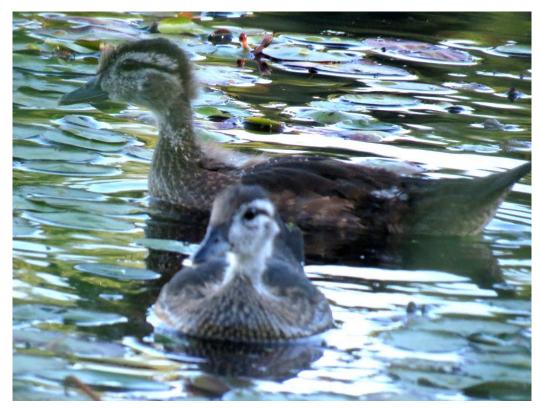
Cooley's hedge nettle in



can find it so in the RP. I know there are extendedfamily patches in damp

places in the Little Creek catchment area, but my luck in finding them within the RP itself has not been good. The species has no ambitions of becoming invasive.

Lots of dragon and damselflies this year. The dragon flies sometimes seem to have mastered the art of flying more than any bird. Just watch the "catch-meif-you-can" dances of the skimmers as pairs thread between the sheltering snags at a speed and with a dexterity that no avian predator could match. Only elite NHL hockey players can evoke the same "did you see that!" kind of admiration.











Other dragon-fly species hover assertively just a few feet in front of your face, staring at you, but somehow aware that they should no closer go. Can't help thinking that maybe they're secret government drones looking to see if you're doing something they could tax or forbid.

Blood-red meadowhawks, possibly Sympetrum madidum (red-veined) judging by the black legs, mostly just loitering on their favorite perches. This species is well-suited to life on Gabriola in that they sometimes lay eggs in creek beds that in the summer are dry.





In contrast to the drones, the smaller damselflies show the same fearless friendliness of the chickadees, though they wouldn't appreciate the comparison, some alighting on your hand where they pose for pictures. This hatch were Pacific forktails (*Ischnura cervula*, male and female).

The blue dashers have their powder-blue outfits on.



Duck families are fine, the juveniles, not yet fully fledged but using their wings as they skitter across the watershield. Several families with at least six surviving ducklings.

The clearings all white with daisies, some with matching white foxgloves. Yellow hairy cat's-ears in between.

June 28, 2021

The air is hot (40°C max.) and dry (RH 21% min.). Hardly a breeze; no suthering from the canopy; no shadows of leaves dancing on the bare-bone trails; and no hint of air fresh from a journey over a wavy sea. There's just sun, and yet more sun.

The tall canary grasses with their long needle-thin stems are top-heavy with inflorescence. Most stand still, but some gently sway in local thermal turbulences, whilst others nod in response to visits by passing insects.

The greenswards are browning, some bread-crust brown; others more golden like Corona Extra, a Mexican lager; and as the grasses

bleach, still others are turning the cloudy yellow of a Bavarian weißbier. And their multitude of seed heads endlessly quiver in a macro version of Brownian motion.

The shrubbery is for long periods motionless, seemingly smugly remaining green in the coolness of the understory, but despite its bravado, the berries there are sparse. Once in a while there's a frond that flaps and vibrates with vigour, driven by a faint flow of air that for fleeting





moments is exactly right to excite in it an animated resonance.

July 2, 2021 (day 2176, 1827+349): NanRG cum. 1041.1 mm (norm. 1105 mm).

Rain in June, all in the first half of the month, only 2% below long-term month's average.
Almost as normal as it gets. Total for the first six months of this year now

26% below average.
Weir 60 mm WPB scale. Cistern +78 mm SCB.

[cal. datum: weir -0.587 m, cistern +0.445 m, Δ = 1.03 m].

Have to hand dig down through mud on the downstream side of the beaver dam near the baffle to read the scale. May not be accurate.

The lake looking like late-August in early-July.

<u>July 14, 2021</u> (day 2188, 1827+361): NanRG cum. 1041.1 mm (norm. 1115 mm). Weir -38 mm WPB scale. Cistern +19 mm SCB. [cal. datum: weir -0.685 m, cistern +0.386 m, Δ = 1.07 m].

There are still young ducklings on the lake. Probably mallards, but I'm not sure. A late second attempt at a family?

I enjoy the bentgrass this time of year. It grows in dense patches, its diffuse panicles with branches so spider-web thin they're hard to see. The purple-brown spikelets small, appearing to float like specks in a shaft of sunlight, the whole so airy you can see right through it, like the cluster of galaxies (ACO)

S 295) seen by NASA's Hubble Telescope. Impossible to capture in a 2-D image.

Douglas-firs are showing unusual red-flagging this year, especially those exposed to the sun along the open stretches of the main trails.

The arbutus have fully recovered from their fungal attack.

<u>July 16, 2021</u> (day 2190, 1827+363): NanRG cum. 1041.1 mm (norm. 1116 mm). Weir -50 mm WPB scale. Cistern +8 mm SCB. [cal. datum: weir -0.697 m, cistern +0.375 m, Δ = 1.07 m].







 $\underline{\text{July }17,\ 2021}$ (day 2191, 1827+364 = 2192-1): NanRG cum. 1041.1 mm.(norm. 1117 mm). July to July rainfall is -7% below normal, not at all unusual.

```
Date
              NanRG
                        Weir pool
                                    Lake level (cal.)
Jul. 17 2016 1306 mm -660 mm
                                    .027 + .212 = +239 \text{ mm}
                                    .185 + .212 = +397 \text{ mm}
Jul. 17 2017 1277 mm -687 mm
Jul. 17 2018 1143 mm -671 mm
                                     .202 + .212 = +414 \text{ mm (extrapolated)}
Jul. 17 2019 1043 mm -619 mm
                                    .225 + .212 = +437 \text{ mm (extrapolated)}
Jul. 17 2020 864 mm
                        -473 mm
                                    .336 + .212 = +548 \text{ mm (interpolated)}
Jul. 17 2021 1041 mm -702 mm
                                     .158 + .212 = +370 \text{ mm}
```

The contrast between 2018-2019 and 2020-2021 is interesting. Despite the almost identical amount of precipitation over the annual seasons (July to July), the lake level is down this year. A reflection maybe of the fact that this season, more of the rain fell in winter, so runoff was greater, and the spring has been dry and hence evapotranspiration higher. It's hard to capture the vagaries of weather with statistics.

THAT CONCLUDES THE SIXTH YEAR OF OBSERVATIONS AT THE MARSH \Diamond Previous file. Next file.

July 20, 2021 (day 2194, 2192+2): NanRG cum. 0.0 mm (norm. 1 mm).

LAKE LEVEL summary from 2010 onwards with comments on the beaver dam has been added to File 673 and can be found in File 673b.



The dry weather is distressing some of the Douglas-firs, which is unusual, but most so affected live in the upland drier areas in the



adjacent 707CP, places where there are no cedars, and along old logging roads, now major trails, that have been opened up to the sun.

Flowering Cooley's hedge nettle along Little Creek. No need to grasp it to see if it stings. Also an "orange dandelion". First saw it when



camera-less in late-June, a few days later the orange flower had confusingly been superseded with yellow ones. Little idea what species, probably exotic, i.e. another European weed, possibly a hawkweed, *Hieracium aurantiacum*, the devil's paintbrush, but yellow? I'll leave it off the species list for now. Incredibly hairy plant (appealingly so I think). Just one, so far.

July 25, 2021 (day 2199, 2192+7): NanRG cum. 0.0 mm (norm. 11 mm).



Bats are back at the Stump Farm site. Unexpected.

"...Sometimes bats use different roosts early in the season and then switch to a maternity site so this would be quite in line with that behaviour."

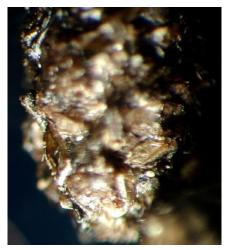
Vanessa C.



Mice or bats?

Guano full of the undigestible parts of flying insects settles that.

I tried growing gooseberries once, but although the plants were happy, so were the species of something that liked to eat their leaves. I can still spot a gooseberry leaf a mile off though.





Although no berries, I think this plant is a black gooseberry (Ribes lacustre). East Path Creek riparian area. Young growth very bristly with vicious spines at the leaf nodes. [see Aug.4, mabe R. lobbii]

Cooley's (left) and water-plantain at the lake (right), which is not







It lives in the lake's parafluvial fringe, and there are both native and exotic broad-leaf species, hard to differentiate. This one is probably an import. Would not be surprising given the lake's history. Some are more than 170 cm tall.

<u>July 28, 2021</u> (day 2202, 2192+10): NanRG cum. 0.0 mm (norm. 16 mm). Weir +100 mm WPB scale. Cistern -52 mm SCB. Evening. [cal. datum: weir -0.547 m, cistern +0.315 m, Δ = 0.86 m].

Weir-pool level is strange.

From day 2190 to 2202 (12 days) change in level +150 mm (+13 mm/day).

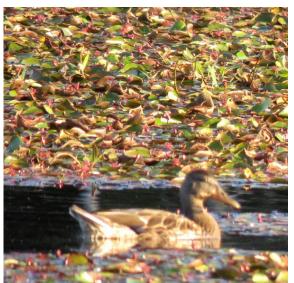
Cistern

From day 2190 to 2202 (12 days) change in level -60 mm (-5 mm/day).

In the absence of precipitation, a rise in the weir-pool level can be attributed to one of two causes: a leak in the beaver dam, or an observational error. The loss of -5 mm/day at the cistern is high but still consistent with established evapotranspiration (EV) loss at the marsh (File: 673t) given how hot it has been.

Assuming that the EV loss was the same both sides of the dam, the rise at the pool seems to have been +150 + 60 = 210 mm. Quite a substantial influx of water. There is currently no outflow possible from the weir pool into Coats Marsh Creek.

The problem was solved when today I discovered that the RDN had, on



July 23, installed a second waterlevel gauge on the outside-side of

the dam. You have to cross the dam to access it, something I am normally reluctant to do because it often disturbs waterfowl, which this summer are still around

though hard to spot in their eclipse plumage among the aquatic vegetation.

My surmise is that at the same time as they installed the gauge, the RDN syphoned water across the dam, simulating a leak.



The new metric gauge reading was 1265 mm, which for the time-being I take to be equivalent to my +0.315 m [calibrated] at the cistern at the east end of the lake, a difference of 0.950 m, to be subtracted from the RDN gauge to get the calibrated CWB level.

The reluctance of the RDN to share this kind of information with interested citizens is, shall I say, "regrettable". In my view, and I believe the view of residents along Coats Marsh Creek, re-engineering the work of the beavers at the dam is quite unnecessary. The priority should be making the old wooden baffle more secure; lifting it used to completely drain the marsh and it's going to have to be replaced some day to avoid such a catastrophic ecological event. 1



Path *right* is the top of the dam, which is stabilized by vegetation. The gradients of creeks running into the shallow-water wetland (East Path and NE Arm) are low, making for a low-energy environment overall.

<u>July 30, 2021</u> (day 2204, 2192+12): NanRG cum. 0.0 mm (norm. 18 mm). RDN outer gauge 1260 mm. [cal. +0.310 m].

If we take the relative areas of the weir pool and the outer area into account (~ 20) , evapotranspiration loss² seems to be -4.2 mm/day with a

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¹ I also wonder, not being able to read the engineering report, why failure of the wooden baffle was deemed nothing to worry about on the grounds that rot of wood underwater in anaerobic conditions was a slow process; yet, this same consideration did not apply to the beaver dam.

Normal" mid-summer evapotranspiration loss is around -3.5 mm/day.

 ~ 10 mm drop in the level of the main area and ~ 200 mm rise in the weir pool due to the recent syphoning.³

July 31, 2021 (day 2205, 2192+13): NanRG cum. 0.0 mm (norm. 19 mm).

Rain in July confined to two days when drops were observed; but not enough to clean off the dust, or actually wet anything, so we can count July rainfall as being 100% below long-term month's average. We've only had such a sub-millimetre total for July four times in the last 77 years.⁴

Total for the first seven months of this year now 29% below average.



A small patch of shasta daisies in the western burn-pile clearing, a 20th-century cultivar, but, nevertheless, a refreshing glimpse of "summer snow", evocative of the summit of their name-sake, Mount Shasta in California, and reminiscent of all the 4000-plus metre summits I have known.

August 4, 2021 (day 2209, 2192+17): NanRG cum. 0.0 mm (norm. 23 mm). Everything waiting now for the rain. On looking around a bit, the black gooseberry ID (Jul. 25) could be wrong. Gummy gooseberry is more common, and the "bristles" are not golden and more like hairs.

 3 Achievable in say 1-2 hours with a 200-mm ID PVC pipe.

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⁴ 1958, 2010, 2013, and 2017. July is our driest month of the year.



Syphon intake: [4 hoses 5"OD, 0.8m head, ~87 L/s total; my guess, simulating a 200mm ID PVC pipe]

August 6, 2021 (day 2211, 2192+19): NanRG cum. 0.0 mm (norm. 24 mm).

The RDN have commenced draining the lake, for how long, and for what purpose other than conforming to their plan to install a pond leveller, the details of which are known only to themselves and certainly not to any one actually living on Gabriola and actually familiar with the marsh and with the rhythms of its hydrology and its aquatic and parafluvial environment.

All we know is that the plan was developed by Scot Merriam from SRM Projects (Sustainable Resource Mechanical Engineering and Project Management) in Nanaimo, who visited the dam and weir and "walked the creek" with Chris van Ossenbruggen from the RDN one morning in May 2020. Residents along Coats Marsh Creek downstream of the lake have expressed no concerns about the beaver dam, but how that is reflected in the plan is to this day unknown to them.

This fits the pattern in recent times of Gabriola governance authorities relying entirely on the input of off-island consultants for guidance on environmental issues, when those consultants, no matter how formally qualified or how well-meaning, do not have the time to make use of local knowledge. The inevitable mistakes that are made are characterized, for example, in the reports of the hazardous slope study (mixing up tree and ground height as a consequence of relying on photographs) and the riparian area regulation

identification (no contact with Gabriola Streamkeepers on fish-bearing streams, some of which are consequently not subject to the LTC's RARs).

The draining of the lake now going on amidst a drought that could last another two months resulting in a 300 mm evapotranspiration loss of water is potentially very damaging for the ecology of what is a shallow-water wetland rather than a lake, setting it back possibly for several years to come.



Coats Marsh Creek flowing in early August!
Carrying water from the marsh down through
the forest to Hoggan Lake where it will
eventually evaporate, be used for the greens,
run-off into the sea, or who knows, improve
the environment down there.

In places, the shoreline has already retreated six feet leaving behind numerous disoriented young frogs and stranded aquatic plants. A mature bald eagle patrolling the lake margin is also not comforting. No sign or sound of ducks.



<u>August 7, 2021</u> (day 2212, 2192+20): NanRG cum. 3.6 mm (norm. 25 mm). Weir +362 mm WPB scale. RDN outer gauge 1085 mm. [cal. datum: weir -0.285 m, RDN outer gauge +0.135 m, Δ = 0.42 m]

Coats Marsh Creek is still running at a modest pace. There is something slightly amiss with the weir calibration as the pond leveller is only trickling with its bottom just in the water while the calibrated old gauge says the level of the bottom of the leveller is at -0.450 mm and the sill at -0.640 mm. In any case, the weir pool level is still falling but the RDN syphon across the beaver dam has practically stopped draining the outer marsh. It's just dribbling at the rate of a kitchen tap. Will try to recalibrate both gauges next week.



Meanwhile, I would like to see the rationale for the RDN asserting no adverse environmental effects will occur, reportedly quoting the project biologist, Trystan Willmott from Madrone in Duncan.

<u>August 8, 2021</u> (day 2213, 2192+21): NanRG cum. 3.6 mm (norm. 25 mm). Weir +259 mm WPB scale. RDN outer gauge 1080 mm. [cal. datum: weir -0.388 m, RDN outer gauge +0.130 m, $\Delta = 0.52$ m]

Coats Marsh Creek has stopped flowing at the Marsh Trail culvert, and there is no more flow from RDN's four syphon hoses. The pond leveller at the weir is still gently flowing ($\sim 0.1/L/s$), but that water is being absorbed by ponding or by infiltration in the watercourse of Coats Marsh Creek before it reaches the Marsh Trail.



Only wildlife fauna seen, nine Canada geese, presumably escaping from

the drying-up of their usual haunts.



Mats of bladderworts, Utricularia macrorhiza, in the reedy, muddy sulphurous-smelling, margins of the lake. Truly delightful.

August 10, 2021 (day 2215, 2192+23): NanRG cum. 3.6 mm (norm. 26 mm). Weir +259 mm WPB scale. RDN outer gauge 1075 mm. [cal. datum: weir -0.388 m, RDN outer gauge +0.125 m, Δ = 0.51 m] Syphoning stopped, two of the four hoses disconnected, no flow from

the weir-pond leveller or over the sill of the baffle, but quite

X365

strangely there is a minor flow from the drainage pipe from Lot 5 on the downstream side of the berm. Although not unknown for it to not stop flowing until August, it is unusual for it to start up in August without significant precipitation (ref: File 668, p.18).

<u>August 11, 2021</u> (day 2216, 2192+24): NanRG cum. 3.6 mm (norm. 27 mm). Weir +241 mm WPB scale. Cistern -255 mm SCB. RDN outer gauge 1073 mm. [cal. datum: weir -0.406 m, cistern +0.112 m, RDN outer gauge* +0.123 m, Δ = 0.53 m]. *with -950 mm cal., not indicated -961 mm.

The lake at the east end looking devastated. I imagined that I had never seen the portion of the lake that is outside the regional park but within the community park (go figure!) looking so dried out, but then I must have. It is even questionable whether the level at the cistern datum I have been using for years is still valid it is so far from open water. There were three low-flying vultures circling around.



One or two waterbirds seen at a distance, resident summer mallards? Elsewhere, an all-alone juvenile (pre-fledgling) diving duck (so not a mallard).

If the drought continues, the area threatens to become cloaked with rotting watershield. That's the brown stuff in the photograph nearest the shore; that's not dead tree leaves, it's former healthy habitat.

The RDN drawdown of 400~mm may eventually have added 100~days to the length of this summer's drought.



A week or so ago before draining commenced I had to wear my waders to stand where the photograph above was taken. I was wearing my town shoes yesterday. The east end of the marsh, where the experts seldom go, is relatively flat, so a small drop in water level makes a big difference to the surface area and location of the strand.

A summary of lake level measurements is in $\underline{\text{File }673b}$, a link which is not always correctly advertised. Sorry. This file also contains a summary of the history of the lake, which is not completely accurately told in the old out-of-date 2011 Management Plan that the RDN are accustomed to quoting.

<u>August 12, 2021</u> (day 2217, 2192+25): NanRG cum. 3.6 mm (norm. 27 mm). Cistern -261 mm SCB.

[cal. datum: cistern +0.106 m]

Hot and windy; making evapotranspiration uncommonly high.

August 16, 2021 (day 2221, 2192+29): NanRG cum. 3.9 mm (norm. 28 mm). Weir +174 mm WPB scale. Cistern -268 mm SCB. [cal. datum: weir -0.473 m, cistern +0.099 m, Δ = 0.57 m].

No flow from the weir-pond leveller or over the sill of the baffle, but minor flow from the drainage pipe from Lot 5 continues. Not enough to reach the Marsh Trail culvert. No syphoning. The main wetland area is now down to a level not seen since the summer of 2016.

The mood at the marsh very different to what it has been. Blue skies gave way to a patchy smoky cover and a red-complexioned sun, and now

to an amorphous, hueless grey nimbostratus. The air feels moist; any



sounds quiet and muffled. Small patches of sun-burnt grasses, small pieces of Canadian prairie, bowed down and billowed as if by squalls; but there has been no wind nor has there been rain heavy enough even to dimple the surface of the lake.

Three ducks in eclipse plumage seen in the space of half an hour winging their way over the marsh from east to west;

for them at least, the flightless phase of their moult is over.

The distinctive smell of a dead deer along the path.

<u>August 18, 2021</u> (day 2223, 2192+31): NanRG cum. 3.9 mm (norm. 29 mm). Weir +326 mm WPB scale. Cistern -284 mm SCB. RDN outer gauge 1045 mm. [cal. datum: weir -0.321 m, cistern +0.083 m, RDN outer gauge* +0.095 m, Δ = 0.42 m] *with -950 mm cal., not the indicated -962 mm.

Syphoning resumed with new longer pipes, a 4-man job. Old syphon had acquired a few small evidently unrepairable holes, all equally about nail size. Might have been sabotage, but that seems unlikely. Getting access to the dam unseen is not that straightforward. It would have been easier in any case to have just pulled the inlets out of the water. Another conjecture is that they were punctures made inadvertently by wire ends left exposed after snipping the protective welded-wire 4"x 2" mesh fences to size.

Existing pond leveller running. Levels evidently not stable (calibrated cistern level is 12 mm higher than RDN outer gauge level at the dam). More than one possible reason including measurement error. Madrone out in a boat using a sounding pole around the syphon intake.

Kingfishers, at least five of them, noisily scouting out the weirpool.



Estimate that drawing the lake level down 400 mm will cause the shoreline to retreat toward the centre of the lake by 10 metres. $\underline{\text{File}}$ $\underline{668}$, appendix. What impact this will have on tree-cavity nesters, we'll just have to wait and see, I guess.

<u>August 19, 2021</u> (day 2224, 2192+32): NanRG cum. 3.9 mm (norm. 29 mm). Weir +460 mm WPB scale. RDN outer gauge 1030 mm. [cal. datum: weir -0.187 m, RDN outer gauge 0.080 m, Δ = 0.27 m] Evening.

<u>August 20, 2021</u> (day 2225, 2192+33): NanRG cum. 3.9 mm (norm. 30 mm). RDN outer gauge 1000 mm. [cal. datum: RDN outer gauge +0.050 m].

Coats Marsh Creek still running. Kingfishers still at the weirpool. As far as I know, the last time anybody saw them at the marsh was more



Evening check on the 20th about 7 hours later

than five years ago.

Weir +471 mm WPB scale. RDN outer gauge 942 mm. [cal. datum: weir -0.176 m, RDN outer gauge -0.008 m, Δ = 0.17 m] Red squirrel my only companion.

Water flowing over the sill. There are still several ducks on the lake but they've all retreated to the east end as has the beaver.

<u>August 21, 2021</u> (day 2226, 2192+34): NanRG cum. 3.9 mm (norm. 30 mm). Weir +460 mm WPB. RDN outer gauge 920 mm. [cal. datum: weir -0.187 m, RDN outer gauge -0.030 m, Δ = 0.16 m].

RDN Director Vanessa Craig visit. We inspected the dam and "infrastructure" the RDN are so fearful of being held liable for. A log cabin, the owner valued for the purposes of discussion at \$25,000 if it were totally lost in the highly unlikely event that the entire beaver dam structure failed. Online. Nothing more. The annual insurance cost to cover the risk would be, I wildly guess, about the





same as the annual insurance on one new car or truck.

Only one of the four syphon hoses running and that only feebly. Creek running strongly. The drawdown since July 17 is now by my reckoning 40 cm.

My guess, nothing more, is that the RDN are intent on lowering the level to 400 mm below their July 23 level which I saw on July 28 as being +1265 mm, which calibrated to the weir datum is -0.090 m.

⁵ Hydrological monitoring of beaver dams in low-order channels, low-energy environments, and stabilized by vegetation, such as the one at Coats Marsh, by the University of Exeter (UoE) throughout Britain since 2014 has rarely observed complete failure of a dam.

August 22, 2021 (day 2227, 2192+35): NanRG cum. 3.9 mm (norm. 31 mm). Weir +376 mm WPB scale. Cistern -420 mm SCB. RDN outer gauge 900 mm. [cal. datum: weir -0.271 m, cistern -0.053 m, RDN outer gauge* -0.050 m, Δ = 0.22 m] *with -950 mm cal., not the indicated -953 mm.

Drawdown continuing unabated. By my reckoning now 42 cm. Marsh is looking stressed with open water breaking up into ponds, and a distinct smell of rot in the air. There were a dozen or more ducks abandoning the drying-out sedgey fringes of the "lake" now not much more than a pond, and the beaver at the east end of the lake is frequently breaking the surface because the water has become so shallow.



The flow in Coats Marsh Creek from the pond leveller has turned inky black presumably as the syphons dredge up gyttja.

One of the hazards of allowing both the dam and the weir baffle to dry out is that wood rots far faster in aerobic environments than anaerobic ones. Whether or not this has been considered in the plan is not known.

<u>August 23, 2021</u> (day 2228, 2192+36): NanRG cum. 3.9 mm (norm. 31 mm). Weir +375 mm WPB scale. RDN outer gauge 890 mm. [cal. datum: weir -0.272 m, RDN outer gauge -0.060 m, Δ = 0.21 m].

Everything still running but subdued. Beaver is at his lodge.





August 24, 2021 (day 2229, 2192+37): NanRG cum. 3.9 mm (norm. 31 mm). Weir +369 mm WPB scale. Cistern -444 mm SCB. RDN outer gauge 870 mm. [cal. datum: weir -0.278 m, cistern -0.077 m, RDN outer gauge* -0.080 m, Δ = 0.20 m] *with -950 mm cal., not the indicated -947 mm].

Syphoning continuing. Coats Marsh Creek still running black at the Marsh Trail culvert.



View from the downstream side of the deck (seen at the bottom of the picture) looking down at the gap in the middle of the concrete weir. In this view, water flows from bottom (the weir pool) to top (Coats Marsh Creek). The turquoise pipe below the re-bar is the outlet of the pond leveller running below the deck and above the sill. The woody debris below the pipe has just been put there by the beaver and is on top of the baffle. You can see the slots in the concrete sides of the gap that used to be used for sliding the baffle up and down, thus controlling the flow of water, long before the leveller was installed.

The industrious beaver has managed to stop the flow over the sill, so that flow through the weir is now only via the pond leveller. The sill measured in August 2015 was at -0.640 m, what is I believe a quite arbitrary level set by the previous owner before 2008, some 0.360 m below the present weir-pool level.

The summer resident ducks have now taken to using the weir pool as a refuge with the result that it is quite impossible to cross the dam to read the gauge or inspect the syphons without putting them all to flight. They'll soon be abandoning the site.

A fiasco. Completely unnecessary. Created and approved by people who do not live here, and who do not know this place.

August 25, 2021 (day 2230, 2192+38): NanRG cum. 3.9 mm (norm. 32 mm). Weir +369 mm WPB scale. RDN outer gauge 858 mm. [cal. datum: weir -0.278 m, RDN outer gauge -0.092 m, $\Delta = 0.19$ m].

Evening.

Nothing heard, nothing seen except the enterprising beaver who's been collecting watershield to use as a futile plug. No ducks. No bats. No swallows. No song birds. No frogs. No ravens. Few dragon flies. Only some moths and an occasional buzzing fly. 6

Drying-out aquatic plants rapidly turning brown as the water retreats, like leaves in the shrubby woodland toward the end of a summer-long drought.

Draining the wetland continues, uninterrupted.

 $^{^{6}}$ Oct. 6, discovered that this was the day TNT visited and flew a drone over the marsh.



August 26, 2021 (day 2231, 2192+39): NanRG cum. 4.8 mm (norm. 32 mm). Gentle rain. A drizzle. So begins the approach of fall.



Unexpected flock of nine or ten wood ducks arrived. Mostly females, but two males in their unfamiliar summer garb, and a couple of the





smaller ones looking like they might not yet be grown up. I guess they're on their way to somewhere else.

Grass in the clearings and up at the old farm site that might once have been ready to hay, now, bereft of any nourishment, only good for straw.

Beaten down by droplets (dropples).

Coats Marsh Creek still running. The syphons and the pond leveller are working together at the moment to maintain a constant weir-pool level.

If the weir-pool level drops below the equilibrium level, the syphon head increases, consequently so does the flow into the weir pool, and the pond leveller exhausts water more slowly until the weir-pool level rises back to the equilibrium level. If the weir-pool level rises above the equilibrium level, the syphon head decreases, consequently so does

the flow into the weir pool, and the pond leveller exhausts water faster until the weir-pool level drops back to the equilibrium level.

August 28, 2021 (day 2233, 2192+41): NanRG cum. 4.8 mm (norm. 32 mm). Weir +287 mm WPB scale. RDN outer gauge 845 mm. [cal. datum: weir -0.360 m, RDN outer gauge -0.105 m, $\Delta = 0.26$ m].

The end of equilibrium, the syphons not working anymore. Coats Marsh Creek only ponding at the culvert. The pond leveller continues to dribble, drawing down the weir-pool level. No wildlife of note seen.



Sapsucker in Lot 5. The wrong side of the berm to be counted as an inhabitant of the RP, but I'll nevertheless count it as an "accidental".

Courtesy GM and CB. September 2012.

The drawdown based on the level on July 28 is now 42cm, and based on that of July 17, 48 cm.

The Nature Trust of BC (TNT) who half-own the park have visited the site. I gather not involving anyone on the island, and so leaving key questions unaddressed.

Seems from the reporting that TNT's focus is on the bad optics that the "temporary" drawdown is creating by concealing the water beneath the leaves of the watershield (*Brasenia schreberi*). Drying-out is, in fact, easy to see as the watershield dies quickly once water depth is less than a foot (0.3 m), but it is true the watershield may look like land.

An aerial photograph from TNT shows open water, but the open water is a result of the higher water levels in the spring and early summer; open water won't be there next summer. We

know what the future looks like; it'll look like the past.

No comments reported from TNT about the purported need for the drawdown: the stability of the dam and the weir, the risk to and value of the downstream "infrastructure", the impact of human disturbance at the dam, especially in winter, of whatever water-levelling device the RDN is going to install, nor the water levels the RDN are hoping to



Back in August 2015, open water was lacking and there were few to no summer-resident waterfowl (typically only two mallards) in contrast to 2021 when waterfowl (several species) have been present during the summer and ducks when in their annual moult.

maintain on a "permanent" basis throughout the year. Nature will adapt TNT are reported as saying (it usually does), but why does it have to?

Watershield, for example, is rooted in the "lake" bed and thrives in water depths between 1 & 6ft.(0.3-1.8m), struggles when deeper than 7ft.(2m), and leaves open water at 9ft.(2.7 m). Do the planned levels allow for open water in summer?



The pre-2015 levels certainly did not. And if not, are the species of waterfowl that require open water to gain flight, and the pied-billed grebes that nest on floating vegetation, going to return?

<u>August 31, 2021</u> (day 2236, 2192+44): NanRG cum. 4.8 mm (norm. 35 mm). Weir -99 mm WPB scale. Cistern -492 mm SCB.[cal. datum: weir -0.746 m, cistern -0.125 m, Δ = 0.62 m]. RDN gauge must have been around 840 mm.

Rainfall in August soft; 83% below long-term month's average. Total for the first eight months of this year now 31% below average.

Creek dry. At the weir, only drips from the pond leveller, but the drainage from Lot 5 continues. This can only be leakage from under the berm. It and evapotranspiration has drawn the weir-pond level below the sill so there can't be any leakage to speak of through the beaver dam and the syphons must have stopped.

Forwent (why not forgo'ed?) visiting the dam as there were several ducks I could hear in the weir bay as I threaded my way through the snaggy woods. They were splashing and bathing ebulliently, maybe seeing the end of their eclipse plumage. Left them undisturbed, they seemed to be having such fun. Wood ducks I suspect.

I've cleaned up one of the appendices of the hydrogeology $\underline{\text{file}}$ and continue to update the level summary $\underline{\text{file}}$. The drawdown based on the level on July 28 is now 44cm, and based on that of July 17, 50 cm.

<u>September 4, 2021</u> (day 2240, 2192+48): NanRG cum. 8.6 mm (norm. 38 mm).

Weir -301 mm WPB scale*. Cistern -502 mm SCB. RDN gauge 835 mm [cal. datum: weir -0.948 m, cistern -0.135 m, Δ = 0.81 m, RDN gauge -0.115 m **]. *hard to measure, the water is below the bottom of the scale in



Bulrush and burdock, fashionably spikey.

<u>September 5, 2021</u> (day 2241, 2192+49): NanRG cum. 8.6 mm

(norm. 39 mm).



Cooper's hawk nonchalantly watching the "pond" from up-high.

mud. **with -950 mm cal., not the indicated -970 mm. The correct value is averaging out at -958 ± 8 mm rather than -950 mm.]

Weir pool continues to slowly drain, level now well below the sill. Creek still dry at the culvert. Syphons not working.

Rain. Paths puddled. No sign of animal life beyond frogs and fluttering birds sheltering in the bush. A go-to-bed-early-with-a-book kind of rain that makes comforting monotonous sounds on the roof and on the great dark outside.





The beaver's green-topped lodge, its entrances no longer flooded. Beavers are commonly social animals but Coats Marsh seems to be home for a hermit. Such solitary individuals usually inhabit old abandoned farm ponds, as does ours, and they aren't members of a family unit, though our "hermit" does sometimes go missing for two or three months at a time when he likely follows Coats Marsh Creek down to Hoggan Lake for a change of pace and perhaps some entertainment.

September 9, 2021 (day 2245, 2192+53): NanRG cum. 10.7 mm (norm. 43 mm). Weir -239 mm WPB scale. Cistern -507 mm SCB. [cal. datum: weir -0.886 m, cistern -0.140 m, Δ = 0.75 m].



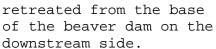
All leakage into Coats
Marsh Creek at the weir stopped. The Lot 5 leakage may be a delayed reaction to weir-pond level changes. It normally has stopped running this time of year.



Wood ducks in their post-breeding plumage again in the weir bay inhibiting access to the RDN paraphernalia out on the dam.

Ducks in this moulting phase are vulnerable (they're sitting ducks) as they are for a time flightless and their need to spend time foraging without human disturbance is high. This is the first year ducks have been seen in such numbers at this time of year.

As usual, when the weir-pond level is at its lowest, water has



First mushrooms of the season. Inky caps of some kind, likely Coprinopsis atramentaria.

September 14, 2021 (day
2250, 2192+58): NanRG
cum. 16.3 mm (norm.
49 mm).

The RDN are going ahead and installing a permanent syphon this week. They don't appear interested in anybody else's opinion as to the need for it, or the downgrading of the ecosystem of the wetland it will have wrought.





RDN: "The project is being overseen by a biologist [Madrone environmental services] to minimize detrimental effects to wildlife".



An interesting surprise in the west burnpile clearing, a few great mulleins (Verbascum thapsus). I've never noticed them in the park before.

These flowers, in the same figwort family



as foxgloves, have a poor reputation, a "Eurasian weed" (molène) being a common attribute. Each of the many buds on its pole-like stem opens only for one day. Its habitat is invariably disdainfully given as "waste and bare"

places", "dry open scrub", and "sparsely grassy places" —the abode of vulgar things—and it's placed in the CM 2011-2021
Management Plan in the same invasive category as himayalan blackberries, tansy ragwort, canada thistles, and scotch broom.

Having not noticed it during hundreds of visits over the years, I give it a pass on being a nasty foreign threat, and consider it, on the contrary, a worthy addition to the waste-place ecology. Its leaves are beautifully soft and woolly, just like the ears of my dog.

And speaking of softness, flying tufts of thistle down were easily out-numbered by the dragon flies. One or two thistles still blooming, such audacious weeds.

September 19, 2021 (day 2255,
2192+63): NanRG cum. 64.2 mm
(norm. 57 mm). Cistern -435 mm
SCB.[cal.datum: cistern -0.068 m]

Rain. Many puddles on the bare hard-packed trails, big enough to splash through, their surfaces "dimped" both with rising "blebs" and falling "dropples" (John Clare).

On the trails, woolly bears searching for a place to hibernate, garter snakes, puffballs, frogs singing out-of-season, and slugs of course, but ominously for the latter, a gastropod-eating ground beetle scurrying across the way, very agile and anxious to keep out of sight; Scaphinotus angusticollis.

New syphon installed but not in operation. Looks to be a simple system, nothing automatic. Four 4" PVC pipes, each starting when primed with a pump that has to be brought out on to the dam. Should be interesting in foul winter weather when the trumpeter swans are there.

Not clear what the snorkels without fittings are for. The syphons can be closed manually each pipe has a gate valve.











September 23, 2021 (day 2259, 2192+67): NanRG cum. 66.0 mm (norm. 64 mm). Weir +250 mm WPB scale. RDN outer gauge 871 mm. [cal. datum: weir -0.397 m, RDN outer gauge -0.079 m with -950 mm cal.].

Evening.

apply.

All deathly quiet. The open water like a mirror.

RDN/Madrone have been out all day working on their new syphon system. They also made adjustments to the existing pond leveller by the weir so the old levels no longer

Two of the four pipes are now flowing so draining the lake is resuming. Gate valves on the two inner pipes are closed. Snorkels have been disconnected and attachment points sealed.

Their to-and fro-ing is creating a path through the woods and across the dam.

Bats. No sign of the beaver which is usually active this late in the day or of the flock of ducks in weir bay. Migrating geese and a few ducks overhead going west.

September 25, 2021 (day 2261, 2192+69): NanRG cum. 67.3 mm (norm. 69 mm). Weir +180 mm WPB scale. Cistern -457 mm SCB. RDN outer gauge 855 mm. [cal. datum: weir -0.467 m, cistern -0.090 m, RDN outer gauge -0.095 m with -950 mm cal.**]

**the correct value is now averaging out at -954 ±9 mm rather than -950 mm.

Coats Marsh Creek is





running again at the culvert but there is no flow over the sill or through the leveller. Two of the four syphons running.

The beaver has not been seen for some time and the local resident believes it may have abandoned the site. No tail-slapping in the evenings heard now and the weir has sprung a small leak at the edge of the concrete deep down on the north side, which should have attracted his attention.

Twenty plus ducks at the far east end of the lake, sheltering from the human disturbance out on the beaver dam. Must be more unseen among the snags and reeds. Too far away to be identified but wood ducks, widgeons possibly, and a few mallards, not the usual early-arriving winter residents (buffleheads and ring-neckeds).

Checked with a construction transit (theodolite) calibration for the

water level out beyond the beaver dam. Result showed: outer water level cal. = -0.121 m rel. to CWB.

Since the calibrated cistern level (presumably the same) was -0.090 m, this implies that the cistern SCB datum at +367 mm determined on August 30/31, 2018 is 31 mm too high and should, according to the new measurement, be +336 mm. And to get the level directly from the RDN outer gauge, its reading should be reduced by 976 mm.

The top of the dam was measured to be $+0.451~\mathrm{m}$ above CWB. In August 2018 (A-B page C9) we measured $+0.462~\mathrm{m}$ above CWB. Confirmation that the beaver is not interested in raising the height of the dam any more.

Also checked the weir gauge, which we've not done before with the transit. Odd result. Measured to be -0.559 m instead of the expected -0.467 m. The calibration constant -0.647 ± 0.017 m was determined four times previously and corresponds to a zero close to the level of the sill, so it's disappointing that the new observation says it should be -0.739 m.

Sill level was measured at -640 mm which is exactly the same as measured in 2015.

For the time being, I'm going to keep all the old calibrations as it is not clear which of the differing calibrations is more correct.

September 28, 2021 (day 2264, 2192+72): NanRG cum. 93.3 mm (norm. 76 mm). RDN outer gauge 895 mm. [cal. datum: RDN outer gauge -0.055 m]
Everything but for the drainage from Lot 5 stopped running.



Coats Marsh Creek no flow, no flow over the sill, pond leveller high and dry, no leakage at the concrete weir itself, all four syphons with gate valves shut.

The earth is thirsty, and the rain, as if hesitant to run-off in rivulets, forms puddles that patiently wait to infiltrate. Mosses spring to life, and cover the ground in thick, poly-greenhued blankets, turning boots to slippers. Dead conifer-needles, the browned victims of the drought, are rain-rafted together where they sometimes squelch underfoot. But there's no sign of ponding in the course of East Path Creek or in the NE Arm wetland. Still, early days; the lake's catchment area remains quite small.

September 30, 2021 (day 2266,
2192+74): NanRG cum. 120.2 mm
(norm. 80 mm). Weir +403 mm WPB
scale. RDN outer gauge 870 mm.
[cal. datum: weir -0.244 m, RDN
outer gauge -0.095 m]

Rainfall in September +168% above long-term month's average (well over double). Total for the first

nine months of this year now -18% below average. For the six months of summer (Apr.Sep.), it was -16% below average, which is less than the one-sigma deviation thanks entirely to these late-September downpours.

Draining has resumed.

No information forthcoming as to the RDN/TNT plan and reasons for it beyond ill-informed platitudes and generalities:

---catastrophic beaver dam failures can be dangerous

---nature will adapt

---don't worry we've done this before

---we have qualified experts on site

---we're protecting valuable infrastructure downstream ---the ecosystem will be the same as before, only smaller.

This despite several requests for what should, I'd have thought, be information readily available to taxpayers, their elected representatives, local residents, journalists, volunteer and non-profit societies, and interested citizens who live on Gabriola.

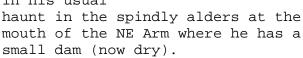




Coats Marsh Creek flowing at around 40-50 L/s, flow over the sill (depth 40 mm), pond leveller flowing but now pointing skyward ominously like a gun, the knuckles of all four syphons retro-fitted

with bleed valves and their gate valves now all open.

Still no sign of the beaver, even in his usual



A large (30-40-ish) flock of ducks (female wood ducks?). Supersensitive to disturbance, so much so that if you don't listen for them on approach or don't know where they'll be, it's impossible to appear on the shore without spooking them. ◊





Amanita gemmata.
previous file
next file

October 4, 2021 (day 2270, 2192+78): NanRG cum. 127.6 mm (norm. 91 mm).

Beaver has returned to the weir pool. All syphon gate valves closed. No flow at the weir beyond a trickle from the pond leveller. No flow in Coats Marsh Creek.

If the plan were to pull the level of the lake down to the level of the top of the baffle, they'd

have to drain away not much less than half of the volume that's currently there (File 668, see example 3) adding another 13 metres (43 ft.) to the retreat of the shoreline.

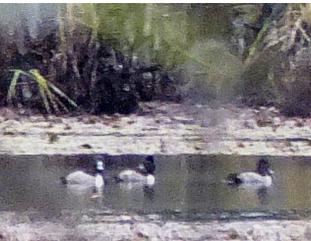
Curious mushroom, apparently common on logging roads as were these, clustered so close together the otherwise normal-looking caps sometimes fuse together; Clitocybe dilatata.

October 5, 2021 (day 2271, 2192+79): NanRG cum. 132.8 mm (norm. 94 mm).

Ring-neckeds have arrived. So have numerous male wood ducks in their brand-new clobber. The hens likewise are lookers too. One or two other species including northern shovelers in their midst.

Modifications to the syphon system still being made. All gate valves closed.















October 6, 2021 (day 2272, 2192+80): NanRG cum. 132.9 mm (norm. 97 mm). RDN outer gauge 837 mm. [cal. datum: RDN outer gauge -0.113 m].

All yesterday's birds on the lake either in hiding or have been scared away. None to be seen or heard. Workers out on the dam, highly visible from almost anywhere on the water.

More mods. Syphons running. Lots of Jubilee hose clamps seems to have been the answer. Gate valves rather elaborately clamped open, and bleed valves closed though the two outer ones lack plugs.





October 11, 2021 (day 2277, 2192+85): NanRG cum. 136.0 mm (norm. 113 mm). Cistern -552 mm SCB. [cal. datum: cistern

-0.185 m].

Coats Marsh Creek ponded at the culvert with a flow less than 1 L/s so syphoning's stopped again.





Judging by the drawdown, I'd say syphons have only been running for a couple of days. The weir-pool level is becoming as if tidal. Level at the cistern now approaching the lowest I've ever measured.

Pearly everlasting, looking like a species of pussytoes (Antennaria sp.) but lacking clustered basal leaves. This plant is a female; you can tell because female pearlies don't spread their white petal-like bracts until seeds have formed.

Lichen on moss, *Hypogymnia* sp.?, no holdfast, hollow white lobes, an epiphyte?

No ducks on open water, but I heard some sheltering along the southeast shore where the swallows roost in summer. I'm told Mr. Beaver has been trying to stop the flow at the weir.

Visiting the marsh has become a source of anxiety, a shadow of what it once was.

October 16, 2021 (day 2282, 2192+90): NanRG cum. 185.0 mm (norm. 131 mm). RDN outer gauge 810 mm. [cal. datum: RDN outer gauge -0.140 m].

Steady rain. Coats Marsh Creek flowing but has been dry for most of this past week. Syphons openended; not running.

A covey of wood ducks and two or three mallards sheltering in the slough at the NE Arm outlet, but no sign of the ring-neckeds or buffleheads that are usually around in numbers this time of year.

October 21, 2021 (day 2287, 2192+95): NanRG cum. 194.2 mm (norm. 150 mm). Cistern -428 mm SCB. [cal. datum: cistern -0.061 m].





Wood ducks far off alone in beaver bay.

Watershield is rotting. Coats Marsh Creek dry. Fast changing bright blue and dreary grey days.

October 22, 2021 (day 2288, 2192+96): NanRG cum. 196.4 mm (norm. 155 mm). Cistern -405 mm SCB. RDN outer gauge 913 mm. [cal. datum: cistern -0.038 m, RDN outer gauge -0.037 m]

Maple trees putting on a show. Leaves, golden browns and yellows, some still mottled a limey green, capturing the light and then gracefully twisting and twirling like flakes of snow to carpet the ground. Pacific crab-apple trees near the water adding a blush to the autumnal colour.

Mallards, could well be transients, out in the open, splashing about, stretching and





flapping their wings and looking pleased with themselves.

Heard that wood ducks have been seen in earlier years in the winter wetlands in Randy Hollow along Little Creek in the 707CP.

No syphoning. Hopefully the misguided RDN-NTBC beaver-dam project is running short of time and money.

October 25, 2021 (day 2291, 2192+99): NanRG cum. 224.9 mm (norm. 167 mm). Cistern -332 mm SCB. RDN outer gauge 980 mm. 1 [cal. datum: cistern +0.035 m, RDN outer gauge +0.030 m]

Windy. Coats Marsh Creek dry despite the rain. Suggests the Clemson leveller is only skimming off weir-pool precipitation. Back in October 2016, File 673u, there were substantial leakages through

the beaver dam that maybe the beaver has now plugged, or maybe the lake level is currently just too low for them to have any effect.

East Path Creek and NE Arm sparsely puddled; nowhere near starting to flow. The ratio of lake-level rise to rainfall (dL/dR) in the past 14 days has been 2.7 so the catchment area is still just very local but measurably increasing.²

October 28, 2021 (day 2294, 2192+102): NanRG cum. 265.8 mm (norm. 181 mm). Weir +274 mm WPB scale. RDN outer gauge 1090 mm. [cal. datum: weir -0.373 m, RDN outer gauge +0.140 m, Δ = 0.51 m]

Rain, every day. Have to be careful what you say! East Path Creek starting to flow, as have

¹ GM observations.

² This is a rough figure assuming no significant evaporation in winter.

the two associated springs near the Stanley Place entrance.

The ratio of lake-level rise to rainfall (dL/dR) in the past 12 days has correspondingly increased to 3.4. The growth in effective catchment area is, not surprisingly, following a quadratic rather than a linear curve and d^2L/dR^2 (the acceleration of the ratio) is currently 0.34 per day.

The syphons are flowing, starting I believe today, trying to keep up, and incidentally confounding the analysis of the lake's hydrology.

The capacity of the syphon system is by my reckoning not large. Even though there are four pipes, their nominal dimension is only 4" (100mm) which means friction losses are high.

My estimate is that the capacity is $\approx 90\,\text{V}\Delta$ L/s where $\Delta \leq 1\text{m}$ is the hydraulic head. Today, Δ is 0.51 m and falling. The estimated drainage rate currently is thus around 65 L/s, 3 a drawdown rate for the lake of the order of 120 mm/day less precipitation augmented by the increasing inflow from the catchment area beyond the lake surface.

If these estimates are right, there may be days in winter when the outer lake level is rising even though the syphons are running.

October 29, 2021 (day 2295, 2192+103): NanRG cum. 265.8 mm (norm. 185 mm). Weir +488 mm WPB scale. RDN outer gauge 1000 mm. [cal. datum: weir -0.159 m, RDN outer gauge +0.050 m, Δ = 0.21 m]

October 30, 2021 (day 2296, 2192+104): NanRG cum. 265.8 mm (norm. 190 mm). RDN outer gauge 985 mm. [cal. datum: RDN outer gauge +0.035 m]

October 31, 2021 (day 2297, 2192+105): NanRG cum. 265.8 mm (norm. 195 mm). RDN outer gauge 990 mm. [cal. datum: RDN outer gauge +0.040 m]

Rain in October plentiful; 38% above long-term month's average. Total for the first ten months of this year now just a mere 10% below average.

November 1, 2021 (day 2298, 2192+106): NanRG cum. 271.2 mm (norm. 199 mm). RDN outer gauge 1000 mm. [cal. datum: RDN outer gauge +0.050 m]





Both the NE Arm and SE Arm wetlands dry. East Path Creek not flowing but ponded. Covey of ducks still around, ID uncertain, but they're not ring-neckeds.

 $^{^3}$ The 8"(200mm) Clemson pond leveller's capacity when fully submerged is $\approx\!40~\text{L/s.}$

Syphon flow weak.

November 2, 2021 (day 2299, 2192+107): NanRG cum. 309.5 mm (norm. 204 mm). RDN outer gauge 1100 mm. [cal. datum: RDN outer gauge +0.150 m].

Little Creek running gently as it approaches the Three Gates Trail. Buffleheads are on Nelders Pond and in False Narrows so they should also be at the marsh.

Syphon flow continues but appears weak.

November 4, 2021 (day 2301, 2192+109): NanRG cum. 335.8 mm (norm. 214 mm). Weir +511 mm WPB scale. RDN outer gauge 1301 mm. [cal. datum: weir -0.136 m, RDN outer gauge +0.351 m, $\Delta = 0.49$ m]

Rain, lots, 70mm in the first four days of the month. Running strongly are: Coats Marsh Creek; East Path Creek, culvert at East Path more than 50% capacity; NE Arm wetland outlet flooding East Path; and Stump Farm Number 1 Stream at culvert carrying outflow from Canary Grass Meadow.

All ducks on the lake at the moment are extremely sensitive to human disturbance. Best to stay away.

November 5, 2021 (day 2302, 2192+110): NanRG cum. 342.8 mm (norm. 219 mm). Weir +518 mm WPB scale. RDN outer gauge 1400 mm. [cal. datum: weir -0.129 m, RDN outer gauge +0.450 m, Δ = 0.58 m]

Stump Farm Number 2 Stream is running gently. I suspect this creek was consigned to be just logging-road drainage long ago. It has no surface connection to the lake.

Standing water in the NE Arm wetland, which is alive with croaking frogs.





An old cluster of Lycoperdon pyriforme.

Small patches of sky more deeply blue than usual. Enough rain to wash out the aerosols? The rain, despite its heaviness has an April-showery nature which seems to be new for this time of year. A succession of troughs and ridges? ...or fast moving fronts?

November 6, 2021 (day 2303, 2192+111): NanRG cum. 353.5 mm (norm. 224 mm). Weir +527 mm WPB scale. RDN outer gauge 1445 mm. [cal. datum: weir -0.120 m, RDN outer gauge +0.495 m, Δ = 0.61 m]

Very gloomy sky, like dusk, but a good day at the lake. Ring-necked ducks and buffleheads arrived in numbers. Mostly drakes visible,

in good spirits, pleased to see open water and the lake level as high as is normal in the fall. Awaiting the start of the courting season.

Only two of the four syphons seem to be working. Spillways in the beaver dam only trickling suggesting the 950 mm calibration may be low given the measured height of the dam was +451 mm on Sept. 25, 2021.

From afar look's like the beaver's been trying to plug the syphons, defeated of course by the wire cage.









The ratio of lakelevel rise to rainfall (dL/dR) in the past six days has increased to 6.0 with (partial?) syphoning.

November 8, 2021 (day 2305, 2192+113): NanRG cum. 386.4 mm (norm. 234 mm). Weir +549 mm WPB scale. RDN outer gauge 1480 mm. [cal. datum: weir -0.098 m, RDN outer gauge +0.530 m, Δ = 0.63 m]

A new adjustable sluice for the weir, and an up-sizing of the downstream 24" culvert leaving the beaver to control the outer lake level is what we need now.



November 11, 2021 (day 2308, 2192+116): NanRG cum. 407.1 mm (norm. 250 mm). Weir +559 mm WPB scale. RDN outer gauge 1517 mm. [cal. datum: weir -0.088 m, RDN outer gauge +0.567 m, Δ = 0.65 m]





The jet stream is right overhead, the weather is cluttery, and the lake is full to the brim.

The spillways on the beaver dam are working; but it's hard to tell whether the syphons are.





Willows along the berm preparing for winter.

Weir-pool level is high, but the deck is not flooded, ⁴ and there's a torrent of water on its way to Hoggan Lake.

Everything looking comfortable, and it's spotting with rain again.

November 13, 2021 (day 2310, 2192+118): NanRG cum. 455.0 mm (norm.

261 mm).

The leaves of the alders, distaining the lambent yellowing of those of other deciduous small trees and shrubs,



 $^{^4}$ The lowest point of the deck is at +0.045m CWB (SE corner).

are holding their green as they always do, all the while becoming increasingly blotched with the dark coffee-brown colour of dead ones.

The NNE Arm pond beside East Path full but not crossing the trail. Standing water in the SE Arm Wetland but no continuous flow down into it from the High Point Meadows and McGuffies Swamp.

Sometimes confusion and turmoil among the all-shades-of-grey clouds; low misty ones mizzle and drizzle; others a little higher up steadily pour; on the dark horizon you can see over there, it's chuckin' it down; while still others, depending on which direction you look, just veil the blue. What my grandfather would call good grawin' (growing) weather.

Beaver reported missing for several days prior to Nov. 11.



November 14, 2021 (day 2311, 2192+119): NanRG cum. 532.8 mm (norm. 266 mm). Weir +656 mm WPB scale. [cal. datum: weir +0.009 m]

Rain; breaks when the light peeps in; then rain again.

Rain 125 mm in just the last two days.

"Christopher Robin didn't much mind what the weather did, as long as he was out in it."

November 15, 2021 (day 2312, 2192+120): NanRG cum. 549.7 mm (norm. 272 mm). Weir >914 mm*. RDN outer gauge 1631 mm. [cal. datum: weir >+0.267m*, +0.292m**, RDN outer gauge +0.681m, $\Delta \approx 0.4$ m] * over the top of the scale. **GM estimate +11.5 inches deck.

Highest water ever seen.

Water flowing strongly over the whole length of the deck of the weir. At the downstream edge of

the top of the concrete ≈ 5 " (127 mm) deep.

The inundation of the weir has raised the width of the sill from its normal 2 ft. $(0.6\ m)$ to an effective 18 ft. $(5.5\ m)$, 20 ft. $(\approx 6\ m)$ if you include water flowing round the two ends of the concrete. As a result of this near-tenfold increase, the weir-pool level rate-of-rise has been curtailed.

The berm is not looking threatened.

Numerous spillways over the beaver dam but no sign of any looming failure. Whether the syphons are working or not has become irrelevant.

The only downstream structure affected is a 24-inch culvert that is submerged and forcing water to circle harmlessly around it



through the woods. The log cabin is dry and not in danger.

No measurement of the flow in Coats Marsh Creek at the Marsh

Trail culvert, but it's more than anything I've ever measured, meaning it's more than 500 L/s.
[estimated 565 L/s File:673,c15]





Coats Marsh Creek culvert outlet at the Marsh Nov. 15, 2021

I think it's worth quoting here a response I received on November 3, 2021 from Richard Brazier, Professor of Earth Surface Processes at the University of Exeter. His response was to my

enquiry as to whether he had more to add to his comment that data collected up until 2019 in the UK had found that catastrophic failure in well-established, low-order channels is "rare".

"I would still stand by this statement and indeed reinforce it as we rarely see beaver dam failure at our study sites and when we do, it is on higher-order, high-energy stream/river systems during times of flood.

"Even in these cases, we most often see partial failure, where a notch in the beaver dam fails, and is subsequently repaired the following evening by the beavers. This is because beaver dams are very coherent structures, far more so than the analogous dams that we humans construct, which of course we rarely, if ever, maintain.

"Considering the system that you refer to. which is a low energy lake system, in my opinion, especially given the maturity of the dam, the chance of any catastrophic failure is non-existent. The chance of partial failure is also very low and thus I would not consider there being any enhanced risk to infrastructure downstream, above and beyond the 'normal' risk that such a system might afford to any infrastructure that is in place.

"On this point, it is often the case that the risk to infrastructure, including culverts, roads, bridges etc... is due to the inadequate design of older infrastructure that renders it less resilient to the rainfall:runoff regimes that we currently experience, and perhaps even more so to the regimes that we will experience under climate change scenarios.

"Ironically, beaver dams can enhance the resilience of such structures, as we prove in the attached paper from earlier this year which demonstrates natural flood management, protecting villages downstream of beaver sites, by the beaver dams themselves."





November 16, 2021 (day 2313, 2192+121): NanRG cum. 549.7 mm (norm. 277 mm).

Jet stream and atmospheric river have moved on south, the temperature has dropped, the barometric pressure has gone up, the rain has stopped, and the sun has come out.

Stabilizing the level of the lake during storm events depends on the outflow matching the inflow. Drawing the lake level down in normal times is not only destructive to the ecology, it takes little time for storm water to restore the lake to its natural level regardless of the activities of the syphons. An adjustable sluice gate engineered to match the storm water inflow, which is from several sources, is what we need above all. An inadequate outflow capacity causes the weirpool level to rise potentially

threatening the berm and lowering the hydraulic head of the syphons making their contribution irrelevant. Fortunately the present design of the weir greatly helps in curtailing the rise in weir-pool level by making the whole width of the weir available for discharge when the Clemson leveller and the 2-foot wide, 2-foot deep gap above the baffle are not enough.

Seen flowing strongly today were East Path Creek, culvert submerged; NE Arm spillway on East Path; NNE spillway (W2N in File: 668); upper East Path Creek at the inflow to the SE Arm wetland coming down from the High Point Meadows. Available photographs similar to those taken in flood conditions in previous years.

November 17, 2021 (day 2314, 2192+122): NanRG cum. 550.0 mm (norm. 283 mm).
Weir 579 mm WPB scale.

[cal. datum: weir
-0.068 m]

Flooding abated. Beaver still absent.

November 19, 2021 (day 2316, 2192+124): NanRG cum. 561.4 mm (norm. 294 mm). Weir +536 mm WPB scale. TRDN outer gauge 1522 mm. [cal. datum: weir -0.111 m, RDN outer gauge +0.572 m, $\Delta = 0.68$

m]



Along the edges of well-trod trails, seed-leaves (cotyledons) sprout, but ashy alders, their branches bared, know in the months to come, they may rue their alacrity.



⁵ The scale reads higher than the sill level because the beaver has been consolidating debris into a dam. Height estimate ≈40 cm.

November 22, 2021 (day 2319, 2192+127): NanRG cum. 563.4 mm (norm. 311 mm). Weir +517 mm WPB scale. RDN outer gauge 1483 mm. [cal. datum: weir -0.130 m, RDN outer gauge +0.533 m, Δ = 0.66 m]

Sill level = -640+125 = -515 mm.

Ducks, some buffleheads and ringneckeds, not a lot tho' and seemingly all drakes.

No sign of the beaver. Some log movement but not characteristically organized, possibly a result instead of the storm.

November 24, 2021 (day 2321, 2192+129): NanRG cum. 567.7 mm (norm. 323 mm). Weir +509 mm WPB scale. RDN outer gauge 1448 mm. [cal. datum: weir -0.138 m, RDN outer gauge +0.498 m, $\Delta = 0.64$ m]

Overcast; shades of grey but with holes of blue. Gusty wind soughing in the canopy, mimicking the sound of a fast-approaching downpour.

Ring-necked ducks, less than ten, sheltering uneasily along the shore at the east end. The open water dispiritingly vacant of wildlife. Birds in the woods quiet; Pacific wrens in the bush and ravens overhead; mostly that's all.

Water still
flowing from
the NE Arm
wetland and,
although
crossing East
Path, doing so
sub-surface.
Beaver activity
at the weir?
Maybe. Don't
think so. Hard
to judge.
Syphons
reported to

have been running as designed.

November 28, 2021 (day 2325, 2192+133): NanRG cum. 621.0 mm (norm. 346 mm). RDN outer gauge 1482 mm. [cal. datum: RDN outer gauge +0.532 m]

Overcast, still and quiet. Frogs and sea lions at Harmac all that's to be heard. All creeks running.



Buffleheads in the weir pool, females and juvenile males with incomplete white hoods. Missed gauge-reading so as not to disturb them; level not changed much.

November 30, 2021 (day 2327, 2192+135): NanRG cum. 624.6 mm (norm. 358 mm). Weir +555 mm WPB scale. RDN outer gauge 1530 mm. [cal. datum: weir -0.092 m, RDN outer gauge +0.580 m, Δ = 0.67 m] Rain in November again plentiful; 104% above long-term month's average (a bit more than double).





We have only had a wetter November in two of the last 75 years; 1983 and 2006. Total precipitation for the first eleven months of this year now +11% above the long-term average.

The marsh is done with fall. Green is now the colore di questi giorni. Only an occasional shrub like this 'giant' dwarf rose (Rosa gymnocarpa) signalling that so far this winter, it's not just been wet, it's also been pretty mild.

December 5, 2021 (day 2332, 2192+140): NanRG cum. 639.3 mm (norm. 388 mm). Weir +521 mm WPB scale. RDN outer gauge 1440 mm. [cal. datum: weir -0.126 m, RDN outer gauge +0.490 m, Δ = 0.62 m] Light frost; just enough to quieten the frogs who've been imagining it's spring. Very few waterfowl; unusual for the time of year. One mature female bufflehead all that was clearly

seen. Several bike tracks across the clearings from the Marsh Trail down to the wetland shore. The "nature-reserve" status of the park continues to fray.

December 9, 2021 (day 2336, 2192+144): NanRG cum. 648.9 mm (norm. 413 mm). Weir +521 mm WPB scale. RDN outer gauge 1370 mm. [cal. datum: weir -0.126 m, RDN outer gauge +0.420 m, Δ = 0.55 m] So dull and dark are some November days. Yesterday, the lake, a mirror, no wind to ruffle the surface. Today, brighter. Seen, just one juvenile bufflehead, two mallards, and a small hard-to-spot flock of about ten ring-neckeds. The continuing syphoning is drawing the level down to where summer watershield is showing.

The beaver believed missing for a month now. No sign either of the swans that have been reported to be on the island.





Chocolate-brown alder leaves underfoot and clusters of tawnied bracken in the bush marking the end of another year. Grey lichens tingeing green in the shafts of sunshine piercing the gaps between the trunks of the trees.

Orange jelly (Dacrymyces chrysospermus), likes to party after heavy rain.

Feathers of a robin or possibly a towhee, left by a hawk, likely a Cooper's hawk, as it prep'ed its dinner. Often seen.

December 15, 2021 (day 2342, 2192+150): NanRG cum. 715.5 mm (norm. 449 mm). Weir +552 mm WPB scale. RDN outer gauge 1528 mm. [cal. datum: weir -0.095 m, RDN outer gauge +0.578 m, Δ = 0.67 m]

Lake deserted except for the small tight-knit group of ring-neckeds. No beaver.

Lake back up to a perfectly normal winter level despite the syphons. This is because its

catchment area is expanding as the fractured-sandstone aquifers fill up and, as a consequence, run-off into the lake increases. There's now a flow down from High Point Meadows into the SE Arm wetland, Appleyard Ponds, and into East Path Creek and its two springs.

Little Creek is now flowing across the Three Gates Trail.









Arbutus berries, like glowing embers from warmer days, seemingly scarce this year, but not entirely absent

A prince! No such luck. Very fresh-looking but a Leucopaxillus gigantius, its 'gigantic' cap a startingly 10-inches (25cm) across.

December 18, 2021 (day 2345, 2192+153): NanRG cum. 748.0 mm (norm. 468 mm). Weir +568 mm WPB scale. RDN outer gauge 1552 mm. [cal. datum: weir -0.079 m, RDN outer gauge +0.602 m, Δ = 0.68 m] Slushy snow, air about 5°C, drifting mist masquerading as ground-level clouds with a

promise of bright sunshine higher up. Like the bottom of a low-altitude ski resort in spring.

Numerous spillways in the beaver dam are just beginning to flow. Syphoning appears to be not serving any useful purpose. Weir



deck is dry and the berm is showing no hint of stress.

No wildlife seen; yet, Nelders Pond, Farrow Spring, Commons Pond, and Dicks Swamp all have winterresident waterbirds.





We won't be seeing the real impact of the syphoning system until next April when, if it's not shut down, it starts draining the lake's reserve of water that it relies on to get it through the dry season.



December,
lateafternoon,
three days
before the
end of
this
tropical
year.
Nature's
light at
the end of
a tunnel?

December 22, 2021 (day 2349, 2192+157): NanRG cum. 778.1 mm (norm. 493 mm). Weir +547 mm WPB scale. RDN outer gauge 1525 mm. [cal. datum: weir -0.100 m, RDN outer gauge +0.575 m, Δ = 0.67 m]

No wildlife seen on the water. Geese and ducks overhead.

Beaver still absent, so no routine maintenance being done on his dam. RDN focus appears to be on the integrity of the concrete weir, but nothing more about their syphoning plans made public.

December 30, 2021 (day 2357, 2192+165): NanRG cum. 822.6 mm (norm. 541 mm).

Lake frozen over and snow covered. Wood ducks and one or two female buffleheads sheltering in what open water there is. Had to take extra care not to alarm them.

Snow-clad trees around Stump Farm appearing as sentinels from a Harry Potter tale. Magical.

<u>December 31, 2021</u> (day 2358, 2192+166): NanRG cum. 822.6 mm (norm. 548 mm).

Precipitation, including snow, in December normal; just 5% above long-term month's average.

Total precipitation for the year +10% above the long-term average, nothing statistically unusual as an annual average but monthly totals have been 'interesting". These days, we are getting more rain on average in the spring and again, especially in the fall, noticeably less rain in summer, and a trendless amount of precipitation in winter.









Sky a medley of ragged crystal white and moisture-laden icy grey clouds. Welcome to Canada, new year!

◊ previous file next file

<u>January 3, 2022</u> (day 2361, 2192+169): NanRG cum. 861.7 mm (norm. 566 mm).

Thaw underway.

A bald eagle by the lake.

Beaver dam's major spillway flowing again.

Along the trails, snappedoff trees, frost-clipped twigs, and slushy footsteps the same grey colour as the underbellies of the ragged clouds.



NO ROAD HERE







January 11, 2022 (day 2369, 2192+177): NanRG cum. 921.0 mm (norm. 613 mm). Weir +585 mm WPB scale. cal. datum: weir -0.062 m]

Now-fading ice reached about 1½-inch thick during the cold spell. Not enough to attract skaters. Pond leveller approaching full capacity.

Numerous ravens scattered all over the park carrying on exceptionally noisy conservations. So varied in vocabulary and tone, it's impossible to discern what it might be all about.

January 13, 2022 (day 2371, 2192+179): NanRG cum. 942.6 mm (norm. 624 mm). Weir +631 mm WPB scale. cal. datum: weir -0.016 m]

Open water, cascading freely over the crest of the beaver dam.

There was a time when I visited the marsh to observe the wildlife. These days it's more often to hang out at the weir to examine, and sometimes discuss, infrastructure.





<u>January 23, 2022</u> (day 2381, 2192+189): NanRG cum. 956.4 mm (norm. 680 mm). Weir +521 mm WPB scale. cal. datum: weir -0.126 m] Less dramatic days. Precipitation has eased off.

There are a few winter resident ducks of the wetland around — ring-neckeds and buffleheads, but far fewer than usual. The only transients so far a flock of mallards, a one-day glimpse of widgeons, and brief sojourns of some Canada geese. Absent this season have been green-winged teals, shovellers, and hooded mergansers, species preferring secluded habitat and that are present elsewhere on the island. There have been no visits from trumpeter swans this year either, and conclusive photographs of pintails and yellowlegs remain on the "wanted" list.

Time to halt the wellintentioned but illadvised RDN/NTBC draining of the marsh; - the syphons are unable to handle the flow in winter from the extensive catchment area to the east once the aguifers there are fully charged. The destructive drawdown at the end of the dry season last year was quickly negated when autumn rain began; - the syphoning has failed to protect the concrete weir from normal seasonal overflow on three occasions this wet season with no ill effects;

- the marsh needs to conserve water for the summer and to curb the growth of watershield that will otherwise completely choke the water surface;
- expert opinion on the integrity of beaver dams is that this dam is not going to fail catastrophically;
- local residents
 immediately
 downstream of the
 weir do not support
 the draining;
- disturbance by humans around the weir and dam may contribute to the reduction in wildlife including the now near three-



Without precommercial thinning, stands of pecker-poles like these are common in the RP and adjoining 707CP..



Green-winged teals at Dicks Swamp. Rarely seen at Coats Marsh.

month long absence of the beaver; and maintaining the syphons is a waste of RDN Parks staff's time.

<u>January 31, 2022</u> (day 2389, 2192+197): NanRG cum. 969.6 mm (norm. 723 mm). Weir +509 mm WPB scale. RDN outer gauge 1210 mm. [cal. datum: weir -0.138 m, RDN outer gauge +0.260 m, Δ = 0.40 m] Precipitation in January within normal variation, 15% below long-term month's average.

Addendum to these notes added on <u>rainfall statistics</u>. Rainfall is increasing in the six months of winter but the trend is very weak and barely detectable amid all the normal weather vagaries.

One couple of hooded mergansers. Both preening, and in the process showing their seldom-seen fan-tails, very unusual in duck species; both sexes have them. They don't seem to be using them for display (other than to human photographers).



George Szanto in his book *Bog Tender* (p.99) remarks that five hooded mergansers were observed on McGuffies Swamp at the headwaters of East Path Creek in the CM lake catchment area in January. This would have been a decade or so ago now.

<u>February 15, 2022</u> (day 2404, 2192+212): NanRG cum. 973.9 mm (norm. 794 mm).

Flock of ducks, in the 20-30 range, mostly quack-quacking mallards with a few ring-neckeds. Possibly one or two other species in the mix but none seen.

Somebody has been logging in the NE Arm. Heard today of an instance of a dog chasing a deer in the park, and causing or contributing to its death.

February 23, 2022 (day 2412, 2192+220): NanRG cum. 978.0 mm (norm. 829 mm). Weir +265 mm WPB scale. RDN outer gauge 968 mm. [cal. datum: weir -0.382 m, RDN outer gauge +0.018 m, Δ = 0.40 m]

Hardly any precipitation beyond a short shower of hail. Creeks have all stopped running and water down to summer levels.

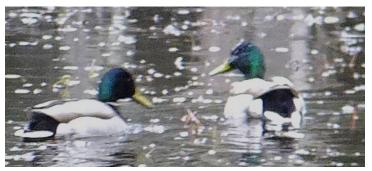
A few transient mallards seen and heard at the beaver dam, left undisturbed. They had gone when I carefully checked again later.
Nothing else seen, but

Nothing else seen, but inspection perfunctory. Sticks moved around but unlikely the recent work of the beaver. It's been missing since early November.

Golden eagle (no, not an immature bald one) at the carcass of the deer pursued by a dog into the muddy fringe of the marsh where it died shortly after.







<u>February 28, 2022</u> (day 2417, 2192+225): NanRG cum. 1028.6 mm (norm. 849 mm).

Precipitation in February, 51% below long-term month's average. Unusual, but not extremely so.

 $\underline{\text{March 8, 2022}}$ (day 2425, 2192+233): NanRG cum. 1040.0 mm (norm. 874 mm).

No visits, trying to reduce disturbance, but heard beaver is back. Geese and ducks reported on the lake.

Water levels variable, not clear what is going on despite an unverified second-hand report that the RDN syphoning is being discontinued until the fall.

Welcome news that dogs no longer allowed in the park as was always the case according to the 2011-2021 Management Plan, but widely ignored as there has been until now no signage to that effect. Posted maps (March 2021) imply that 707CP rules apply to the RP.

March 15, 2022 (day 2432, 2192+240): NanRG cum. 1057.4 mm
(norm. 901 mm).

Quiet. Water level looking fairly normal. Ducks scattered over the lake. Fewer than average perhaps and only the usual winter regulars (no widgeons for example) but not bad. Pair of Canada geese. Not much open water in the NE Arm but squelchy underfoot. A mature inflower Daphne laureoloa plant seemingly alone in this wetland - dealt

with by a one-man workparty. These invasive plants remain rare in the RP.











 $\underline{\text{March 19, 2022}}_{\text{cum. }1066.0 \text{ mm}}$ (day 2436, 2192+244): NanRG .

Beaver dam overtopping. The pair of geese still here and boldly on patrol. RDN syphoning stopped on March 15 and won't start again until October. Protecting the northern red-legged frogs the reported reason.

March 26, 2022 (day 2443, 2192+251): NanRG
cum. 1091.6 mm (norm. 934 mm).

A fair number of evergreen huckleberry plants (*Vaccinium ovatum*) have been infected this year with witches' broom rust (*Pucciniastrum goeppertianum*), though more so at the north end of the 707CP than in the RP itself.

This fungus causes the shoots of the huckleberry to swell and produce few or no leaves. It also infects the needles of balsam firs (Abies grandis).

Deer have seldom been seen this winter.



 $\underline{\text{March 31, 2022}}_{\text{cum. }1094.2 \text{ mm}}$ (day 2448, 2192+256): NanRG

Precipitation in March, 40% below long-term month's average. Despite the slow start this spring, last winter's rain (Oct.-Mar.) was 12% above average, thanks in no small measure to the November downpours.

I can count the number of places I know on Gabriola where blackcaps (black raspberries) grow on the fingers of one hand, but although they are reliably said to grow in the East Path Creek catchment area, I've yet to find one there.

Often solitary, these shrubs (Rubus leucodermis), even when berryless are distinctive with arching, prickly, only sparsely-branched stems that frequently have an ash-white bloom not seen on roses, and their leaves are silver-undersided, and finely-toothed.

Polyporus sulphureus with their bright sulphur-yellow colour are easier to find in

the park. They seem to prefer deciduous trees and shrubs as their hosts.

<u>April 26, 2022</u> (day 2474, 2192+282): NanRG cum. 1227.6 mm (norm. 1003 mm).

Sunshine, showers, and swallows. Found two blackcap plants in the RP.











I've been walking right by them for years. Creeks running, the lake brim-full. Only geese seen on the lake. Renovated weir deck looks good. Morels about this year, albeit the false kind. Gyromitra sp. of some kind, but I'm not about to harvest them just to find out. I don't do that with wildflowers so I don't see why I should with mushrooms.

April 30, 2022 (day 2478, 2192+286): NanRG cum. 1254.4 mm (norm. 1011 mm).

Precipitation in April, a whopping 160% above long-term month's average, a new record for the month (160 mm cf.137 mm in 2017). Despite this, annual rain this year is still 7% below average.

May 14, 2022 (day 2492, 2192+300): (**) 1297.3 mm (norm. 1034 mm).

** Nanaimo Airport gauge appears to be down this month. Until it's fixed, I'm using the mean of figures for Nanaimo City Yard, usually too high, with Entrance Island, usually too low, (Duncan and S. Gulf Islands as backups).

Having found blackcaps (black raspberries) in the area, I've been on the hunt for thimbleberries. Suspect that these are less common than they used to be. Found just one bedraggled plant in the park ecosystem so far. By the side of the trail. At one point it had been clipped despite the fact that thimbleberries are harmless.



Blue-eyed Mary's are rare within the park itself — there isn't much sandstone-plain habitat for them there — but mats of these *petites* flowers are to be found growing on the moss-cushioned benches of the escarpment that runs up from Hoggan Lake just the other side of the watershed of Coats Marsh Creek.

The benches are not always easy to reach, guarded as they are by thickets of waist-to-chest-high salal in gullies that traverse the slope. The ways up through them are tortuous and often force you to take the advice of the deer rather than obstinately paying heed to your own sense of direction.

May 19, 2022 (day 2497, 2192+305): (**) 1316.3 mm (norm. 1042 mm).

** Nanaimo Airport gauge still down.

Ducks with ducklings on the lake. No beaver for some weeks. Syphons inactive. Creeks running.

Trails muddy here and there; the earth sometimes "sings underfoot" as farmers

used to say when it's squelchy or makes a squishy sound and thus is too wet to sow seed.

Pea-family plant, hairs absent to woolly, cf. *Vicia sativa* leaflets larger, elliptic not narrow to lanceolate, flowers showier but infrequent, appearing earlier in the year, tendrils similar. Purple peavine.

 $\underline{\text{May 27, 2022}}$ (day 2505, 2192+313): (**). 1321.1 mm (norm. 1055 mm).

** Nanaimo Airport gauge still down.

Evening. Quiet. Syphons overgrown, looking like something from the past.









Lake fairly full. Coats Marsh Creek running but not vigorously. Blackcaps in flower. Mallards with ducklings. Grebes heard. Pair of mergansers. A ring-necked. Swallows. No bats yet.

Spring wildflowers having a good year.











 $\underline{\text{May 31, 2022}}$ (day 2509, 2192+317): (**) 1327.6 mm (norm. 1061 mm).

** Nanaimo Airport gauge still down.

Precipitation in May, 67% above long-term month's average. Plant-life is loving it. Annual rainfall so

far this year just 1% above average. People remember May but forget February.

Thimbleberries as they should be (left in the nearby 707CP) in flower and as all I can find in the Coats Marsh Ecosystem so far (right).





June 11, 2022 (day 2520, 2192+328): (**) 1381.9 mm (norm. 1077 mm).

** Nanaimo Airport gauge out-of-service. Using the mean of Nanaimo City Yard and Entrance Island in the meanwhile.

I love the weather this spring; one moment the clouds grow black, betokening rain; drops moisten my face and patter on the salal; I pull on my hood and hurry to find a large tree where, often by the lake, a nonchalant jenny wren

shares my shelter; the rain increases furiously; then eases and is gone; the sky turns blue and a warm sun is shining once again; the now bepuddled trails become dappled; and raindrops glint in the grass or fall anew when a fleeting breeze ruffles the canopy, or I push my way through the bush. This succession of spring showers, brought on by occluded fronts forcing warm moisture-laden air aloft to dry out, is keeping the forest a myriad hues of green. It is a lovely season. As somebody in Winnie the Pooh says, I don't mind much what the weather does so long as I am out in it.

Several duck families out in the rain including one wood duck hen with four, possibly five, grown but unfledged ducklings. Violet-green swallows also out and about even in the heaviest of the rain. Even managed to get a blurry picture of one, an almost impossible task, as they soar over the water.

The lake full and water spilling over and around the beaver dam but in a controlled manner. The non-functioning syphons gradually being melded into the beaver's landscape. Coats Marsh Creek lively. Infrastructure intact.



















There's been a black bear on the island for the past couple of weeks or so. Reported on Coats Drive and a good chance he crossed East Path Creek to get there, but no scat evidence yet. Said to be a once in 25-year evident.

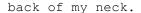


<u>June 30, 2022</u> (day 2539, 2192+347): (**) 1390.3 mm (norm. 1102 mm).

Precipitation in June, 53% above long-term month's average. Annual rainfall so far this year 3% above average. Some creeks still running.

New species, long overlooked and common in the low-lying greenery at the edges of the forest, creeping (trailing) snowberry (Symphoricarpus mollis). Its flowers are small (3-5 mm), pinkish like common snowberry, very seldom seen or noticed as the plants do not appear to flower en masse.

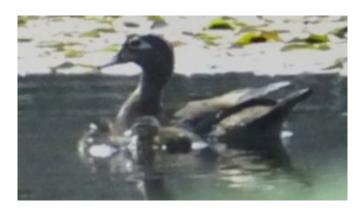
Male wood duck and hen with young ducklings: Idaho blue-eyed grass (Sisyrinchium idahoense); kneeling angelica (Angelica genuflexa); white + pink foxglove; a few small black ants (pavement ants?) exploring abandoned digger-bee nests? or miner ants of some kind? Powdery mildew on the bigleaf maples common this year. Western tent caterpillars everywhere, including the

















July 4, 2022 (day 2543, 2192+351): (**) 1409.7 mm (norm. 1107 mm).



Photograph right, unfamiliar? it shouldn't be. Urtica dioica.

July 14, 2022 (day 2553, 2192+361): (**) 1421.2 mm (norm. 1115 mm). Weir +52 mm WPB scale. RDN outer gauge 1853 mm. [cal. datum: weir -0.595 m, RDN outer gauge +0.903 m, $\Delta = 1.50$ m]

Weirpool level quite normal for time-of-year. Pond leveller only just below water level and flow just a dribble, not sufficient to keep Coats Marsh Creek from drying out before reaching the Marsh Trail culvert, but the "lake" is at an all-time high— 200 mm above the previous record.

Crossing the dam is now hazardous and not recommended, thick vegetation (rushes and above-head-high canary grass) and copious LWD on the downstream side, scarcely visible underfoot. The LWD appears to be mostly rotting fist-sized tree-branches put there either by the beaver or by water spilling over the brim of the dam. Two or three spillways to release water when the level is too high; also used by the beaver to cross the dam.

Swainson's thrush. A bird you hear a lot among the trees but hardly ever see except perhaps in silhouette against the sky. In the old days, would have needed several rolls of film to photograph this one. For a long time I have been assuming that all the aspirated "whit" calls heard were Pacificslope flycatchers, but this one proved me wrong.









With the increased water-depth, some open water. Good to see.

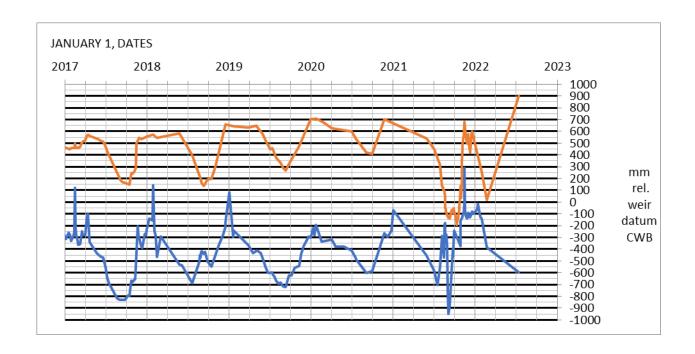


Mud berms now reducing flow around the ends of the dam. Syphon system not functioning and almost buried. No longer an eyesore.





Ducklings shedding their juvenile plumage. Saw 15 of them swimming single-file across some open water. Many others have probably left.



<u>July 17, 2022</u> (day 2556, 2192+364): (**) 1427.1 mm (norm. 1117 mm).

Observation year rainfall 28% above long-term average. High, but not

THAT CONCLUDES SEVENTH YEAR OF OBSERVATIONS AT THE MARSH.

July 22, 2022 (day 2561, 2557+4): (**) 0.0 mm (norm. 6 mm).

Behind-the-times RDN has mowed the nearby 707 trails thereby turning interesting hymenopteran habitat into a forb-free imitation of a suburban-lawn monoculture. No unkempt, unruly nature here!

Sadly lost were thimbleberries along the edges, and the entire *Torilis japonica* patch in the 4-foot at the NE Arm spillway, the latter turning out not to be as invasive as at first feared and probably more at home in prairie habitats.



a record.

Little Creek still running if only a drindle.









The mixed stands of trees in the parafluvial zone make good habitat for beavers and cavity-nesting ducks. The zone is too wet for most conifers, and the dominant tree species by far is red alder, but there are occasionally other deciduous trees such as willows, crab-apples, cherries, and cascaras. The resident beaver spends quite a bit of its time at the east end of the lake where mixed stands are more common than around the weir.

Sand wasps in the hard-pan tread of a main trail.

Bats are back at the rocket house.

Transient species of lake ducks (those that need open water to take







flight) will appreciate the work of the beaver, who has made parts of the lake too deep for watershield.

Reed canary grass (RCG) is in several ways an invasive pain, but it does at least help reduce human disturbance.

July 31, 2022 (day 2570, 2557+13): (**) 0.0 mm (norm. 19 mm).

Precipitation in July, 59% above long-term month's average, but summer arrived in the past ten days. Annual rainfall so far this year 5% above average. Some creeks either still trickling or ponded, but that won't last long.

August 7, 2022 (day 2577, 2557+20): (**) 1.7 mm (norm. 25 mm).

Quiet, sunshine and soft breezes. Spring flowers are over; grass gone to seed, turned from green to golden yellow; no ravens; few song birds, only juncos, fox sparrows, and towhees seen; deer and fawns

have retreated down to the coast.





Therion morio, one of hundreds of species of wasp that live here. This one specializes in caterpillars.



But the exotic flowering "weeds" — a few thistles not yet shedding down, ubiquitous cat's—ears, tansy ragwort, and end—of—their—season oxeye daisies—are keeping bees, wasps, beetles, hover flies, dragonflies, damselflies, butterflies, and more, very active.

The red-listed dark wood nymphs (Cercyonis pegala ssp. incana) are unusually numerous this year and have fluttered and flickered away from their usual grassy haunt to places where I've never seen them before, all the while rarely settling, and when they do, distaining to pose for the camera with open wings. Also saw a wasp buzzing a nymph which the butterfly successfully evaded with its erratic manoeuvring.

Woodland skippers also very numerous this year. Creeks dry. Lake level high and still habitat for a few ducks, mostly mallards.

August 14, 2022 (day 2584, 2557+27): (**) 2.3 mm (norm. 28 mm).



Young mallards still on patrol, single-file. Counted ten. Possibly an extended family as there were mature hens around not taking part in the parade.

This late in the season must be second brood(s). A good sign of the state of the marsh, so much better than last year when the RDN's ill-advised syphoning began and rotting aquatic vegetation was the lake's most notable feature; an effort quickly negated once autumn rains began.







<u>August 16, 2022</u> (day 2586, 2557+29): (**) 2.4 mm (norm. 28 mm). Cistern +164 mm SCB. [cal. datum: cistern +0.531 m].

<u>August 18, 2022</u> (day 2588, 2557+31): (**) 2.4 mm (norm. 29 mm). Cistern +154 mm SCB. [cal. datum: cistern +0.521 m].

Evapotranspiration loss 5 mm/day for hot summer days, as has been measured before.

Visit at dusk. A delight. No wind and the darkening blue sky in the east streaked with high-altitude clouds catching for a few moments the last of the light from the setting sun and turning themselves a bright candy-floss pink. The surface of the water in the cistern dimpled by countless unseen insects as if by a shower. Dragonflies (blue dashers included) and small green treefrogs among the reeds. Ducks stretching and flapping their wings far off.

If only the experts planning this peaceful ecosystem's future would recognize that the beaver dam poses little danger. Mature beaver dams do not fail catastrophically, unless of course they are on a mountainside. Any backhoe operator who has been charged with removing one can testify to that. Breaches and overspills can be accommodated by increasing the flow-through capacity of the weir, which is the potential bottle-neck. A sluice-gate would work. There's little shortage of capacity in the water channel downstream of the weir, and the sluice-gate's main role would be to see that the level in the inner weirpool doesn't threaten to overflow the berm that protects the private property. There's been no hint of that so far largely because once the wooden deck across the weir is harmlessly inundated the effective width of the weir is increased ten-fold. It happened at least three-times last season.

The syphon experiment has been a failure. The syphons capacity is far too low, becoming irrelevant in flood conditions; the pipes are an eyesore; drawing the lake water-level down in summer is destructive on account of the wetland's shallowness, and is in any case ineffective because the "lake" replenishes itself in just two or three weeks in the fall; liability is largely a fiction; and the need for a regular human presence on the dam for maintenance of the syphons seriously disturbs the wildlife and wastes park operators' time.

Let nature manage itself as much as possible; it does a much better job.

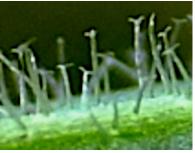
August 23, 2022 (day 2593, 2557+36): (**) 3.1 mm (norm. 31 mm).

Lesser Hawkbits (*Leontodon saxatilis*) ¹ finding a secluded spot to promulgate surrounded by head-high reed canary grass in Canary Grass Meadow. Woodland skippers.

¹ Cat's ears? Leaves hairy, hence not *Hypochaeris glabra*. Stems leafless unbranched with single flower; basal leaves only shallowly lobed, hence not *H. radicata* either. Bristle tips forked, hence hawkbit.]









Consperse stink bug
(consperse = thickly and
irregularly dotted).
Not everyone's favourite
but this fellow was
quite harmless, just
eager to return to the
meadow.

Canada goldenrod in bloom too nearby.

Hardly any sign of the powdery mildew (Sawadaea sp.) infecting the bigleaf maples elsewhere on the island.

<u>August 29, 2022</u> (day 2599, 2557+42): (**) 3.1 mm (norm. 34 mm). Cistern +109 mm SCB. [cal. datum: cistern +0.476 m].

Precipitation in August, 89% below long-term month's average. Not a record tho', we had no rain in August 1967. Annual rainfall so far this year 1% above average.

September 6, 2022 (day 2607, 2557+50): (**) 3.3 mm (norm. 40 mm).

A succession of warm, cloudless days. Everything waiting patiently for the fall now that all of summer's tasks are done. No suthering in the high canopy, just a raven-less tranquillity, a silence broken only by the tap-tap-tapping of a woodpecker and the chattering of a squirrel. A stillness, broken only by a garter snake on the path; a lone young crow, recovering from a wound but lively and foraging like a towhee; the occasional flower of a lawn-weed suddenly nodding as a visiting insect comes and goes; militaristic-looking dragonflies on patrol; and sundry tiny UFOs in shafts of sunlight. Sun-burnt grass has become un-mown hay; greenery is green in the forest's shade but looks duller and dusty, limped by dryness. Moss in the clearings crunches underfoot, like snow; and tawny leaves litter the ground before their time.





Down at the lake, there're a few ducks, not many, but more than ever before at this time-of-year.

Pondweed easy to miss among the far more common watershield. Potamogeton spp., but P.gramineus (grass-leaved) or P.epihydrus (ribbon-leaved). Still not sure. Polygonum amphibium, water smartweed.



September 15, 2022 (day 2616, 2557+59): (***) 23.6 mm (norm. 50 mm). Cistern +61 mm SCB. [cal. datum: cistern +0.428 m].

*** El Verano rain gauge (significantly more than the amount on each of the other two, and heavy rain confirmed independently on Gabriola).



First rain of the fall. Estimated low point of the lake before that, cistern approx. +0.408 m, similar to late-September 2020.

Flocks of wood ducks on the water and circling overhead. Gone later that day.

September 19, 2022 (day 2620, 2557+63): (**)
23.7 mm (norm. 57 mm).

Northwest Hydraulic Consultants busy surveying the weir embayment. Looks like a heavyweight company. Observed was that the drainage trench that runs the length of the marsh was dug down to bedrock sometime in the years when it was just a pasture (https://nickdoe.ca/pdfs/Webp697.pdf).

Witch's hair (Alectora sarmentosa) and Methuselah's beard (Dolichousnea longissima) are easy to confuse. If in doubt, I tend to favour the former as it is more common, but

not always. Although M.'s beard is more likely to be found in old-growth, it still appears to be present locally within the RP.

September 28, 2022 (day 2629, 2557+72): (**) 23.7 mm (norm. 76 mm).

Dusk. The fall equinox now passed, familiarity a better guide to the way home than the failing light. Stillness still. Bats over the water, flying so fast they're just a blur.² The beaver cruising along the northern shore; a welcome sight.

<u>September 30, 2022</u> (day 2631, 2557+74): (**) 23.7 mm (norm. 80 mm).

Precipitation in September, 53% below long-term month's average. Annual rainfall so far this year only 3% below average.





No transient waterbirds yet, always interesting to watch out for them. So important to keep human disturbance at a minimum at this time of year, unlike last year when the unnecessary and ineffective RDN syphon project was installed and activated.

Wood ducks will never be the fixtures in the ecosystem that the spotted towhees (*Pipilo maculatus*) are, but just recently it sometimes seems that way.

October 11, 2022 (day 2642, 2557+85): (**) 23.7 mm (norm. 113 mm). Cistern -4 mm SCB. [cal. datum: cistern +0.363 m].

Twenty-five days with not a drop of rain. At least a dozen or so wood ducks still around. Ravens have been back for a while. Coats Marsh Creek dry.

No transients, but there are overnighters in the Farrow Spring wetland (MOTI Pit Pond). Mallards in their glossy winter coats.

² Faster than the violet-green swallows that are here in summer.

October 14, 2022 (day 2645, 2557+88): (**) 23.7 mm (norm. 128 mm).

Endless blue-sky days; nevertheless, the first winter-residents have arrived. Northern shovellers, mostly with bums-in-the-air, evidently hungry after their journey over the mountains from back east. Looking happy to be here. A paired-couple of relaxing wood ducks watch on from their vantage point among the reeds.

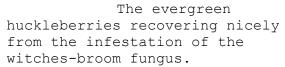






Jam-making berries
have done rather
poorly this year, but
others like hips,
haws, snowberries, and
holly berries are
exceptions as these on
a holly bush in Canary
Grass Meadow show.

Cedars flagging, a species slowly returning to the moist and shaded mountain-valley bottoms they came down from just a few millennia ago.



Haying, if there had been any, would have been good. The seedy, golden grass stirring a deep-seated ancestral memory of the joy of a bountiful harvest.



Some of the leaves of the alders, shrivelling and yellowing, not waiting greenishly as they usually do until nights are cold and the daylight dims. The trees' denuded

branches a stark anachronism when silhouetted against a background of summery-skies.

New signage at the bat-house at the Stump Farm site. Signage that's needed, I suppose; but for me, an unwelcome, intrusive reminder of whom this intended nature reserve is actually really for.



Photograph taken by Libby Gunn included here with her permission (thank you). Quote: "I took it on the afternoon of October 13 (I am working relief on Entrance Island light station and was in the Coast Guard helicopter en route from Nanaimo)."

There is an annotated version in the updated Brief History File 697.

October 18, 2022 (day 2649, 2557+92): (**) 23.7 mm (norm. 139 mm). Cistern -21 mm SCB. [cal. datum: cistern +0.346 m].



Ring-necked ducks have arrived. The still air has a blue-grey haze, the faint smudge from distant wildfires. A warm welcome for these regular winter residents.

October 30, 2022 (day 2661, 2557+104): (**) 63.1 mm (norm. 190 mm).

Rain at last, though light and hardly the atmospheric river predicted. Frequent dry spells occurring all day, seemingly with about the same frequency as commercials in a televised ice-hockey game.



Precipitation in October, 62% below long-term month's average.

Annual rainfall so far this year 11% below average.

Deer on the beaver dam.

Lush greenery has almost completely obscured the syphon system, which remains inactive.



Wood ducks (lots), both male and females, a new development in recent years. Only other waterbirds seen were a small group of Canada geese and a small group of mallards.

Ducks may well have been sheltering out-of-sight; they seem to do this in the afternoons no matter what the weather. Some species seldom seem to visit however; no northern pintails, ever, and no teals for several years. Greater yellowlegs also rare. All fairly common species on Dicks Swamp; perhaps they prefer the flooded fields there. Can only hope the widgeons and buffleheads will be back one day soon, like they always used to be in winter.

Water level in the weirpool very low, but in the outer lake, the level is normal at the end of the dry season.

November 19, 2022 (day 2681, 2557+124): (**) 119.8 mm (norm. 294 mm).

Despite this being $una\ ni\~na$ (ENSO wet-cool) climate phase, it has not been very wet or even cloudy of late; a tad humid perhaps and cool with the first snow of the season on the 8th, and today a skim of ice along the shaded south-shore of the lake.





Newcomers. Buffleheads, all females, and several mixed groups of green-winged teals joining the wood ducks and ring-neckeds out in the sun. Teals haven't been seen here for five or six years.

Canada geese have been passers-by on migration, some honking flocks being quite large, but they don't stay long.



Left: Autumn snowdrops.

Mycenaceae of some sort, uninformed guess. Common in fall, tiny (<10mm cap, 1mm stalk); on Douglasfir needles and rarely on well-rotted cones, often in moss, bell-shaped or conic cap w. knob; chalky white when fresh, with age turning tan and becoming duller starting with the knob and base of the stalk, margin maintaining its lightness; gregarious, single (not cespitose); gills adnexed/adnate, fairly close, uneven; cap easily detached; margin wavy (striate); when old, light brownish-gray (only rare individuals and groups reddish or orangey), the knob darker; no odour; no blue or yellow; flesh and the hollow-stalk watery. Too many species that nearly fit!



November 23, 2022 (day 2685, 2557+128): (**) 128.9 mm (norm. 317 mm).



The bufflehead lads are in town checking out the scene.

Was that a blue-winged teal? Looked unusual but the camera failed to make sure of it. Both mallard and wood duck hens have a bit of blue in their wings, but not a lot.



Comment January 2023: it's a female wood duck, not a teal.



According to Pojar & MacKinnon, frog pelt lichen (Peltigera neopolydactyla) 3 comes in three colours: olivegreen, milky blue, and dark slate-blue. Most other references I've looked at mention only gray (slate).

The olive-green variant, shown here growing in the park alongside the more common slate variant, sometimes has

upturned edges thereby revealing its whitish underside. When it does this, the edges often look at a glance like white flowers blooming at a very strange time of year.



Apothecia?
spore cases,
on the
margins;
(left).

Rhizines
tufted (upper
right, near
finger);

holdfasts on the underside for anchoring the lichen to the substrate.

<u>Veins</u> on the underside, sometimes indistinct (*lower right*, *near thumb*); lichen veins are more like ribs than veins as they're structural and nothing flows through them.



Many look-alikes in the Peltigeraceae family, don't quote me



Song sparrow in winter. At home in the marsh.

November 30, 2022 (day 2692, 2557+135): (**) 147.8 mm (norm. 358 mm).

Frost making the browned fallen leaves of the alders and maples crunch like cornflakes underfoot. The lake surface mostly crizzled, like frosted glass, but there are likely ice-free hide-outs in the reeds and weirpool for some of the ducks.

Precipitation in November, 53% below long-term month's average. Annual rainfall so far this year 19% below average.

December 5, 2022 (day 2697, 2557+140): (****) 228.7 mm (norm. 388 mm).
****Snowfall very variable (flakey). Based mainly on Gabriola.

There's been snow; powdery snow, as white as the white on the LED monitor I'm using to type these words, without hue or tint, and with only the faintest of grays. The landscape in the leafless-alder stands is just as one imagines it must always be in the winter up north in Canada.

Trudging the trails, each crump matching a heartbeat, is as if on the way up to some summit, or across a plain to some pole, or down some last alpine slope where finally is seen a village not far below where warmth and welcomeness will surely be.

Tall shrubs are arched over with their icy burden; twigs and small branches snapped from the alders by the frost and laden with pale bluish-green lichens litter the pristine white surface; and deadfalls lie across the way.

The trees in the sheltered backwoods stand motionless and silent as if in a painting or a photograph, and nothing moves through the evergreen undergrowth. It's deathly quiet. And the cold nips my fingertips.

December 9, 2022 (day 2701, 2557+144): (**) 266.7 mm (norm. 413 mm).
[rough estimate at the dam, cal. datum: +0.115 m]

Drizzle. A grey day. No sign of ducks out in the open. One duck, a mallard, circled the lake before settling somewhere at its far west end.

The lake level has dropped noticeably. Wouldn't think there had been much evaporation in the last two months though rainfall has continued to be well-below average, and all creeks in the area up until now have been nowhere close to running.

However, on checking today, I see that Coats Marsh Creek, the only outlet creek, is exceptionally running for no obvious natural reason. My guess is that the RDN and the Nature Trust BC Park Management, for reasons only clear to themselves, 4 must have started their misguided syphoning and quite unnecessary disturbance once again, just as the winter population of ducks was settling in.

Running water might have helped keep the weirpool relatively ice-free while the outer lake remained frozen; hence the choice of the mallard I saw reconnoitering.

A small mercy is that the dreary sky promises that the drizzle will become steady rain later on.

December 10, 2022 (day 2702, 2557+145): (**) 277.1 mm (norm. 419 mm).



The cistern at the east end of the lake built for watering livestock when the marsh was drained. Normally the concrete walls are below water level. For some reason, the water in the cistern often remains ice-free when the lake surface is frozen. At such times, it used to serve as a refuge for ducks and it was not safe to come here until, as here, there was a thaw. Happens less often these days.

_

⁴ The current rainfall since mid-July is about 40% less than the long-term average.

[rough estimate at the cistern, cal. datum: +0.012 m]

No doubt syphoning underway, the lake level is at a summer-time low and exposed aquatic vegetation is apparent all around the shoreline. There are just a few female buffleheads and mallards out.

East Path Creek and Stump Farm Number 1 Stream running. Nothing yet from the NE Arm. The ravens are back.

December 25, 2022 (day 2717, 2557+160): (****) 378.4 mm (norm.
511 mm). ****Snowfall very variable. Cistern -246 mm SCB. [cal.datum: cistern +0.121 m].

Snow, about 18 inches, and cold, down to -8°C , then a rapid thaw up to $+9^{\circ}\text{C}$ up here, 2°C less at sea level. The lake coated with slush, and the woods mysterious with mists as warm air struggles to displace the cold. The small, spherical, crystalline balls of ice arrayed along bare branches and adorning the fir-tree needle tips have become raindrops.

Lake level up and East Path Creek is running strongly; trails are "sloughs" and bepuddled everywhere; and ice holding a lot of water back. No trace of wildlife beyond deer tracks and one overly-optimistic frog heard coming out of hibernation.

December 27, 2022 (day 2719, 2557+162): (****) 394.5 mm (norm.



523 mm). Cistern +297 mm SCB. [cal. datum: cistern +0.664 m].





Wet season begins in earnest. Cistern startlingly transformed to look like it usually does at this time of year (photo above).

Two spillways on the beaver dam flowing, and lake water is trickling over the whole of the crest of the dam, within inches of overflowing (photo above);

the lake level has risen over half a metre in just two days;

the SE corner of the wooden deck at the weir is at the weirpool surface level (photo left);

East Path Creek flowing across East Path, its culvert full, though the SE Arm wetland is not yet receiving water from the High Point Meadows;

Stump Farm Number 1 Stream also flowing more strongly than the



culvert under the Three Gates Trail can handle;

Flow from the NE Arm moving over East Path and through the trail's rocky substratum as it does most winters (photo above);

Stump Farm Number 2 Stream flowing but within its culvert; Coats Marsh Creek flowing rapidly and noisily but not yet at previous flood levels; and

water is also flowing freely over East Path at the drainage point north of the NE Arm outlet.

Some ducks are back: ring-neckeds, buffleheads, and mallards; the usual suspects.

December 31, 2022 (day 2723, 2557+166):(****) 402.9 mm (norm. 548 mm).

**** from December 17 to 31, precipitation records taken from Duncan and Entrance Island as appropriate when compared to Gabriola at El Verano and snow depths along Hess. Very variable. Several records absent or obscured by snow, and assumed to be wrongly scaled for SWE at Entrance Island.

Precipitation in December, 36% above long-term month's average. Annual rainfall his year was 10% below long-term average.

2021 addendum on past rainfall moved to File 698

2022 Precipitation notes.

On or shortly before May 14, 2022, precipitation figures stopped being available from Nanaimo Airport (NanRG). Substitute figures for the rest of the year reported in this file were obtained mostly by averaging figures for Nanaimo City Yard and Entrance Island indicated by (**).

Neither of these substitute sources was of high quality and were missing a few figures. Figures were taken for Duncan for Nanaimo City Yard and Southern Gulf Islands for Entrance Island where necessary. Exceptions occurred on September 15, (***), when heavy showers on Gabriola indicated an underestimate, and on December 5, 25, 27, and 31, (****), when heavy snow led to missing or inconsistent numbers.

In late December, Environment Canada introduced a new "location" to compensate for the loss of Nanaimo Airport figures described as Nanaimo but covering Duncan, East Vancouver Island, and Nanaimo. A comparison between the figures I used in this file and figures from the new site are as follows.

	this file	new		this file	new
		Nanaimo			Nanaimo
Jan	147 (100%)	147	Jul	37 (86%)	43
Feb	59 (98%)	60	Aug	3 (150%)	2
Mar	66 (100%)	66	Sep	21 (175%)	12
Apr	160 (91%)	175	Oct	40 (71%)	56
May	73 (87%)	84	Nov	84 (69%)	121
Jun	63 (86%)	73	Dec	255 (109%)	235

Annual for this file 1007.4 mm (94%), for the new site 1073.2 mm. The new location usually gives higher figures than the old method, presumably because the new location does not use data from the Gulf Islands. For historical trends, data more recent than March 2022 cannot be reliably used.

◊ previous file next file

<u>January 4, 2023</u> (day 2727, 2557+170): VieRG cum. 405.7 mm (norm. 572 mm).

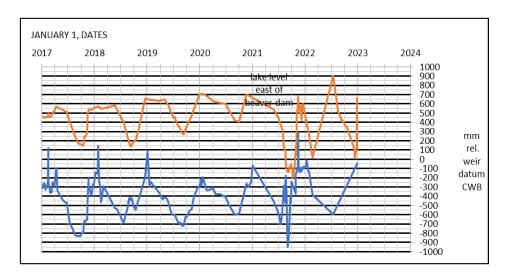
VieRG = Environment Canada Vancouver Island east (called "Nanaimo") total precipitation scaled by 0.95.

Day 0 (now 2727) = July 18, 2015. Cumulative for current rainfall-year, now at day +170, started on July 18, 2022 at day 2557 +0.



Trumpeter swans with curious mallards and ring-neckeds greeting them. $\underline{January\ 5,\ 2023}$ (day 2728, 2557+171): VieRG cum. 407.3 mm (norm. 578 mm).

Syphoning re-started despite for the second year having failed to significantly reduce stress on the weir.



<u>January 12, 2023</u> (day 2735, 2557+178): VieRG cum. 519.1 mm (norm. 619 mm).

Large flock of ring-neckeds (40+). Much rain; occasional gusts of wind ruffle the canopy sending down sudden showers of splattering mega-drops.

<u>January 18, 2023</u> (day 2741, 2557+184): VieRG cum. 553.8 mm (norm. 653 mm). Weir +582 mm WPB scale. [cal. datum: weir -0.065 m].





Canary Grass Meadow, once, long-ago, a permanent body of water, now a vernal wetland, at the moment a tawny sea of grass battered to the ground by the season's snow.

The duff under deciduous trees—mostly alder and maple—at this time of year provokes thoughts of a problem facing both

physicists and philosophers, the very nature of reality about which there is no general consensus. 1



The small (old) beaver dam, a motley collection of debris sealed with mud, a metre or two upstream of the weir, is holding back enough of the flow from the weirpool to prevent flooding at the deck of the weir.



¹ The colour of rotting leaves transitions from green, through optional red/orange/yellow to brown, and from brown to dark brown (a sometimes-handsome bronzy colour), and to finally black. But is black a colour? Colours are not intrinsic properties of light. I'm reminded of this when I walk the trails at this time of year. My camera's electronic viewfinder "sees" some *black* dead alder leaves as being, not black as I do, but as being dark-green. If the human eye were to be equipped with an infrared-sensitive cone, what never-before-seen colour would these *black* leaves have? Nobody knows and the answer can't be imagined. So does this mean that philosophers' qualia are real? And are we to leave physicists to wrestle with the quandary that the seemingly flawless theory of quantum mechanics holds that objects may have properties that are not defined prior to them being "observed". Bell's theorem and entanglement. Stuff like that. Destination-less pondering while wandering destination-less trails.





The "lake" is close to being full with water gently moving through the

several spillways that the beaver allows in its bigger dam.



The syphons evocative of images of RMS *Titanic*.

<u>January 31, 2023</u> (day 2754, 2557+197): VieRG cum. 572.4 mm (norm. 723 mm).





January precipitation 2% below the monthly normal.

An inch or two of snow overnight, precipitation changing throughout the day from light sleet to drizzle. Everything looking "normal" for the time of year (duck population, creeks running sedately, lake level fairly high).

Fairy laundry? (*left*, snow flakes caught in spiders' webs).



Word-on-the-street is that there is hair ice about, 2 so camera at the ready I went searching for it along the east end of the Marsh Trail near where it had been reported. But, no luck. By the time I was there, if there had been any where I was looking, it would have melted. Hair ice's formation depends on the presence of the what-we-used-to-calljelly-fungus Exidiopsis effusa (E.e) but good luck trying to find icefree pictures of that for guidance.3

The search was however not without interest. It's not often I study what's growing on rotting wood, this time on red alder.

The common crust fungus Phlebia tremellosa, 4 (gelatinous woodcrust, jelly rot), (left, next page left and bottom)
I'd take to be angel wings, Pleurocybella porrigens without close-

up inspection.⁵ I used to eat them long ago, now ranked as poisonous. When you look at these supposed angel wings close-up, you find the cap, if there is one is paper-thin and stalkless, almost like a lichen, and the gills underneath? they just aren't there. There's nothing angelic about these fungi.

² "Hair ice" is related to "pipkrakes" which also appear in the park: File 673j, p.158, Feb. 2, 2017.

³ E.e has not been identified in BC, but though not common E.calcea, E.diversa, and E.plumbescens have.

⁴ Formerly *Merulius tremellosus*.

⁵ Formerly *Pleurotus porrigens*.



Occasionally you see them sheetlike without a shelf, which if you're looking for *E.e* based on the one or two pictures shown on the Web, you might get excited about, but perhaps without evidence of hair ice, undeservedly so.(bottom) They sometimes grow on conifers which hair ice seldom if ever does.

While examining dead or dying deciduous trees in mid-winter, you might not expect to find oyster mushrooms; however, the winter oyster, Sarcomyxa serotina, 6 fruits in late fall and I think I found some



growing
alongside
some jelly
rot. Maybe
because they
aren't good
to eat, they
don't
receive a
lot of
publicity.





⁶ Formerly *Panellus serotinus* and before that *Pleurotus serotinus*.



Another serendipitous find on this snowy day was hairy parchment, Stereum hirsutum. The hairy surfaces of the imbricate caps not obvious without using a loupe or, better yet, a microscope. The hairs are the colour of the cap and densely matted like fur. Not rare, just hadn't taken notice of them before. If you don't look, you don't see.

<u>February 6, 2023</u> (day 2760, 2557+203): VieRG cum. 611.1 mm (norm. 753 mm).

Another oyster-like mushroom on decaying alder; this one without a common name, Scytinotus longinquus ssp. pacificus.



Off topic note: The Coats Marsh weir replacement has been estimated to cost about \$955,000 by consultants hired by the RDN. The current budget is for \$414,000 of which about \$56,000 has already been spend on assessment studies and syphoning leaving a shortfall of around \$597,000.

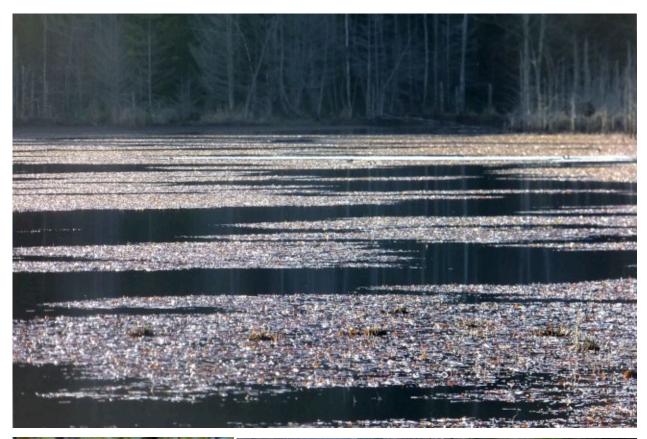
No word on the beaver's estimate. Not been seen for a couple of months.



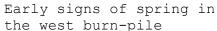
Also known as *Panellus longinquus* and *Pleurotopsis longinqua*. "Pink oyster" is a name already taken by a tropical species, so I'm going with "rosy oyster", which somebody has already suggested.

February 7, 2023 (day 2761, 2557+204): VieRG cum. 622.9 mm (norm. 757 mm). Weir +552 mm WPB scale. [cal. datum: weir -0.095 m]. Cistern -187 mm SCB. [cal. datum: cistern +0.180 m].

Draw down continuing. Lake now at the late-summer level and decaying watershield at the surface. Water needed for summer being syphoned away into Coats Marsh Creek. A few scattered buffleheads and a small flock of 20+ ring-neckeds. No other species seen.









clearing. LBMs (how do they survive the hard frosts?). ID usually a bad guess: in grass and moss, *Conocybe*? Dunce caps. New crop of broom showing signs of life.

Meanwhile, the hair-ice project goes on. The mystery is that *Exidiopsis effusa* (*E.e*), widely acclaimed to be the fungus catalyst for the formation of hair ice, does not appear in any professional/academic list for either BC or Washington State. Yet, rare though the weather conditions may be for the formation of hair ice, when it does occur it occurs in at least three separated locations on just Gabriola alone (Cox CP, Commons, and 707 CP). So, the fungus responsible may be rare, but not all that rare.

So based on reports, we should look for a fungus that resembles *E.e*, lives on decaying decorticated (barkless) alder branches, usually fallen, not more than a few inches thick; found on Gabriola in the same locales as hair ice; but not common. It's a tall order because there's no guarantee that such a fungus is fruiting in mid-winter. Holes in decaying alder are frequent, but at 1-mm diameter and scattered, they are likely the work of woodboring insects.

What does E.e look like? For the non-mycologist (myself included), at a glance, a mold on rotting wood. Not unlike some dust or crust



lichens. Ommonly white, smoky, without the grayish-green tinges that the many patches of the lichen have on the bark of living alder trees (those patches that are so profuse and ubiquitous they make

all our alders look like birch trees) (right and A below).

On looking around, I saw a few examples looking friedegg white, but they were absent from the



rotten branches on the ground where examples of hair ice had been reported. The only example that at least fitted the locale, habitat, and relative scarcity was the regular-looking mushroom with stipes and gills, *Marasmiellus candidus*. It fruited showily a week after the hair ice observations.

⁸ The only article I've seen confronting *E.e*'s absence in N. America in the hair-ice context is by Jan Thornhill, Mycophile, March-April 2014. He records an unidentified *Pyrenomycetes* (flask fungi, including the *Hypoxylon* genus) as one possible *E.e* alternative.

⁹ Translated from the French in the MycoDB global database of mycorrhizal fungi. Contribution by Eric Diaz. "When fresh (0.3 mm thick), forming like a soapy coating, very finely pellicular when dry. At first, appears as small irregular spots that eventually coalesce. Hymenial surface smooth and dull, separable into a thin fragile membrane, pruinose, light pink, peach-blossom, silvery-bluish, whitish-gray, pale discolored on drying. Irregular but clearly limited margin." Entry (*fiche*) with photographs. Another source https://www.verspreidingsatlas.nl/0400030.



Another sighting that was decidedly unlike a regular mushroom was on a decorticated standing but longdead arbutus tree. I imagined it to be a dust or blemished lichen. Perhaps Phlyctis argena (whitewash lichen, a name given to several species)?

However, under the microscope (B

below), it looks like scattered white "pom-poms" in the <100 µm dia. range with short bristles and matted together into a soft powdery network [mycelium?] of fine threads [hyphae?] that hold it together; it's easy to scrape off in a sheet despite its open structure. Quite different from the very common bark lichens on the island's red alders (Ochrolechia, Rinodina, Lecidella spp, etc.).



What was a surprise is that this is not nearly as uncommon as I at first thought. A little later I found that it, occasionally but not rarely, grows, outof-sight, on the <u>inside</u> of alder bark that is being

shed from decaying trees. This unsunned environment is not where you'd expect to find organisms like lichen that rely on photosynthesizers (green algae and/or cyanobacteria). So, not a lichen, but maybe a species of white rot.¹⁰

Hair ice strands are only about 20µm thick so looking for individual holes isn't going to be successful even if they exist. Some trees in the vicinity do however sport intriguing arrays of holes (*left*) not linear enough to be the work of sapsuckers. Maybe created by the





White rot breaks down the lignin in wood, leaving behind holocellulose, which is spongy and soft. Brown rot does mostly the converse, leaving lignin intact and breaking down the holocellulose. Soft rot affects only dead wood and acts mostly as brown rot, but includes some breakdown of lignin. It is not as aggressive as the white and brown rots, but is less sensitive to biological resistance to decay, and to environmental constraints.

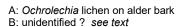
fruiting bodies of something deep in the wood. No idea.

Lecidella spp., crustose lichens, create little black dots and are said to live around here perhaps on alder, but the correlation with the dots and the crustose lichen I see is puzzling. Crustose fungi that might be here in BC are Diatrypella verruciformis, Hypoxylon fuscum, and those in fn.3, particularly Exidiopsis plumbescens; but maybe they're too rare to be what we're looking for. I'm lost. Time to move on.









A (donuts, apothecia) 1 mm; B (white dots, soralia?) 50-100 μm.



February 13, 2023 (day 2767, 2557+210): VieRG cum. 634.8 mm (norm. 785 mm). Cistern -234 mm SCB. [cal. datum: cistern +0.133 m].

Draining continuing. Only remnants of the usual winter duck population present.

Somebody expecting a lot of rain?

February 18, 2023 (day 2772, 2557+215): VieRG cum. 645.0 mm (norm. 808 mm). Cistern -185 mm SCB. [cal. datum: cistern +0.182 m].



Coats Marsh Creek ponded but unexpectantly not flowing. Lake level has risen a couple of inches. Ring-neckeds at the west end, at least 20 of them. East Path Creek, NE Arm outflow, Stump Farm Streams, no flow. All points to syphoning has probably stopped.

Adding to the effort to get to know the fungi on decaying wood, just so that if I ever do see hair ice I'll have some idea what to look for, I'll document this crustose species (salmon colour when dry as in the photograph, orange when wet). Seems to be rare on Gabriola but there is some within the CM ecosystem. Maybe *Peniophora incarnata*? but I'm no expert at this. Just an interested but uninformed rambler.



Sun warm, we're two-thirds of the way from winter solstice to spring equinox.

<u>February 24, 2023</u> (day 2778, 2557+221): VieRG cum. 660.7 mm (norm. 833 mm).



Snow 2-3 days ago, start of Lent. About 6 inches. Time to pull on my bought-in-Alberta boots and go trudging into a world full of untrodden places. Too cold for hair ice but established where to look. Snow glistening like icing sugar in the sun and the tall shrubs and branches of trees arched low over the path, daring you to creep underneath without provoking an icy shower.

Green burgundy stink bug, Banasa dimidata, hibernating under peeling alder bark.

Looking back at my notes, I'm embarrassed to see how confidently I identified species of plants and insects, backed up by not much more than pictures in popular nature guidebooks, a search on E-flora and E-fauna, or a rummage through Google images. I should have been a great deal more cautious, especially when species' possibilities number in the hundreds, as with lichens for example, even after hundreds more have been eliminated because they don't live here on the coast, are too rare, or

you'd need a microscope or DNA analysis to sort them. So here are a few pictures of epiphytes and saprobes on mostly red alder bark I took in the Little Creek and East Path Creek catchment areas, without any definitive ID., just suggestions: Ochrolechia laevigata [not Thelotrema?], Rinodina hallii, Lecidella elaeochroma, Trentepohlia aurea [not GaLTT trail-mark paint], Phlyctis argena?[whitewash]. On dead conifer Aleurodiscus grantii. Graphis scripta is very hard to find in the RP area, though occasionally seen elsewhere on the island.







February 28, 2023 (day 2782, 2557+225): VieRG cum. 688.0 mm (norm. 849 mm).

Precipitation for February 3% below its monthly long-term average. Annual 2% below average for this time of year.

Lake access snowed in at the moment, but I doubt that it's seriously frozen.

March 1, 2023 (day 2783, 2557+226): VieRG cum. 693.6 mm (norm.

852 mm). Cistern +55 mm SCB. [cal. datum: cistern +0.422 m].

Mossy maze polypore, Cerrena unicolor, on dead wood on the ground near Stump Farm.

Lake level up.

March 5, 2023 (day 2787, 2557+230): VieRG cum. 716.3 mm (norm. 867 mm).

Another bug, this one quite awake, quite harmless, not at all interested in things with backbones, hunting in the moss and lichen on an old grand-fir stump.

Bdellidae family, possibly Neomolgus littoralis, a relatively large mite, called a snout mite, though more than two kilometres from any beach where they're commonly found.

saprobes in the Little Creek

More epiphytes and

catchment where the soil is poorly

drained, and alder is the dominant tree (Alnus rubra). Redcedar (Thuja plicata) and Douglas-fir (Pseudotsuga menziesii) co-exist, and grand fir (Abies grandis) is abundant and was logged way back. Arbutus and maple are virtually absent; hemlock rare, holly thriving.

Brown rot, looks like Porodaedalea pini, no doubt along with others. Crust fungi, Ganoderma sp.?? Tiled something, chalky; on the inside of grand-fir bark(? but not oak) well-rotted stump. Familial lichens, Lecanora sp. left? Bracket fungi, likely white cheese polypore, Tyromyces chioneus, nice smell, wrongly IDed in Webp673m.pdf.









March 9, 2023 (day 2791, 2557+234): VieRG cum. 722.1 mm (norm.
881 mm). Cistern +278 mm SCB. [cal. datum: cistern +0.645 m].

Numerous ducks, nearly all ring-neckeds with a few mallard couples. Inlet creeks all running with snow melt. About six percent of our precipitation falls on average as snow.





Noticed that my fungi species <u>list</u> doesn't include the large bracket fungus, red-banded polypore, Fomitopsis pinicola (above and to the *left*).







Similar to the artists' polypore, Ganoderma applanatum, (above and to the left) also found in the RP

area. This species has lots of brown dust-like spores; that's a finger test on the underside. Large ones only seen on very old trees, which are sadly rare.

Left: Coral-like fungus, Ramaria sp., on Douglas-fir litter in East Path Creek catchment area (dated Apr.25).

Lake level back up to the normal, brim-full high at the beaver dam.



 $\underline{\text{March 14, 2023}}$ (day 2796, 2557+239): VieRG cum. 739.8 mm (norm. 898 mm).

A few more notes on the hair-ice stuff before I get back to the ducks.

Yellows (2) wood-rotting, decorticated hosts not identified. Too

conspicuous to be likely to be involved in hair-ice production.







A very strange one, not only from its appearance but from its host which appears to be a remnant of old unpeeled scaly bark near the moss'd base of an old Arbutus menziesii. 11

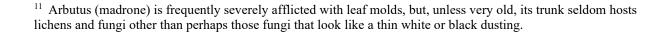
Pores somehow torn to reveal the tubes.

It looks like a picture I've seen of Daedalea quercina, but that fungal species doesn't grow here, and grows on oak, a tree rarely found in these inland

woods.

better guess might be imbricated timber polypore (Fomes fomentarius).

The inset, left, shows what might be a fungus beetle (Dacne californica?) on the fungus, if so, it's body length is about 3 mm. The height of the fungi array, above left, is 100 mm. mycelium resembles that shown on pp.ZA475/6, also found on arbutus.



Some examples of crust fungus occasionally seem to have mycelium visible; either that or they have a cobweb-like adornment generated by an insect or spider. It's unlikely they are hair ice on account of

the abovezero air temperatures.

Far left: Feb.1, 2023 +2°C

Near left: Mar.5, 2023 +8°C

Below left: Feb.16, 2023 +5°C





Finally, two pictures of a crustose fungus on wood lying very close to where I'm told hair ice was seen. But, as many references explain, "identifying the species of such fungi on the basis of purely macroscopic features is scarcely imaginable" (Fungi of Switzerland volume 2/#239).





 $\underline{\text{March 24, 2023}}$ (day 2806, 2557+249): VieRG cum. 746.0 mm (norm. 928 mm).



Buffleheads on the lake. They've been mostly absent this winter, though there are lots down at False Narrows. The number of different species of waterbirds has been unusually low. No widgeons is another example, though again there have been flocks down at the narrows.





Mallard couples.
Seclusion requested.

March 31, 2023
(day 2813, 2557+256):
VieRG cum. 754.4 mm (norm. 947 mm).
Cistern -75 mm SCB. [cal. datum: cistern +0.292 m].
Dry month.
Precipitation

39% below long-

term average. Cumulative annual to-date now 12% below normal. Winter precipitation (Oct.-Mar.) for 2022/2023 was 15% below average.

Level down to the late-summer level in 2019. Far too much to be caused by evapotranspiration.

Lichenomphalia umbellifera (lichen agaric) among lichen growing on a rotting redcedar stump. Has the habit of turning itself into a funnel shape as it ages, like an umbrella being blown inside-out in a gust of wind.

Flittering half-white carpet moths in the understory, and small clouds of smuts dancing in fleeting shafts of sunlight.

Buds are breaking open everywhere, but the woodland flowers are being more cautious than the flora down along the southern coast where bitter-



cherry and salmon-berry blossoms are ahead by at least two weeks.

<u>April 6, 2023</u> (day 2819, 2557+262): VieRG cum. 780.5 mm (norm. 962 mm). Cistern -218 mm SCB. [cal. datum: cistern +0.149 m].

Drizzle. The two major inlets (East Path Creek and NE Arm) are dry but the outlet Coats Marsh Creek is running.

Lake level down; it's up-and-down like a yo-yo these days. Open water diminishing. Numerous ducks but all seem to be buffleheads or mallards though two hooded mergansers reported. Transient Canada geese.

 $\frac{\text{April 9, 2023}}{969 \text{ mm}}$. Weir +503 mm WPB scale. [cal. datum: weir -0.144 m].

<u>April 10, 2023</u> (day 2823, 2557+266): VieRG cum. 821.2 mm (norm. 971 mm). Cistern -272 mm SCB. [cal. datum: cistern +0.095 m].

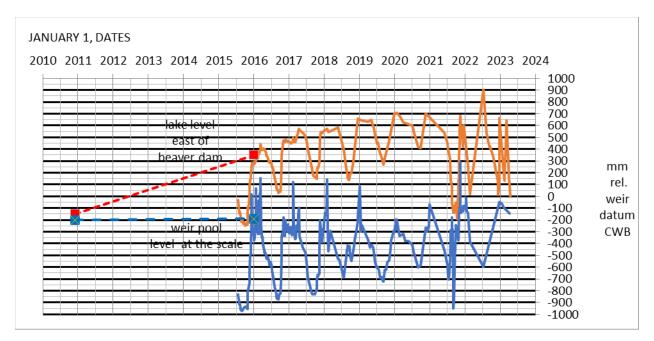
Swallows, snakes, and syphoning.

<u>April 17, 2023</u> (day 2830, 2557+273): VieRG cum. 833.2 mm (norm. 986 mm). Cistern -372 mm SCB. [cal. datum: cistern -0.005 m].

Swallows. Cold blustery SE wind buffeting the canopy. Spitting rain.

The RDN's needless draining of the marsh continues despite this being the start of the ducks' breeding season, tree-cavity-nesters hooded mergansers and wood ducks included. Creeks not running but ponded.





The old cistern, an unusual sight this time of year. Skunk cabbage at Stump Farm.







polypore, Cryptoporus volvatus, a species that rots recent deadfalls. It has evolved an unusual method (for a fungus) of spore dispersal. It provides shelter inside for wood-boring beetles, which emerge covered in spores from their hidey hole through a small hole in the underside.

<u>April 25, 2023</u> (day 2838, 2557+281): VieRG cum. 868.1 mm (norm. 1002 mm). Cistern -407 mm SCB. [cal. datum: cistern -0.040 m].

Coats Marsh Creek still running. Last year the RDN stopped syphoning in mid-March for the summer, to protect red-legged frogs they said. Not this year though, the marsh still being drained, assuming, that is, that there isn't an unrepaired hole in the beaver dam. Preparation for work on the weir in the fall? Who's to tell when hardly anybody outside the Nanaimo Offices knows what's going on.

Ducks in pairs, nearly all either mallards or buffleheads. Buffleheads as potential breeders in the marsh is interesting. It would be a first, and they would be the third species to nest in tree cavities.

Canada geese seen (they come and go), and one male wood duck but there may well be one or two more.

Swallows (violet-greens) but very few ravens.





Yellow-rumped warblers visit this time of year and hang-out in the same small area by the lake. Usually audoboni spp. but this may be a myrtle spp.





 $\frac{\text{April 26, 2023}}{1003 \text{ mm}}$. Weir +437 mm WPB scale. [cal. datum: weir -0.210 m].





Left: That's the beaver's lodge. High and dry, like a medieval castle with a dry moat.

Not seen the beaver for many months, but somebody has been working on both the large dam and the smaller one by the weir.





Fairy slippers (Calypso bulbosa) in flower and the candyflowers (Claytonia sibirica) among the alders just starting, but there has been no sign of the slender toothworts (Cardamine nuttallii) despite them having put on quite a show wherever cedar grows this spring at the south end of the island.

Daffodils in the clearings - a symbol of the suburbanization of this nature reserve perhaps.

Two "wild" turkeys (feral roamers from the village area) just outside the park in the lower Coats Marsh Creek area.



Possibly a golden eagle at the weir. They've been seen there before but the juveniles of golden and bald eagles are hard to tell apart. This one had feathered legs, a distinctly banded tail, and wasn't bald.

<u>April 30, 2023</u> (day 2843, 2557+286): VieRG cum. 869.4 mm (norm. 1011 mm).

Heavy showers this month. Monthly precipitation 81% above long-term average and cumulative annual to-date now also above average, but only just, by 1%.

One syphon at least and Coats Marsh Creek running. Checked April 27.

♦ previous file next file

 $\underline{\text{May 1, 2023}}$ (day 2844, 2557+287): VieRG cum. 869.4 mm (norm. 1012 mm). VieRG cum. 881.8 mm (norm. 1012 mm).

VieRG = Environment Canada Vancouver Island east (called "Nanaimo") total precipitation scaled by 0.95. RG = rain gauge.

Day 0 (now 2844) = July 18, 2015. Cumulative for current rainfall-year, now at day +287, started on July 18, 2022 at day 2557 + 0.



April showers bring forth... so a display by a gummy gooseberry (Ribes lobbii) adding to that by the calypso orchids is welcome. It's a rare plant in the RP ecoregion, this is only the second plant I've come across.

The comment on April 26 about the absence of slender toothwort, bittercress, (Cardamine nuttallii) prompted a search for this particular species, and a few were found in Canary Grass Meadow along the wooded margins of the





area. I remember when I first started botanizing I thought some of this species might be the red-listed Cardamine angulata,

marshy

but I have a feeling now that I might have been wrong. Candyflowers out as they reliably are.

Oregon grape deserves a mention as being very showy this spring, especially the tall version (Mahonia aquifolium).

With nearly 5000 species of beetle in BC, choosing one is a gamble. All I can say is: what about Devil's Coach Horse (Ocypus olens) on account of its unusually large head?





May 2, 2023 (day 2845, 2557+288). VieRG cum. 869.4 mm (norm. 1014 mm). Cistern -403 mm SCB. [cal. datum: cistern -0.036 m].

There has been much talk recently of the damage that a perceived catastrophic failure of the beaver dam would cause. These are field notes so details of these discussions are in <u>documents</u> other than this one; but I'll add these (temporary) comments and observations here:

- (i) beaver dams are very resilient. Expert opinion is that there is absolutely no danger that a mature beaver dam in a lake-like setting, like the one in Coats Marsh, will ever fail catastrophically. Because of their method of construction, beaver dams do not collapse in the way a manufactured one might;
- (ii) the debris released by several breaches of the dam would quickly choke the channel and hold back floodwater. It would also reduce stress on the weir due to the reduced velocity of the water;
- (iii) the concrete weir was built in 1968. It was rightly pointed out in a 2020 assessment that the weir has defects, but it is not flimsy and regularly withstands flooding seemingly without damage;
- (iv) damage to downstream infrastructure in the event of an abnormally-large flood is in the opinion of the landowners likely to be minimal. The log cabin in the riparian area is not intended to be for anything other than short-term residency by visiting family and friends and would never be in use in winter if there were a possibility of a serious flood. Any compensation deemed due for the

damage to infrastructure by a hypothetical catastrophic failure of the dam would be very modest compared to the cost of alternatives;

- (v) the syphon system installed to relieve pressure on the dam and weir in flood conditions has proved inadequate. Flood volumes are far more that the syphons can handle. Assertions to the contrary are misinformation;
- (vi) maintaining the syphoning system requires periodically disturbing the wildlife, forcing ducks into open water in the presence of predators for example, and may be potentially dangerous for staff working out on the dam;
- (vii) assertions that syphoning is doing no damage to the ecosystem are misinformation;
- (viii) the bed of Coats Marsh Creek is sandstone bedrock so scouring by floodwater is probably not an issue. The wetland near the park boundary absorbs some floodwater before it reaches any fish habitat;
- (ix) removing the dam could result in it being later re-built either by the same beaver or by another;
- (x) there are no fish in Coats Marsh. This has been firmly established over the years by several observations by members of Gabriola Streamkeepers. No fish have ever been trapped there; no birds that forage primarily for fish are resident there; dragonflies, whose nymphs are fish-food, are abundant there; and no rises have ever been observed there during mayfly season;
- (xi) a professional study of Coats Marsh Creek fish habitat for the purposes of defining riparian area regulations established that there was a barrier for fish from Hoggan Lake into the upper reaches of the creek beyond South Road. No fish have ever been observed there.

 Because the creek is also an intermittent creek it seemed unlikely that the upper reaches or the marsh could support a salmonoid species. Despite this, Gabriola Streamkeepers (who, as is often the case, were not consulted) have observed trout in pools upstream of South Road, but not so far up as to be crossing the poorly-defined wetland at the park boundary which constitutes a second potential barrier;
- (xii) the beaver, there is only one, has survived in the marsh for over fifteen years and remains active in maintaining the dam. There are other beavers on the island so if the habitat remained suitable he would likely have a successor;
- (xiii) reducing water levels to the point where the dam is permanently dry will cause the dam to start to rot;
- (xiv) removing the concrete weir without replacement would be cheaper than other proposals (leaving aside the option of doing nothing) but it would remove the weirpool from the ecosystem, expose the beaver dam to drying out, and (presumably) do nothing to resolve the perceived issue of legal liability through beaver dam failure;
- (xv) construction of the weir was not the initial step in creating the wetland. A wetland existed there long before a landowner blasted through rock to create an outlet channel in the mid-20th century; (xvi) only lightly addressed in these discussions is the need to replace the wooden baffle with something more durable. Complete

failure of the baffle could result in draining the entire marsh. Replacing the baffle with a sluice gate, or replacing the flashboards with concrete might be part of the ideal solution; however, the current baffle is healthy and the need to address this issue is not urgent;

(xvii) removing the beaver dam and severely damaging the thriving ecosystem that it has created would defeat the purpose of this being held as a nature reserve;

(xviii) what is wrong with the practical solution of just leaving the weir and ecosystem alone?

 $\underline{\text{May 3, 2023}}$ (day 2846, 2557+289). VieRG cum. 869.4 mm (norm. 1016 mm).

Note from Vanessa Craig, our RDN Director:

"RDN staff went to the marsh today and found that, indeed, one of the siphons was operating. They shut it down immediately. It seems that the conditions were right this year for one of them to operate even without specifically being activated. The staff have put in an interim fix to prevent that from happening again and will be working with the consultants to determine a permanent modification."

The syphons were de-activated by RDN Staff mid-February. The continued syphoning since then was an unintended consequence of a syphon mis-function.



Photo 2.4 Lower (left) and upper (right) portions of the weir outlet slot and flashboards, viewed from the downstream channel. Note cracks in the concrete at several locations (NHC, Sep. 2022).

Interesting view of the baffle from the NHC 2023 Report. The notch is too narrow and the flashboards too high to contain floodwater.

May 5, 2023 (day 2848, 2557+291). VieRG cum. 887.4 mm (norm. 1019 mm). Cistern -389 mm SCB. [cal. datum: cistern -0.022 m].

 $\underline{\text{May 10, 2023}}$ (day 2853, 2557+296). VieRG cum. 888.4 mm (norm. 1028 mm).

Reports in the Gabriola Sounder by Rachelle Stein-Wotten:

- 1. May 3, 2023, 33(18), RDN says water levels at Coats Marsh normal for this time of year,p.1; https://simplecirc.com/view issue/34516
- 2. May 10, 2023, 33(19), RDN confirms Coats Marsh siphon system malfunction, p.12; https://simplecirc.com/view issue/34699
- 3. May 10, 2023, 33(19), Regional parks committee in favour of decommissioning Coats Marsh weir,p.12 https://simplecirc.com/view issue/34699





April 26, 2023:
(a) snags offer fledgling ducks and their parent(s) protection from predators, eagles, hawks, and owls. Hooded mergansers and wood ducks nest in tree cavities at the marsh. Whether they will again this year is still to be seen;

(b) the beaver's lodge, high and dry. Not "normal" at this time of year. Water level has not been this low before syphoning since the late summer of 2015.

Level slightly up. Now it's a competition between precipitation (average 43 mm for May but very variable) and evapotranspiration (currently 2.1 mm/sunny day and rising; it peaks in summer at around 5 mm/day when relative humidity is lower). Based on past years' records, the level is certain to decrease throughout this summer.

Coats Marsh Creek dry at the Marsh Trail culvert. Only the private property drainage outlet running modestly (<10 L/min) at the weir; nothing from the pond leveller. The level of the weirpool is currently dropping at roughly 7.6 mm (0.3')/dry day.

A few ducks out on the lake, not many, but there are undoubtedly more hidden in the reeds. Canada geese (2 seen), mallards (mostly males visible), wood ducks (just one pair), pied-billed grebe (heard for the first time this year but not spotted). No hooded mergansers (unusual) or buffleheads (only hoped for in the breeding season). No or very few red-winged blackbirds.

Western azures (Celastrina echo, 3 spring blues) about.



¹ Coats Marsh Creek has tributaries downstream of the park (Little Creek, Stump Farm Number 1 and 2 Streams) and currently flow continues into Hoggan Lake from upstream of South Road.

² This is now thought to be seepage through the fractured-sandstone bedrock beneath the berm foundation that is sufficiently low in volume that it sinks back into the bedrock downstream of the weir before reaching the culvert.

³ The identification *Celestrina ladon* in earlier reports is out-of-date.

 $\underline{\text{May 15, 2023}}$ (day 2858, 2557+301). VieRG cum. 888.4 mm (norm. 1036 mm).

No flow from Stump Farm Number 1 Stream where it leaves Canary Grass Meadow with minor ponding below Stump Farm, but Little Creek still shows some movement as it enters the Three Gates Wetland.

At the culvert on South Road the Coats Marsh Creek is flowing surprisingly strongly. A couple of mallards observed in one of the pools just beyond the upstream side of the culvert. May 16, 2023 Cistern -381 mm SCB. [cal. datum: cistern -0.014 m] May 18, 2023 (day 2861, 2557+304). VieRG cum. 888.4 mm (norm. 1041 mm).

Blue skies. Lack of moisture being felt early this year. Oreas angelwing, green lacewing on a Douglas-fir needle (not many bikers notice these), strawberry blossom, hairy woodpecker, and a good show of vanilla leafs (but not here).



Coats Marsh Creek flow at South Road now just a drindle.







 $\underline{\text{May 21, 2023}}$ (day 2864, 2557+307). VieRG cum. 888.5 mm (norm. 1046 mm).

Little Creek still flowing at the Three Gates Wetland. Along its watercourse:



miniature bird's-foot trefoil (Lotus micranthus); petite, everything less than 5 mm. A delightfully healthy-looking herb even in sandy soil, and without the fecundity of broom; broad-leaved starflower, unusually common this year, elegant; and, OK, vanilla leafs (and leaves); trailing blackberry with (wild guess) some species of flower fly; and surely that's quackgrass (it's hairy). It'd be blooming if it weren't apetalous (being common doesn't disqualify it);











and sword ferns (ditto).

 $\underline{\text{May 23, 2023}}$ (day 2866, 2557+309). VieRG cum. 888.5 mm (norm. 1049 mm). Cistern -389 mm SCB. [cal. datum: cistern -0.022 m] Quiet. The "tide" is going out and there's a new crop of watershield



schreberi). Birds in the woods silent other than an occasional song-sparrow and a very subdued sounding red-winged blackbird. Muffled or shut-down Harmac. Stillness and calmness prevail. No breeze to

stir the leaves, ruffle the grass, or ripple the water.

No ducks visible on the lake, just one American robin seen exploring its new terrestrial fringe.





Naturalized English Hawthorn (Crataegus monogyna). Rare in the RP. Northern tent caterpillars taking gregarity, ubiquity, and peskiness to its limits (Malacosoma californicum ssp. pluviale).

May 29, 2023 (day 2872, 2557+315).
VieRG cum. 888.5 mm (norm. 1058 mm).
Cistern -402 mm SCB. [cal. datum:
cistern -0.035 m]

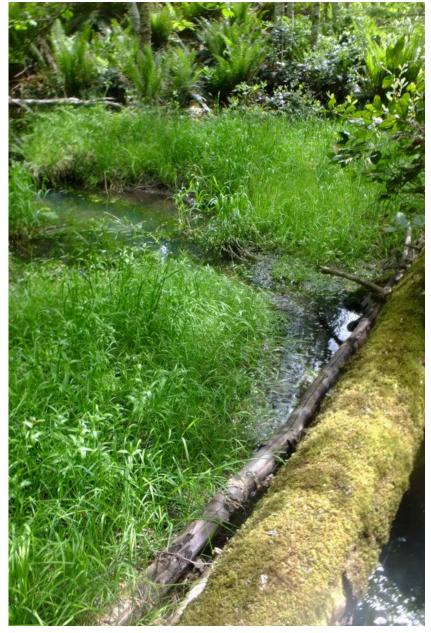
Fine day, partial cloud, but that's good for photography.

Notes on upper Coats
Marsh Creek (CMC).
Where does it run
exactly? where is the
flow through the South
Road culvert (the
divide between lower
and upper CMC) coming
from? Are there still
fish in upper CMC?

Mapping

The only map of CMC I'm aware of downstream from the CM-RP boundary to Hoggan Lake based on ground observations is in Madrone (2012). However, as is pointed out in the text accompanying the map, the watercourse is in sections "poorly or extremely poorly" defined. Certainly not as well-defined as might be inferred from the map alone.

Tracking the watercourse in places is compounded by difficult access; dense vegetation, especially salal thickets; lack of anything remotely resembling a trail; stream braiding that



makes it difficult, without investigation, to distinguish sidechannels from minor tributaries flowing in from the north; and, as reported below, subsurface passages.

My attempt to identify the watercourse from elevation (contour) maps easily available to amateurs (Google Earth Pro) was unsuccessful because of lack of precision (± 1 metre), the terrain in some stretches is essentially flat, and some flow is underground and thus independent of the surface elevation. There is some better contour data based on LidarBC in NHC (2023), but ground-based observations of CMC additional to those in Madrone (2012) are lacking.

Geology and Hydrogeology

Earlier files on the geology 4 and related hydrogeology 5 of Coats

Marsh RP short-change CMC once it leaves the park boundary, but the CM ecosystem doesn't stop there.

Geologically, the CMC watercourse is shaped by the uppermost two formations (Fm.) of the Nanaimo Group, viz. the Gabriola Fm. and the underlying Spray Fm., both of which are members of the deep-water (upper) units of the Nanaimo Group. Beneath the Spray Fm. is the gravelly Geoffrey Fm. The Gabriola Fm. is usually characterized as being sandstone, and the Spray Fm. as mudrock; however, this is a simplification as Gabriola Fm. has interbeds of silty mudrock (shale) and the Spray Fm. interbeds of sandstone. The contact between the two formations is rarely sharp.6 The hydrogeology is determined by a number



The <u>vertical</u>

of factors.

permeability (hydraulic conductivity) of the sandstone is relatively high because of bedding-plane-perpendicular fracturing of tectonic origin extending deep below the surface. In general, terrain with a sandstone bedrock is well drained and relatively dry; however, there are exceptions in hollows and basins where glacial meltwater once deposited fine-grained sediment rich in feldspar (glacial flour).

⁴ See Coats Marsh Regional Park geology File: 691.

⁵ See Coats Marsh Regional Park hydrogeology <u>File: 668</u>. A GSK atlas of Gabriola is in <u>File 661</u>.

⁶ A fine exception is the contact exposed along Easthom Road on Gabriola.

Feldspars rapidly weather chemically to clay minerals, and even thin layers of clay are virtually impermeable and now support perched waterbodies (including muddy-in-winter areas) and perched aquifers. The horizontal permeability of the sandstone varies with depth below the surface.7 At groundwater levels, it is only modestly permeable through joints, partings between lithofacies (types of rock), and weathered and eroded interbeds. Within a few metres of the surface however, horizontal fractures of glacial (glacigenic) origin greatly enhance the ability of water to flow just below the surface parallel to the surface. This effect occurs at several places along CMC.

The permeability of mudrock is less than that of fractured sandstone and it is less anisotropic (directional). In general, terrain with a mudrock bedrock is relatively moist.



At this low level of flow, instead of by-passing the tree, the creek is disappearing into the root system and emerging at the other side of some large woody debris (LWD).

Because of the differing weathering and erosion characteristics of sandstone and mudrock, regolith that rests on just one type of lithofacies tends to be flat with only gentle undulations. These are the areas of wetlands, poorly-defined watercourses, meanders, and reservoirs of one kind or another (surficial aquifers as it were). The overall drop in elevation between Coats Marsh and Hoggan Lake is about forty metres. This creates scarps, bluffs, and inclines mostly confined to boundaries between the flats like a staircase where the creek water flows faster downhill in well-defined courses.

⁷ See <u>File 573</u> for details.



The highest point at which flowing surface water was seen was downstream of the wetlands that are near the CM-RP boundary. The water was an emerging subsurface flow shown here.

At the present water level, the flow from Little Creek is not contributing directly to surface flow in upper CMC but must be contributing to the reservoir (wetland surface or subsurface) that is the source of this water.

Biology

No fish were observed in any part of upper Coats Marsh Creek.⁸
Beyond a very short distance upstream of the South Road culvert, migration of fish further upstream is made impossible because of frequent LWD obstructions⁹, reaches where the flow is subsurface, and reaches where the watercourse is undefined as it passes through seasonally-dry swamps and patches of marshy wetland.

⁸ See however File 678.

⁹ LWD = large woody debris sufficiently large to create a pool in a stream. There is a GSK glossary in <u>File 676</u>. In places, rotted-out roots of large old trees make subsurface by-pass channels for water completely obstructed at the surface.

Several red-legged frogs (Rana aurota) were seen in and around the many pools in the watercourse. Water striders (Limnoporus notabilis). Damselflies (Tule bluets? Enallagma carunculatum).

This was not a botanizing trip, and the notes of plants I observed are perfunctory and missing I'm sure plants that I am not familiar with and did not stop to examine. What I noted were (going from distal upland down to the water, bold = locally dominant or codominant tree/shrub/herb):

Douglas-fir

(Pseudotsuga
menziesii), grand-fir
(Abies grandis),
oceanspray (Holodiscus
discolor), salal
(Gaultheria shallon),
Oregon grape (Berberis
nervosa), evergreen
huckleberry (Vaccinium
ovatum), bracken
(Pteridium aquilinum),
roses (mostly Rosa
gymnocarpa), honeysuckl



The gravel is glacial lag gravel plus a significant component of probably more recent sandstone channery.

gymnocarpa), honeysuckle (Lonicera ciliosa), nettles (Urtica dioica);



Red cedar and stumps thereof (Thuja plicata), red alder (Alnus rubra) in logged-cedar areas, holly (Ilex aquifolium), sword fern (Polystichum munitum), salmonberry (Rubus spectablis), abundant red huckleberry on decaying redcedar wood (Vaccinium parvifolium);

Ninebark (Physocarpus capitatus), lady fern (Athyrium filix-femina), slough sedge (Carex obnupta), small-flowered bulrush (Scirpus microscarpus), skunk cabbage (Lysichiton americanus), and various grasses, mainly exotic species.

Ecosystem comment

The Gabriola Island Sensitive Ecosystem Mapping (SEM Airphoto 2007) shows wetlands in the NW corner of the RP extending into the adjacent private property (50235) as being map-coded "Western redcedar - Indian plum". I failed to notice any Indian-plum (Oemleria cerasiformis), but that's not to say they weren't there; 10 however, interpretation of aerial photos and satellite imagery without ground truthing is likely to be inaccurate and incomplete, especially when the riparian margins of small creeks are the focus of interest.

¹⁰ Some creeks on Gabriola have abundant Indian-plum in their riparian areas, Martin Brook is an example.

 $\underline{\text{May 31, 2023}}$ (day 2874, 2557+317). VieRG cum. 889.5 mm (norm. 1061 mm).

May has been a dry month, in contrast to April when it rained a lot. Monthly precipitation 54% below average and cumulative annual to-date now 4% below average.

Water level in the weirpool very low. No outflow or drainage.





Beaver present
and very active
around the weir.
It is now
possible to walk
comfortably
across the weir
using his dam.
No ducks seen in
the weirpool;
the days are
gone when you
might see bluewinged teals
here.





The leaves of Pacific ninebark I find too similar to those of Douglas maple (Acer glabrum var.douglasii) for comfort, which may account for the on-going lack of the latter in the CM species list.



Vine maple (Acer circinatum) presents no such problem with its 7-lobed leaves (photo left). A good find but needing technical confirmation as it is now a very rare species on the Gulf Islands and Vancouver Island.

Caterpillar infestation has almost completely denuded most of the alder trees. My (deciduous) sun-hat is becoming caterpillar habitat!

June 22, 2023 (day 2896, 2557+339). VieRG cum. 909.6 mm (norm. 1093 mm). Cistern \geq -442 mm SCB. 11 [cal. datum: cistern -0.075 m]

Relatively little activity, though it was mid-afternoon. Only one mallard hen with about eight small ducklings seen. Many dragonflies. The dominant aquatic plant in the marsh is watershield (Brasenia schreberi) but there are patches of water smartweed (Polygonum amphibium). The two are easy to tell apart because the leaves of watershield are attached to the petioles (leaf stalks) at the centre while those of the water smartweed are more conventionally attached at one end.





¹¹ The concrete cistern datum point has been eroded somewhat so the precision is not what it used to be, not to mention the accuracy.





 $\frac{\text{June 30, 2023}}{\text{mm}}$ (day 2904, 2557+347). VieRG cum. 909.6 mm (norm. 1102 mm). Cistern ≥ -474 mm SCB. [cal. datum: cistern -0.107 m]

Another dry month. Monthly precipitation 51% below average and cumulative annual to-date now 7% below average.

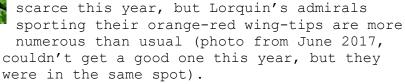
Little Creek no longer running into the Three Gates Wetland. Musk monkey-flowers (*Erythranthe moschata*, but often still IDed as *Mimulus moschatus*) growing in the streambed along with *Angelica genuflexa* and small blue forget-me-nots (*Myosotis* sp.).

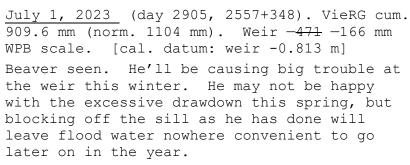




There's still movement in Coats Marsh Creek at the South Road culvert replenishing the pools where trout have been seen over the years on the upstream side.

Red-winged blackbirds have made themselves





I'm disappointed the RDN/NTBC have given no consideration to putting in an old-fashioned sluice gate. By my reckoning the 500L/s outflow capacity of the weir could be increased tenfold by lifting the baffle in the

wet season. 12 More than adequate to prevent overflow of the berm, which is all that really matters.

No swallows at the lake but a variety of other species including cedar waxwings and possibly sapsuckers. A few mallards are successfully raising a family, but no other species are doing so this year.

¹² Using the "Rectangular Contracted Weir" formula on the Washington State University page "Irrigation in the Pacific Northwest". "Contracted" means the sill width is much smaller than the approach channel, which in this case is the width of the weirpool. For L=2 ft (notch width), W=2.1 ft (0.64m notch full, no overflow), Q=522 L/s. For L=2 ft., W=10.1 ft (3.1m, no flashboards), Q=5053 L/s. The berm is at +0.30 m CWB File: 673.





The Clemson leveller is a good design. The beaver has shown limited interest in attempting to block it. Its capacity is just too low for this application.





Habitat the RDN/NTBC are considering destroying.

<u>July 8, 2023</u> (day 2912, 2557+355). VieRG cum. 909.6 mm (norm. 1111 mm).

[Re-checked height of berm crest with a laser level. Hazards are: berm slopes down as it nears the weir, however floodwater moves around the end of the weir and into the creek, so the slope is not of consequence if measurement is far enough along the berm to avoid it; convenient to use a point on the deck as an intermediate station, but deck is not level; spirit level used to level the laser level has limited accuracy.

I measured: berm above deck station near the SE corner (the corner that floods first) = +0.362 m; deck station below CWB at its southern end = -0.066 m; hence berm = +0.362 - 0.066 = +296 m CWB with an overall accuracy I'd guess as being no better than ± 10 mm.

Flooding being an issue, I also re-visited volumetric flow calculations, primarily for floods on March 10, 2016 and November 15, 2021, using theoretical weir flow calculations; photographic evidence of water levels where measurement not made; additional measurements of the weir and creek culvert dimensions; and developed empirical formulas. Some minor corrections detailed in the master File: 673, but nothing very significant. The maximum outlet flow at present is in the 500-600 L/s range. A value that could at least in theory be increased by over 60% by just removing the top flashboard.

I did note that assessing the flow at the Coats Marsh culvert during floods has to be done by measurement. Theoretical formulas (Francis and Kindsvater-Carter) do not work because of abrupt changes in the relationship between thalweg depth and flow velocity at flood levels, probably due to the suppression of the nappe by the rising downstream water.

Precise determination of the volumetric flow at the weir is complicated by the presence of the deck. In light of the relatively small freeboard of the berm, I think it would help if the deck was raised to a level where it does not obstruct floodwater. Overflow of the concrete weir and wooden deck can be more significant than it looks because the width of the weir is ten times that of the notch.



The weirpool is close to being completely drained.

<u>July 12, 2023</u> (day 2916, 2557+359). VieRG cum. 909.6 mm (norm. 1114 mm). Cistern -540 mm SCB.

[cal. datum: cistern -0.173
m]

The proportion of tansy ragwort plants being fodder for cinnabar moth larvae higher than usual this year; a good year for caterpillars.

Hardhack (Spiraea douglasii) used to be common in riparian areas; seems less so nowadays. 13 Yellow-faced bumble bees (Bombus vosnesenskii) with yellow pollen baskets on their legs showing an interest.

A few solitary mallards.

Marsh is struggling to survive, but it used to be pleasantly tranquil this time of year, now its languor is touched with anxiety.

<u>July 17, 2023</u> (day 2921, 2557+364). VieRG cum. 909.6 mm (norm. 1117 mm).

Observation year rainfall 19% below long-term average. Hard to correlate with ENSO (la Niña, warm and wet?, in 2022) but not especially unusual.



Some idle musings about sluice gates. It's wrong to imagine that what's needed is a gate capable of opening the entirety of the 10 ft. 2ft-wide notch in the weir. That would be a massively heavy and awkward lift.

Following are estimates of the equilibrium volumetric flow (litres per second) that would sustain a level of the water in the weirpool at the top of the concrete weir with no overflow (0.0 m CWB). The notch is assumed to be unobstructed. Units except for flow are imperial (ft.).

Each flashboard (stacked board that makes up the baffle) is 1.0 ft. high so although there is good reason for them to be replaced I'll assume that they remain and the sill is the top of these flashboards. Currently the sill is a little over 2 ft. down (-0.67 m CWB).

¹³ But still dominant in the shoreline around Hoggan Lake in the golf-course grounds.

_

There are two similar equations needed for the estimations. For water flowing over the sill \underline{or} over the top of the gate, whichever is higher, we need equation 1 (fully-contracted rectangular weir with free-flowing nappe) giving Qw.

For water flowing over the sill $\underline{\text{and}}$ under the bottom of the gate, we need equation 2 (fully-contracted rectangular orifice with free-flowing nappe) giving Qo.

Equation 1 for Qw is used when the top of the gate is at or below the concrete crest of the weir, or the bottom of the gate is at or above the concrete crest of the weir.

Equation 2 for Qo is used when the bottom of the gate remains below the concrete crest of the weir.

Qw and Qo to be added to give Q when the gate is partially open.

[I'm going to assume (rashly? but practically) that the contribution to the flow by the gate acting as a weir can be estimated ignoring the presence of the orifice, and the simultaneous contribution to the flow by the gate acting as an orifice can be estimated ignoring the presence of the gate also acting as a weir. This gate part-way-open calculation is probably of academic interest only.]

Equation 1 is fully described in File: 673 p.C4.

```
Qw = 3.247 \times L^{*}H^{1.48} - 0.566 \times (L^{*}H)^{1.9} / (1 + 2 \times L^{1.87})
```

where.

Qw = cubic feet per second (cfs), 1 cfs = 28.316847 L/s;

L = the width of the notch in feet; and

H = head in feet, depth (+ve) relative to CWB of the top of the gate unless the bottom of the gate is at or higher than the crest of the concrete weir (H1 in equation 2 is 0 or negative) when H becomes the depth relative to CWB of the sill.

Equation 2 is described on a CODECOGS website.

```
Qo = 0.667 * C_d * L * (2q)^{0.5} * (H2^{1.5} - H1^{1.5})
```

where:

Qo = cubic feet per second (cfs), 1 cfs = 28.316847 L/s;

 C_d = coefficient of discharge;

g = acceleration due to gravity;

H2 = the depth (+ve) relative to CWB of the top of the baffle; and H1 = the depth (+ve) relative to CWB of the bottom of gate with the proviso Qo = 0 if H1 is at or above CWB ($H1 \le 0$).

For these types of calculations we can, as is often the case, take $C_{d} = 0.61$ and g = 32.174 ft.s⁻², reducing the equation to:

```
Qo = 3.262 \times \xi \times L \times (H2^{1.5} - H1^{1.5}) 1 cfs = 28.316847 L/s
```

where $\xi=0.9$ is a personal "fiddle factor" valued so that the sum of the squared difference between Qw and Qo is as small as possible whenever H1 \approx 0 (the orifice is becoming a weir).

"gate x.x" in the tables below means a gate with a height of x.x ft. "sill -y.y" means the position (ft.) of the top of the flashboard baffle relative to CWB, its depth then being +y.y ft.

No gate	sill CWB (ft.) -2.0 -3.0 -4.0	Q (L/s) 486 877 1331	mode weir weir weir	relative Q 1.0 1.8 2.7
gate 1.0 sill -3.0	gate lift (ft.) 0.0 1.0 2.0 ≥ 3.0	Q (L/s) 486 571 698 877	mode weir both orifice weir	relative Q 1.0 1.2 1.4
gate 2.0 sill -4.0	gate lift (ft.) 0.0 1.0 2.0 3.0 ≥ 4.0	Q (L/s) 486 643 860 1164 1331	mode weir both orifice orifice weir	relative Q 1.0 1.3 1.8 2.4 2.7

Lots of detailed considerations involved and a test needed to check



the theory by removing a flashboard or two in the wet season and measuring the flow; re-discovering what those who designed and built the weir already well-knew. Maybe out-of-the-question, but who knows?

<u>July 19, 2023</u> (day 2923, 2922+1). VieRG cum. 0.0 mm (norm. 0 mm). Cistern -577 mm SCB. [cal. datum: cistern -0.210 m]





Above: View from the shore of the "lake" of the beaver dam (green strip between snags *top right*). *Below*: Part of the foundation of the 20th-century radio-tower installation once occupying the site. Some islanders remember walking the meadow here and flushing snipe.

WATER QUALITY TEST: cistern; surface water temp 27°C ; pH 7.5; specific conductivity 142 $\mu\text{S/cm}$; TDS 90 ppm. Nothing remarkable except the high temperature.

Air: cool breeze 23°C, but ambient in sheltered sunny spots 27°C.

High water temperatures will be a growing concern if summer water levels are not maintained and the days get sunnier and warmer. A temperature of $+24\,^{\circ}\text{C}$ is about as high as lake trout can stand; don't know about other aquatic creatures.

<u>July 20, 2023</u> (day 2924, 2922+2). VieRG cum. 0.0 mm (norm. 1 mm). Weir -290 mm WPB scale. [cal. datum: weir -0.937 m]

Mallards, some juveniles. Alders, dappling the sunshine with leaves once again. Wood nymphs (*Cercyonis pegala* ssp.*incana*) suddenly common, endlessly flittering, their darkness as striking as any colour.

<u>July 30, 2023</u> (day 2934, 2922+12). VieRG cum. 23.6 mm (norm. 18 mm). Cistern -610 mm SCB. [cal. datum: cistern -0.243 m]

Invasives gaining footholds in the NE Arm wetland despite reed canary grass (Phalaris arundinacea) being dominant. Tansy ragwort (Seneceo jacobaea) and thistles (Cirsium vulgare), both popular with pollinators; 14 Japanese hedge parsley (Torilis japonica) and in the edgehabitat occasional daphnelaurel (Daphne laureola). Small stuff at the moment, but the stage is set.

Common wood-nymphs (redlisted).

July 31, 2023 (day 2935, 2922+13). VieRG* cum. 23.6 mm (norm. 19 mm). Weir -362 mm WPB scale. [cal. datum: weir -1.009 m]

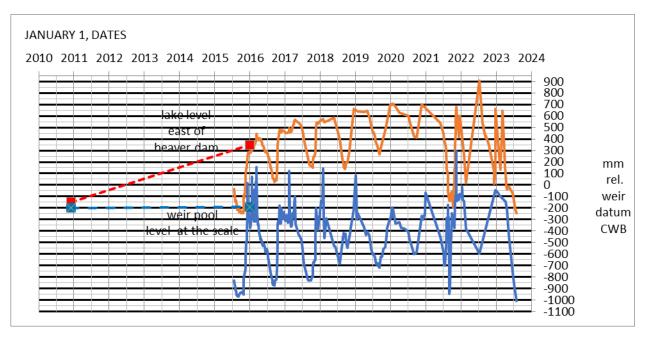
* rainfall datum in trouble again. No VieRG recording this month. Had to use Entrance x 1.092, a factor determined by comparing old Coats Marsh rain





¹⁴ Honey containing nectar from bees that have been foraging on tansy ragwort tastes unpleasant and in quantity is likely toxic Thistle and Scotch broom honey on the other hand are prized.

gauge observations with Environment Canada's figures for the same period. There was intense variation of precipitation with location on July 24, the only day in July that it rained.



Monthly precipitation 2% below long-term average.

Annual so far 7% below long-term average.

Worked in the NE Arm. 15 Observations at the weir and western burn-pile clearing. Mallards (mothers and juveniles) still around and not shy.

Record low water levels, in part due to the malfunction of the syphon system that the RDN continues to maintain is doing something useful.

Honey bees (Apis mellifera) in the clearing where there're thistles galore but this one seems special.

¹⁵ An hour's work in the NE Arm on July 31 made a serious dent in the sporadic daphne-laurel and easily-seen blooming tansy ragwort, but many young rosettes of ragwort remain untouched. There's ragwort still to be cleared from the outlet and watertracks downstream of the East Path crossing (NE Arm Creek).

<u>August 4, 2023</u> (day 2939, 2922+17). VieRG* cum. 23.6 mm (norm. 23 mm).

Cleared tansy ragwort from NE Arm Creek down to the lake and from the NNE spillway tributary coming down from East Path. 14 Can't be sure I got 'em all, but hope so. Mostly water, not the wind, spreading seeds.

<u>August 13, 2023</u> (day 2948, 2922+26). VieRG* cum. 29.8 mm (norm. 27 mm). Weir -398 mm WPB scale. [cal. datum: weir -1.045 m]. Cistern -664 mm SCB. [cal. datum: cistern -0.297 m]



This is the best picture you'll ever get from me of a water scorpion (*Ranatra fusca*). This one leisurely swimming below the surface, looking huge but actually only an inch or two long.

WATER QUALITY TEST: cistern; temperature shaded, 15 cm down, +24°C.

Time to measure dissolved oxygen which falls with temperature rise, 16 probably not a factor that often arises in discussions about lowering summer water levels.



 16 At 24 °C, 1 bar, 100% = 8.29 mg/L requiring at least 84% saturation to keep the level above a safe 7 mg/L. At 20 °C, the saturation needs to be at least 78%; and at 28 °C it needs to be at least 91%.

<u>August 19, 2023</u> (day 2954, 2922+32). VieRG* cum. 29.8 mm (norm. 29 mm). Cistern -708 mm SCB. [cal. datum: cistern -0.341 m]

Thinly overcast with blue smoke from distant wildfires tinting the haze, the gusty wind making my eyes water. The diffuse sunlight at noon has a slight but perceptible sunsetty reddish hue.

No wildlife beyond a few flower-flies. A raven, muttering to itself, high in the tree behind me.



Substantial swathes of the perimeter of the "lake" have now become a thick, soft muddy morass. It's a simple enough message; you need to store water in winter in order to maintain an adequate water level in summer; and this hasn't been done. At the entrance to the RP at Stanley Place, visitors are now confronted with, not water, but mire, any water being far off toward the centre of the marsh.



The yellow patches are mats of bladderworts, *Utricularia macrorhiza*.



WATER QUALITY TEST: cistern; temperature 15 cm down, +18.5°C; pH 7.5; specific conductivity 152 μ S/cm; TDS 76 ppm; air pressure ≈ 100 kPa, 17 dissolved oxygen (DO) measurement attempted but no reliable result. 18



¹⁷ My own instrument (calibrated HANNA meter H198129) used for pH, conductivity, TDS, and temperature.

¹⁸ The HACH DO Test Kit #1 (modified Winkler GSK25104) that was used had all components present but all four reagents (GSK15027-30) were at least five years beyond their expiry date. The two low-range DO measurements (0.2-4 mg/L) were not consistent with the two high-range measurements (1-20 mg/L). High 4.5 mg/L and 3 mg/L; low both ≥10 mg/L (50 drops). Step 9 of the high-range procedure did not dissolve all of the brown precipitate as I think it should have. GSK has a modern optical DO sensor, (GSK15210), but at the moment I don't know where it is or if it's useable. Help!

<u>August 24, 2023</u> (day 2959, 2922+37). VieRG* cum. 29.8 mm (norm. 31 mm). RDN outer gauge 852 mm. [cal. datum: RDN outer gauge -0.098 m]

There appears to be a disconnect between the water level measured at the cistern and at the beaver dam. Possibly the level is so low now that the water level in the cistern no longer reflects the level out in the open water, or the depth of the scale at the dam has been altered. Also possible, but unlikely, is that pools of water are becoming disconnected, some being perched relative to others. Also possible, though I hope unlikely, is that numerous earlier calibrations, although consistent, were systematically wrong.

WATER QUALITY TEST: beaver dam upstream side; temperature surface 18.9°C. At depth temperature 16.6°C; specific conductivity 99 µS/cm; air pressure ≈100 kPa, dissolved oxygen (DO) measurement attempted with only partial success. 19

Indications are that DO is at a level that's low enough ($\approx 4~\text{mg/L}$) to severely stress most aquatic organisms. The usual major causes of low DO concentrations are high





of low DO concentrations are high diurnal temperatures, and unusually high oxygen consumption by aerobic decomposers of dead aquatic plants.

Nodding beggarticks (Bidens cernua) out on the beaver dam, the perfect habitat for this species.

August 26, 2023 (day 2961, 2922+39). VieRG* cum. 30.2 mm (norm. 32 mm). Cistern -726 mm SCB. [cal. datum: cistern -0.359 m]

¹⁹ Using the RDN's YSI Pro-quatro galvanic DO sensor after calibration. This DO sensor is inconvenient for wetland measurements because it consumes oxygen and requires flowing water or constant stirring. Care must also be taken to eliminate all air bubbles in the sensor's protective shield before taking a reading. I was unable to get a stable reading at the surface. At depth (about a metre) I saw 43.1% saturation interpreted by the meter as 4.20 mg/L. This is commensurate with the Winkler test result, fn.18.

<u>August 27, 2023</u> (day 2962, 2922+40). VieRG* cum. 30.2 mm (norm. 33 mm). Cistern -732 mm SCB. [cal. datum: cistern -0.365 m]. RDN outer gauge 845 mm. [cal. datum: RDN outer gauge** -0.105 m]

A simple surveying method involving sticks and a spirit level showed the water level in the cistern is not more than 10 mm below the openwater level. Not nearly enough to account for the RDN outer gauge anomalous readings, and close enough to suggest that the levels at the cistern are in fact the same.

** Photographic evidence confirmed a large change in the depth of the RDN outer gauge, which is now reading around 260 mm higher than the cistern level. The scale has to be re-calibrated before providing an independent measure of water level.

The depth of the cistern measured as -1970 mm SCB [cal. datum: cistern floor -1.603 m, 95.4 AMSL]. WATER QUALITY TEST: cistern; temperature, 15 cm down, +27°C.

The weirpool almost completely de-watered but for Bill Coats's drainage channel that likely goes down to bedrock. Several mallards about, the usual residents in this pre-migration time-of-year, always relatively few in number.



♦ previous file next file

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.

For a more detailed list see <u>here</u> and for pertinent Gabriola Streamkeepers notes see <u>here</u>.

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.

Coats Marsh – human disturbance of breeding and migratory <u>ducks and geese</u>.

Coats Marsh Management - paper on.

Coats Marsh brief history.

Long-term precipitation (1944-2021) – <u>statistics</u>. Updated every month and used as the "normal" meaning average precipitation at Coats Marsh.

Field observations—2023 (Sept.—Dec.)

THIS FILE (Field Observations 2023) IS A SUPPLEMENT TO:

"Observations at Coats Marsh, Gabriola Island" File: 673.

For an up-to-date list of supplements see here.

Sept.01, 2023 (day 2967, 2922+45): ViGRG cum. 36.2 mm (norm. 36 mm). Weir -413 mm WPB scale. [cal. datum: weir -1.060 m]. Temperature 15 cm down, $+22^{\circ}$ C. ViGRG = [1.092*Entrance Island + Nanaimo City Yard]/2



"Although the Province does offer protections to northern red-legged frogs through the establishment of approved Wildlife Habitat Areas (WHA), the project area is not identified as such and therefore the habitat is not offered special protections for this species." EDI Report p.263 to the RDN 2023.

Precipitation in August 53% below average and cumulative (calendar) annual to-date now 9% below average.

Coats Marsh Creek has ceased to flow at the South Road culvert, but deep disconnected pools of water remain on the upstream side. Small flocks of flickers on the hardpan trails, foraging maybe for ants.

Pockets of turbulent air rushing through the canopy while below there's only the slightest breeze. Reminds me of an express train, pulled by a King or Castle, powering through a rural railway station spewing steam and smut, but leaving those on the platform unperturbed.

Sept.02, 2023 (day 2968, 2922+46): ViGRG cum. 36.2 mm (norm. 36 mm).
Cistern -742 mm SCB. [cal. datum: cistern -0.375 m].

[I should add to the caption above that the WHA actually only applies to provincially-managed Crown land, not parks or private land; however, changes to water level in the wetland affecting red-legged from habitat may require Water Sustainability Act (WSA) authorisation.



"Asked what ecological damage may have been caused due to the siphon malfunction, [the RDN parks manager] said staff walked around the entire marsh following modification of the siphon 'and did not see any negative impacts on the marsh ecology due to the siphon running unexpectedly'."

GABRIOLA Sounder 33(19) p.12, May 10, 2023.

There is much discussion on this in the cited report. The management plan accompanying a WSA application needs to show how impacts to the habitat will be avoided, minimized, or, if necessary, compensated for as the WSA can be used to ensure that there is no net-loss of wetland habitat.





Red-legged frogs are also protected under the Wildlife Act which would require a permit to "relocate" them.

Also involved in any RDN decision regarding the future of the concrete weir would be co-owner NTBC, and Environment and Climate-Change Canada (ECCC), which oversees the federal ecological gifts program that contributed to the cost of acquiring Coats Marsh RP.]

<u>Sept.04, 2023</u> (day 2970, 2922+48): ViGRG cum. 36.3 mm (norm. 38 mm). Research¹ on vegetated, shallow lakes (less than 0.6m deep) has shown that the perception that they are homogeneously mixed in temperature, dissolved-oxygen content, pH, and water chemistry may be wrong. Stratification and diel variations of the parameters within the strata can be very strong.

The biological consequences are as yet unknown, one of the several reasons I'm still searching for an optical dissolved-oxygen meter to use in place of the one that GSK used to possess, but has gone missing. If anybody knows of one I could borrow, or who could help me procure some reagents for a HACH OX-2P kit, please get in touch.

 $\frac{\text{Sept.}12,\ 2023}{\text{Cistern -772}} \quad \text{(day 2978, 2922+56): ViGRG cum. 40.5 mm (norm. 46 mm).}$

Water level still dropping 3 mm/day despite spotty rain.

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https://royalsocietypublishing.org/doi/10.1098/rspb.2017.1427

Fall is not the time to go looking for a new species of wildflower, but among the still-blooming "dandelions" in the marshes away from the trails, there might be one. However, identifying unusual asteraceae among all the exotic yellow lawn weeds is a challenge. A typical thrashing-around quandary





for me is, could that be a smooth cat's-ear (Hypochaeris glabra)? or a much rarer autumn hawkbit (Scorzoneroides autumnalis)?

I'm not yet anywhere near being able to confidently identify these species, but it's absorbing to try. In the old days, village children, physicians, and apothecaries would have had no problem. I saw centaury and rosebay willowherb, but ignored the thistles.

Sept.19, 2023 (day 2985, 2922+63): ViGRG
cum. 53.5 mm (norm. 57 mm). Weir -536 mm WPB scale. [cal. datum: weir
-1.183 m]. RDN outer gauge 795 mm [no calibration].







² NE Arm and Canary Grass Meadow. Dandelions (*Taraxacum officinale*) actually bloom in spring.

³ On Gabriola, hairy cat's-ears (*Hypochaeris radicata*) are currently everywhere in grassy, bald, unshaded areas. Other dandelion-like species flowering in the Coats Marsh area are smooth cat's-ear (*Hypochaeris glabra*), hairy hawkbit (*Scorzoneroides saxatilis*, illustrated? hairs are forked), and smooth hawksbeard (*Crepis capillaris*). I kept an eye out for a few never-been-recorded-on-Gabriola similar species, but never found any. These were *Crepis tectorum*; *Hieracium umbrellatum*; and *Scorzoneroides autumnalis*. Didn't see any *Taraxacum spp*. either.

⁴ Classical identification keys never work for me. One wrong or non-answer and you're off the rails. I'm looking forward to AI that accepts "maybe" answers; considers geography; considers variations in the plants of all species; accepts images, particularly of leaf morphology; and quantifies the confidence you should have in identifications.



Google Maps 2023

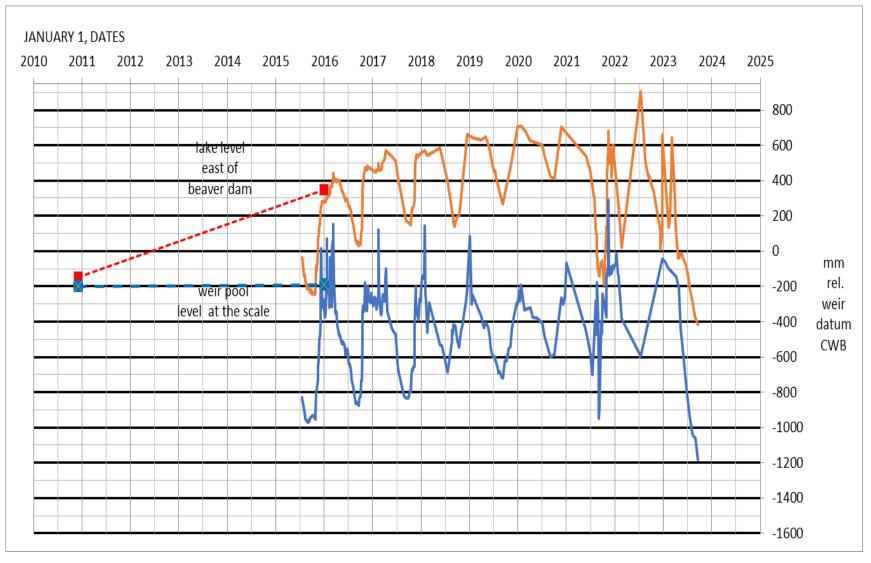
Because the marsh is shallow, reducing its volume by even a small amount causes a relatively large retreat of its margins and hence a relatively large change in the nature of its edge habitat. Ducks that nest in the forest (hooded mergansers and wood ducks) were not seen this summer.



Google Maps 2023.

The drained weirpool, the beaver dam, and the west end of the marsh beyond the dam. In past winters, flowing water in this area has delayed freezing when the marsh to the east is iced over, thus providing a refuge for winter resident waterfowl. Draining this spring by the syphons installed at the bequest of the RDN/NTBC has been so severe that it is doubtful these conditions will continue this winter.





CWB (crest of concrete weir used as a baseline) reported in NHC/EDI 2023 to be 97.0 m AMSL (above mean sea level).



The weirpool seen from the berm with the beaver dam in the background. Aquatic plants in the foreground on the right are yellow pond-lilies (*Nuphar variegata*). These are uncommon outside the weirpool embayment. The water seen here is mostly in the old drainage ditch.

Sept.25, 2023 (day 2991, 2922+69): ViGRG cum. 73.8 mm (norm. 69 mm).
Cistern -756 mm SCB. [cal. datum: cistern -0.389 m].

Dry season is over. Water levels rising.

Flock of half-a-dozen wood ducks in the snags near at the cistern, very vocal, and the males looking very handsome.

Western cauliflower mushroom (Sparassis radicata) by an old fir stump. A confident identification, not a Ramara sp. Edible and hence rare. Nature reserves must have a no-harvesting rule. Parks maybe too.



An admirable, orange red-admiral, on the Marsh Trail among the alders and stinging nettles, obligingly waiting, as is their wont, while I fumbled with the camera. He/she must be migrating soon; winter on Gabriola is no place for a butterfly.

Sept.30, 2023 (day 2996, 2922+74): ViGRG cum. 95.6 mm (norm. 80 mm).

Precipitation in September 36% above average and cumulative (calendar) annual to-date now 6% below average. Nothing unusual; well within normal observed weather variations.

To add to footnote 3.5

Oct.04, 2023 (day 3000, 2922+78): ViGRG cum. 107.4 mm (norm. 91 mm). Cistern -732 mm SCB. [cal. datum: cistern -0.365 m].

One of the unremarked consequences of lowering the water level is that it will become much easier to walk along the shoreline as I did today, thereby destroying the seclusion that nesting waterfowl need.

-

⁵ I've never seen, within the CM Creek catchment, sow-thistles (*Sonchus arvensis*, *S. asper*, and *S. oleraceus*) or goat's-beard (yellow salsify, *Tragopogon dubius*). All these are introduced species, the former having prickly leaves, the latter not looking much like a dandelion. All are probably more at home in farmers' fields than in a nature reserve, but, for the record, all are known to grow somewhere on Gabriola. Weeds become more interesting if you try designing an ID guide using an Excel spreadsheet that cross-correlates descriptions with observations.



Only one duck observed, a summer resident mallard, too far away to be alarmed. The wood ducks have moved on.



Old drainage channel? Normally submerged. In the vicinity of the mouth of East Path Creek.



A view that has been through several drastic changes since the mid-20th century when humans began managing this wetland habitat.







Top left & right: Agaricus, Amanita, or Lepiota sp.? ⁶ Free gills and ring, but no visible volva or sign of a veil. ⁷ Gregarious. Too many all-white species and white-variants to be specific about species, and for me, even the genus in doubt. Need to leave them alone and see what develops. I left them all intact. Upper Little Creek riparian area.

Lower left: Fairy bonnets, Mycena sp. M. tenax perhaps? Gregarious. On dead wood. Common.

Lower right: Conifer tufts (Naematoloma capnoides)? Although these were located on

the other side of the Upper Little Creek watershed, they have been previously observed within the CM Creek catchment area. Blackish spores may be more apparent when mature; cespitose on not-long-dead conifer; when young, looking like stemless pear-shaped puffballs.

Oct.07, 2023 (day 3003, 2922+81): ViGRG cum. 107.5 mm (norm. 100 mm). A yellow sunflower/aster/daisy family flower, hard to pin down.

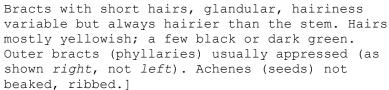
⁶ Lepiota including species recently transferred to other genera, e.g. smooth parasol Leucoagaricus leucothites.

⁷ No warts, but after heavy rain. Cap umbonate (knobby), the umbo low and sometimes faintly dirty-yellow. Among alder and cedar (mainly stumps). Colour tinge more apparent to the camera than the eye; white gills not looking pink or chocolate-brown, smoky-grey on one specimen only, but it's early days yet. Didn't test bruising, but no existing signs that they bruise yellow. Nowhere near a city. Odour weak, not unpleasant.

Uncommon within the park but locally easy to find. Some in a small grassy patch on banks of Coats Marsh Creek in the NW corner just downstream of the small wetland near the boundary; others on the Golf Course Trail.

[Stems: usually only one, many branches, almost hairless to hairless. Any hairs very short, not bristly, yellowish. Taproot.

Leaves: no basal rosette; hairless or sparsely microscopically shorthaired; all narrow and stalkless or very nearly so. Upper stem leaves: entire, grass-like. Lower stem leaves: long, with a few well-spaced sharp teeth.



Narrow-leaved hawkweed (Hieracium umbrellatum)

perhaps, though bracts are not noticeably black, 8 and hairs "shouldn't" be glandular. Although there are several other Hieracium spp. known in BC, they rule themselves out by being rare, having the wrong-shaped leaves, and having a substantial rosette of basal leaves. An alternative fit is smooth hawksbeard (Crepis capillaris); it's common (a plus); almost has the right shaped leaves (a bit too often deeply lobed); glandular hairs (a plus); occasionally hairs may be black; can have a taproot (a plus); achenes not beaked, ribbed; but excepting again, it too often has a substantial basal leaf rosette (a strong minus).











basal leaves. The hawkweed fails mainly because it has never been seen on Gabriola, and the bracts are nowhere close to being as black as seen in some Google images, something not all keys mention.

In the end, I have to go with the hawksbeard, because it's common, but any not-too-technical key would likely eliminate it because of its

⁸ If so, update fn.3. Blackness emphasized in some non-technical books. Seems to be an end-of-life development.

Oct.12, 2023 (day 3008, 2922+86): ViGRG cum. 130.8 mm (norm. 117 mm).

"The season is changing, the darkness returning."

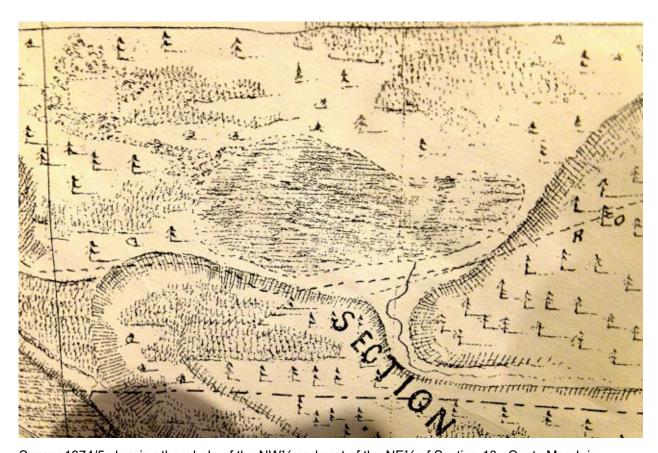
Coats Marsh Creek pools have survived the summer. Creek just starting to trickle at the South Road culvert but not further upstream.

Report in the Gabriola Sounder by Rachelle Stein-Wotten (continued):

4. Oct.11, 2023, 33(41, printed 40), RDN has Coats Marsh weir decommission design underway following federal approval, p.7; https://simplecirc.com/view issue/38847

Comments: The concrete weir was built in the 1960s, not to alter the natural state of the wetland, but to restore it. The cut through the ridge where the weir is now had been made two decades earlier.

There is both historical and geological evidence that a wetland existed here long before any human activity. When the powers-that-be talk about restoring the wetland to its "natural" state, they sometimes mean to some arbitrary, or cherry-picked "historical" state, almost never to its undisturbed $19^{\rm th}$ -century state.



Survey 1874/5 showing the whole of the NW $\frac{1}{4}$ and part of the NE $\frac{1}{4}$ of Section 10. Coats Marsh is outlined and shown as an unforested swamp in the centre. East Path Creek (the solid wavy line) is marked all the way back to McGuffies Swamp, but no outlet from the marsh is apparent.

The history file: File 697.

The task as enunciated in the cited report of "placing large boulders so that we allow water to release but still hold water in the marsh at the same time" will require a novel solution. But isn't that what the existing baffle does now?

The fish that spawn in the lowest 100+ metres of upper Coats Marsh Creek were originally stocked in Hoggan Lake by the government in 1927. They also spawn in Goodhue Creek.



I'm going to give up trying to identify every mushroom I see. Portable DNA testers don't exist; I can't keep up with all the taxonomic revisions; and probably all of the species in the park also live elsewhere on the island and their identification is better attempted by experts rather than me. 9

A Russula (its stipe would snap like chalk);





⁹ I just regret the growing trend of mushroom foragers to leave an unsightly trail of mutilated specimens behind them. In my experience, some species that are harvested don't taste better than *Agaricus nesters* and are only useful mixed with other ingredients, soups and the like (*Mischpilze*). Harvesting may be sustainable as academics claim, but it sure spoils the enjoyment of others who just want to savour their presence.



a strikingly yellow-capped Atheniella (alone and unusual, looking like a wildflower from a distance); 10 and some Suillus (caps slimy, large radially elongated orangey-brown pores originally decurrent, veil remains on stipes, common).

Above right: Another of the common boletes (identified by a collector on the trail rather disconcertingly as "porcini". Possibly another kind of Suillus?); 11 and some sinister warty things, puffballs? ...or are they? [yes, they fart. Lycoperdon]

Only one duck seen on the lake. Mallard.

Oct.19, 2023 (day 3015, 2922+93): ViGRG cum. 218.9 mm (norm. 142 mm).

Rain. Large puddles on the trails, but they're mostly gone a day

later. All the water is replenishing groundwater reservoirs and the creeks won't be flowing anytime soon.

Five years ago, I had no problem identifying purple mushrooms as Cortinarius violaceus, but, armed with three new field guides, I'm not so sure they aren't Laccaria (L.amethysteo-occidentalis or L.bicolor perhaps). The caps of those seen today are not so persistently violet as they might be. In some lighting, they appear brownish.

¹⁰ Atheniella (formerly Mycena) flavoalba is a blue-listed taxon.

Short decurrent yellow pores, small like sponge cake, bruising red-brown, cap margin inrolled, remains of a veil. My guess, not much more, would be very small/young *Suillus lakei*. Same species as on previous page.







Another unfamiliar sighting was a group in moss with red-brown caps covered in granules (not rain drops), white notched gills, stipe veil-draped, also with granules, ring indistinct. Cystodermella granulosa ?

Troops of tiny white fairy bonnets are always a delight to see. They catch the dim light under closed canopies so well on cloudy days that you often need to stop the AUTO camera aperture down. Some *Mycena* species like these are bioluminescent.



Oct.20, 2023 (day 3016, 2922+94): ViGRG cum. 219.0 mm (norm. 146 mm). Cistern -518 mm SCB. [cal. datum: cistern -0.151 m].

Easier ones to ID for a change. Tiger's eyes, fused, pores decurrent (*Coltricia perennis*). Frog pelt lichen (*Peltigera* sp.) in juniper moss.

Heavy rain has made a welcome change to the lake level. The air strangely turbulent, rippling and swirling the sunlit water this way and that midst scattered patches of calm.

No ducks visible but there may be some wood ducks hanging out in the snags, or so I thought. Stealthily working my











way closer without spooking them, I see they're green-winged teals. Haven't seen them here for years. Maybe they approve of the conversion of the lake from a woody swamp to a grassy marsh.

And that lone duck out there. Not a mallard, a northern shoveller. The first of the fall migrants?

Found a copy of William Hoggan's pre-emption claim, July 1872. His sketch, made before there was a cadastral map of Gabriola, shows Coats Marsh as a swamp. The award made to him suggests the wetland was not counted as pre-emption acreage, presumably because it was judged not to be developable.

They got that wrong.

History File 697.



Oct.26, 2023 (day 3022, 2922+100): ViGRG cum. 287.4 mm (norm. 172 mm). Cistern -183 mm SCB. [cal. datum: cistern +0.184 m]. Weir -22 mm WPB scale. [cal. datum: weir -0.669 m].

My what a difference 4-inches of rain makes! Levels are back to the late-summer levels of five years ago and the hydraulic head of the beaver dam is approaching its old figure of almost a metre, File 673b.

Coats Marsh Creek is ponded and trickling.
Both East Path Creek and Stump Farm Number 1
Stream are flowing strongly though I suspect the flows are





Left: Whenever there's rain these days, crowds of tiny orange mushrooms pop up in the mats of dark-green haircap mosses, looking like bird-scattered arbutus berries. Species?; too many possibilities. I just call them orange mosscaps and enjoy their company.

Right: Fluted black elfin saddle. Used to be called Helvella lacunosa, but that's what they have back east. Out west, I'm informed, we call them Helvella vespertina.

diminishing. Nothing from the NE Arm.

Ring-necked ducks (right) are here. These used to be our reliable winter residents. About a dozen.

Met a couple who live near-by. Said loons sometimes visit the lake. Never seen them myself. Seems unlikely as there aren't

any fish, but I don't imagine they were mistaken. Herons and kingfishers have been known to drop by, but after a few hours they're on their way.

Nov.1, 2023 (day 3028, 2922+106): ViGRG cum. 309.8 mm (norm. 199 mm).

Mallards with spanking new coats have joined the ringneckeds, buffleheads too, but so far only females who likely are here from back east beyond the mountains.







Precipitation in October 80% above average and cumulative (calendar)

annual to-date now 6% above average.

Interesting that the commonknowledge truism concerning climate change "less rain in summer, more rain in winter" is only partially true.

I detect no statistical trend in annual precipitation, and, no doubt, we are getting less rain in summer (Jun.-Aug.), but the amount of rain we get in the depth of winter (Dec.-Feb.) hasn't increased over the years.

Instead, the summer shortfall is made up of more rain in the fall (Sep.-Nov.) and to a lesser extent in the spring (Mar.-May). With this change comes a change in its character. The "new" fall rain is like April-showers, sometimes heavy and very local rather than like the multi-day steady rain of winter.

Stump Farm Number 1 Stream has stopped flowing at the Canary Grass Meadow culvert. Little Creek is ponded and trickling at the Three Gates Wetland as is, surprisingly, Coats Marsh Creek at the Marsh Trail culvert.



Above: Calocera cornea. No forked tips otherwise it would have been Calocea viscosa.

Right: cheesy polypores. Little Creek.

John Clare's poem "Shadows of Taste" written in 1830 comes to mind:

---The man of science in discoverys moods roams oer the furze clad heath, leaf buried woods, and by the simple brook in rapture finds treasures that wake the laugh of vulgar hinds who see no further in his dark employs the village childern seeking after toys.

Their clownish hearts and ever heedless eyes find nought in nature they as wealth can prize ---

[John Clare, Major Works, Oxford World's Classics]

Disappointing that the RDN recreation and parks master-plan survey now in progress appears to show residents have little interest in nature reserves and ecological protection zones — tools needed for conserving ecosystems. Like the world in general. In the Anthropocene all available natural resources have to be devoted to satisfying the needs of a human population whose relentless growth is lauded, yet is so clearly not sustainable.



Nov.5, 2023 (day 3032, 2922+110): ViGRG cum. 334.1 mm (norm. 219 mm).







Clare's leaf-buried woods under bigleaf maples (Acer macrophyllum BLMs). The leaves are said to

have 5-lobes, but if you're interested in comparing them with those of Douglas maples (Acer

glabrum DMs) with 3-5 lobes, or with those of vine maples (Acer circinatum VMs) with 7-9 lobes, you have to be careful. Distinguishing lobes from teeth of BLM leaves is not always straightforward. I've had to give up on field guides and invent my own system. It goes like this.

Turn the leaf over and look at the underside. There is always a vein dividing the leaf in half. This is the **midrib**, which starts at the base point (BP) where the leaf is attached to the leaf-stalk (petiole) and runs up to the top of the leaf (leaf-apex). This is one of what I call the A-veins.

Other A-veins have the following properties. They always start at the base point BP and hence are palmate; they come in pairs (one in each half of the leaf); they are always the thickest of the veins; they commonly terminate on the edge (margin) of the leaf at the apex of a lobe (lobe-apex). The total number of A-veins on a leaf is always odd (the midrib plus a variable number of pairs).

Any vein that does not start at the BP is not palmate and is a **B-vein**. Disregard these.

Veins that start at the **BP** but are noticeably thinner than A-veins; often either terminate on the apex of a tooth (**tooth-apex**), or end on the margin of the leaf without reaching an apex; these are **AB-veins**.

Leaves either have no AB-veins or only one pair of AB-veins and, if present, it is always the pair nearest the base of the leaf.

Leaves that appear to have two or more pairs of AB-veins are one of two kinds. The pair of supposedly AB-veins furthest from the base may be a pair of less welldeveloped A-veins terminating in a rather shallow lobe and they should be counted as such. It is common for the lowest of the A-veins to be less well-developed.

Or, if the supposedly AB-veins closest to the base on a large leaf are like thin or indistinct B-veins, then these should be disregarded, despite being palmate.

Douglas maple. DM leaves can be 3A, or 3A+2AB.



Vine maple (in the CM catchment area but not confirmed). VM leaves can be 5A + 2AB, 7A, or 7A + 2AB.





Bigleaf maple. Very common 5A+2AB. BLM leaves can be 3A+2AB, 5A, 5A+2 AB, or 7A.



Bigleaf maple. Occasional 3A+2AB. Just a few leaves on the tree looking like this.



Bigleaf maple. 9 palmate veins! 5A+4AB=5A+2AB+2B=5A+2AB. Uncommon, one or two per walk.



Bigleaf maple. Unusual leaf with 7 palmate veins, 5A+2AB or even 7A if you reckon the teeth at the base are lobes. Not like other leaves on the tree.



Bigleaf maple. 5A. Occasional, but most leaves have at least a trace of a pair of ABveins.

Obviously you can't identify the species of a tree based on the shape of one leaf. If you find a 3A+2AB leaf for example, you won't have to look long to find lots of 5A+2AB leaves if you are under a BLM. Easily confused on the basis of leaf shape alone are DMs and ninebarks (*Physocarpus capitatus*) but those of maples are opposite and of ninebarks alternate. Both have reddish petioles.



The leaves of the bigleaf maples are putting on a show this year. Their bright sunny yellows catching the grey wintry light standing out sharply against the gloomy blue-green of the conifers.

Nov.6, 2023 (day 3033, 2922+111): ViGRG cum. 338.3 mm (norm. 224 mm). Cistern +156 mm SCB. [cal. datum: cistern +0.523 m]. Weir 494 mm WPB scale. [cal. datum: weir -0.153 m]. Sill depth 0.08m.

On the lake, few ducks to be seen, but amongst those out and about there was one male bufflehead and a pair of wood ducks.

Higher than average rain has rapidly re-filled the lake. Stability, with no danger of flooding, will require that the weir outflow capacity into Coats Marsh Creek is never less than the inflow into the lake plus precipitation. File 673u

At the moment, East Path Creek is running, but at less than half the culvert's full capacity. There is no flow across East Path at the NE Arm spillway, but there is ponding on the wetland side. Infiltration in the catchment area east of the park, and the seasonal expansion of the area, is evidently still in progress, so if it keeps raining there is plenty of potential for the inflow to increase.

The syphons appear not to be in operation and are deeply buried in vegetation. All of the flow into the weirpool is coming from spillways in the main beaver dam.

Coats Marsh Creek is running, the majority of the water coming from the Clemson pond leveller, which is not yet at full capacity. The drainage pipe on private land is also contributing some water derived from leakage under the berm.



Above: The largest natural spillway in the main beaver dam. Used by the beaver both to reduce overflow and to move back and forth across the dam. The syphon system seen here on the left of the spillway is hidden in vegetation. *Below*: the pond leveller currently doing its job.



Water flowing over the crest of the baffle (at the sill) is contributing water, but the volume is less than that flowing through the leveller and seems less than it has been in the past given the level of the weirpool.

The difference between the level of the sill and the water level of the weirpool is currently (0.640-0.153) = 0.49 m; yet the depth I measure at the sill is only about 0.08 m.

This difference is due to the renovation on the part of the beaver of the debris, now a dam, amassed just a few metres upstream of the weir. Water is forced to flow in shallow spillways over it.

Lowering the flow over the baffle could have serious repercussions if the weirpool level were to continue to

rise. The pond leveller is too small to handle floodwater on its own.

Nov.8, 2023 (day 3035, 2922+113): ViGRG cum. 339.8 mm (norm. 234 mm). Weir 466 mm WPB scale. [cal. datum: weir -0.181 m].



Above: The debris, now an engineered beaver dam, reducing the flow over the baffle. [Blurring due to raindrops on the lens]

Below: Coats Marsh Creek flowing modestly at the culvert under the Marsh Trail.



Warm wet weather confusing some of the male tree frogs. They crrr'k as if it were April. 12

Looking back on my notes on sluice gates (File 673zb, pp.ZB521-3,

¹² Not a "ribbit", more like the sound of the ratchet in a come-along.

July 2023) I see that an unstated assumption was that the design goal was to have floodwater never rising above the crest of the concrete weir (CWB). It is however true that in the past water has risen higher than CWB but not high enough to breach the berm at +0.30 m CWB, which is a more important design objective.

The dam at the weir is effectively raising the level of the baffle, which reduces the capacity of the weir to allow floodwater into the creek, this reduction in turn allowing floodwater to accumulate which it will continue to do until flooding of the weir and deck occurs and a match between in- and out-flow is established.

Using the formula in the earlier note, raising the baffle from 2 ft.(-0.61 m) below CWB to say 1 ft.(-0.30 m) below CWB will reduce the no-overflow-of-the-weir equilibrium flow from 486 L/s to 177 L/s. To make up for this, the weir has to be flooded to add 309 L/s more water to that flowing through the notch.

Flooding would increase the weir's width by 18 ft. (not including the notch), and we would need its depth above CWB to be 0.098 m (3% in.) to provide the extra 309 L/s. This ≈ 0.1 m would put a dent in the 0.3 m "freeboard" of the berm, 13 but not enough to jeopardize the freedom from inundation of residential land.



The NE Arm wetland. A squelchy solitude, not yet ready to shed surplus water.

¹³ That is ignoring inconvenient details like the effect of the deck obstructing the flow, and the behaviour of the pond leveller. Doing that is above my pay scale.

Raising the weir overflow to say +0.2 m CWB would release a total of 883 L/s additional to whatever is flowing through the notch, which is perhaps why the local residents, who witnessed the flood of March 2014 without it breaching the berm, are not anxious about what the beaver has been doing now.

All of which raises the possibility of re-designing the weir without using a sluice gate. The steps would be: (1) raise the deck above the "floodwater" level so it no longer obstructs any flow; (2) replace the wooden baffle with a permanent concrete one; (3) change the design of the weir so that it is no longer just a vertical 2 ft. wide notch, but an engineered T-structure with the top of the $\boldsymbol{\mathsf{T}}$ being 20 ft. wide and a foot or whatever deep. Need something to stop water scouring away soil at the ends. Flow through the top of the Twhen the notch is full then no longer being "flooding" but flood relief.

Nov.14, 2023 (day 3041, 2922+119): ViGRG cum. 377.1 mm (norm. 272 mm). RDN outer gauge 1705 mm [no calib., est. +0.495 m using 260 mm, ref. Aug.27]



Still. Very little wildlife seen on the water.

Nov.15, 2023 (day 3042, 2922+120): ViGRG cum. 378.5 mm (norm. 277 mm). Cistern +133 mm SCB.



[cal. datum: cistern +0.500 m].





 $\frac{\text{Nov.20, 2023}}{3047, 2922+125)} \text{ (day } \\ \text{ViGRG cum. 381.2 mm } \\ \text{(norm. 300 mm)}.$

Autumn in the woods. Season of shedding trees and yellow-leaved shrubs;

Skies a patchy sunstreaked mosaic of layered greys;

My shadow at noon, over two and a half times my height; Mats of mosses, soft-underfoot, some reflecting a

bright forestgreen light;

Lichen'd deadfalls brought down by the gales;

Cankered leaves of Oregon-grape, burgundy, ruddy, and sunset-red;



Top: Beaver dam, Nov. 14, 2023 ,gently overflowing. *Above*: *Calocea viscosa* end-of-life stag's horn fungi on wood.

Maple-leaf strewn trails, and paths fringed with seedlings too eager to get-out-of-bed;
Time soon to wear gloves, my finger-tips are cold;

A multitude of mushrooms, toad-stools, and molds;

A head-turning owl among bare-branched alders;

A silent song-bird fluttering unseen in the bush;

A chattering, inquisitive, self-confident squirrel;

The sound of a woodpecker's drumming moving easily, like slanted sunbeams, 'tween the trunks of the trees;

Evergreens quietly preparing for winter dormancy;

Heavy rain on leaves of undergrowth shrubs, making them all shiny and glossy, and on sun-dried bracken and tawny reeds, turning their dull-brown more auburny;

Solitary chorus-frogs rehearsing their ratchety croaks, never failing to fall silent upon my approach;

Dampness and puddled sloughs and the rotting debris of summer everywhere; yet,

Doug.-firs and grand-firs; arbutus and cedars; salal and sword-ferns and prickly-leaved grapes; pale-green lichens draped on dead twigs and branches; tree-coats and carpets and cushions of mosses; places where forbs and grasses grow; without snowflakes dancing, all below to obscure, all are enhancing the forest's verdure.

[with apologies to Edwardian ladies who kept country diaries]

Nov.23, 2023 (day 3050, 2922+128): ViGRG cum. 387.2 mm (norm. 317 mm). Cistern -194 mm SCB. [cal. datum: cistern +0.173





Top: ♂ ring-neckeds. *Above*: ♀ buffleheads. Strange mix. Verv few ducks on the lake. It looks disturbed, Nov. 20.

m]. Weir 518 mm WPB scale. [cal. datum: weir -0.129 m]. Sill depth 0.07m. 14

RDN have been out on the dam meddling with their syphons and creating a disturbance. It's all to no common-sense purpose, just to tick the check boxes of legal-department-driven bureaucracy aided by ferry-in-for-a-day experts who have no detailed knowledge of the working of the wetland, nor have sought to acquire any from local residents.

¹⁴ Hard to come up with an explanation as to why an increase in the weirpool level should decrease the depth of water flowing over the sill. Not an easy measurement to make as the water is moving so fast that even if the ruler is held exactly parallel to the flow, a "bow" wave still perturbs the reading.

Seclusion, tranquility, and being left-alone, used to be reasons the wetland was favoured by several species of waterfowl and other wildlife at various times of the year, but the human traffic on the beaver's dam and the constant unseasonal yo-yoing of the level of the water appears to have put an end to that.¹⁵

A few ring-neckeds and buffleheads, males and females, in the weirpool. No ducks seen out on the lake.

Good to see them in their courting gear, but just a small fraction of the numbers that used to be here in November.

Nov.26, 2023 (day 3053, 2922+131): ViGRG cum. 387.2 mm (norm. 334 mm). Cistern - 296 mm SCB. [cal. datum: cistern +0.071 m].

A grey day, misty, several large V-shaped skeins of honking geese heading toward the big island, just skimming below the cloud and scarcely being above the tops of trees. The leaders called a time-out at the lake. Could have been over a hundred in all.

Nov.29, 2023 (day 3056, 2922+134): ViGRG cum. 387.4 mm (norm. 352 mm). Cistern - 395 mm SCB. [cal. datum: cistern -0.028 m]. Weir 503 mm WPB scale. [cal. datum: weir -0.144 m].







¹⁵ I know, such observations don't prove a cause-and-effect relationship. Bad science, but still....























Inside of peeled bark on a dead redcedar.



Goldenrod (Solidago canadensis)

 $\underline{\text{Nov.30, 2023}}_{\text{cum. 397.4 mm}}$ (day 3057, 2922+135): ViGRG

Precipitation in November 38% below average and cumulative (calendar) annual to-date now 3% below average.

River of rain. Drainage channels have become ephemeral creeks. Quite a few ducks out and about, but I left them undisturbed.



 $\underline{\text{Dec.06, 2023}}$ (day 3063, 2922+141): ViGRG cum. 468.2 mm (norm. 394 mm). Weir 558 mm WPB scale. [cal. datum: weir -0.089 m]. Sill depth 0.10m.

day	weirpool level m	depth of water above the baffle m	sill water level m	delta m
3033	-0.15	0.08	-0.56	0.41
3050	-0.13	0.07	-0.57	0.44
3063	-0.09	0.10	-0.54	0.45

Weirpool level is level of water in the weirpool relative to the crest of the concrete weir (CWB).

Depth of water above the crest of the baffle. Difficult to measure with better than centimetre accuracy. The decrease in the depth of water as it flows over the baffle due to the acceleration of the water

(the drawdown) is going to be ignored. If there is no water flowing over the baffle, depth is just taken to be zero.

Sill water level is calculated as the level of the crest of the baffle (-0.640~m~CWB) plus the depth of the water crossing the crest of the baffle.

Delta is the weirpool level less the sill water level, which is approximately the amount the beaver's dam/debris is allowing the level of the weirpool to rise. Delta is of course subject to alteration by the beaver and humans clearing away some of the dam/debris.

I'll include updates to this table in the water-levels file $(\underline{673b})$. $\underline{\text{Dec.08,2023}}$ (day 3065, 2922+143): ViGRG cum. 470.2 mm (norm. 406 mm). Weir 576 mm WPB scale. [cal.datum: weir -0.071 m]. Sill depth 0.135 m.



The debris/dam at the weir, December 8, 2023. More than one engineer been working on it?

 $\underline{\text{Dec.}10,2023}$ (day 3067, 2922+145): ViGRG cum. 491.2 mm (norm. 419 mm). Weir 594 mm WPB scale. [cal.datum: weir -0.053 m]. Sill depth 0.15 m.

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¹⁶ Again, ignoring the contribution of the drawdown. Only positive values of delta are of interest; the analysis is not pertinent when the weirpool level is below that of the crest of the baffle.



The last pool of upper Coats Marsh Creek. Known to be fish habitat despite conjectures by off-island experts to the contrary.

<u>Dec.11,2023</u> (day 3068, 2922+146): ViGRG cum. 491.3 mm (norm. 425 mm). Cistern +150 mm SCB. [cal. datum: cistern +0.517 m].

East Path Creek flowing strongly and water from the NE Arm has started to flow over and under East Path and to contribute to the rising lake water level. Lake seems completely recovered from the effects of syphoning.

 $\underline{\text{Dec.}15,\ 2023}$ (day 3072, 2922+150): ViGRG cum. 512.8 mm (norm. 449 mm). Weir 582 mm WPB scale. [cal. datum: weir -0.065 m].



Apropos of nothing in particular, curious close geometrical resemblance between the



seven palmate veins of most bigleaf maple tree leaves (5A+2AB) and those of the petroglyph at DgRw228.



<u>Dec.20, 2023</u> (day 3077, 2922+155): ViGRG cum. 536.7 mm (norm. 480 mm). Cistern +105 mm SCB. [cal. datum: cistern +0.472 m]. Weir 573 mm WPB scale. [cal. datum: weir -0.074 m].

New report from the RDN, a draft of the plan to remove the weir rather than repair or renovate it, and turn the weirpool into a kind of garden, leaving only the beaver dam protecting the shallow-water wetland, once a glacial meltwater lake, from its possible and likely eventual complete destruction, as was planned when the marsh was drained by the landowner in the 1940s.

 $\underline{\text{Dec.30,2023}}$ (day 3087, 2922+165): ViGRG cum. 576.1 mm (norm. 541 mm). Weir 579 mm WPB scale. [cal.datum: weir -0.068 m].

The marsh's soundscape is seldom without the call or wingbeat of a raven.

 $\underline{\text{Dec.}31,2023}$ (day 3088, 2922+166): ViGRG cum. 576.3 mm (norm. 548 mm).

Precipitation in December 5% below average and annual 3% below average. More rain in October than in December, but that happens every 5 or 6 years or so. ◊ previous file next file



Jan.03, 2024 (day 3091, 2922+169): ViGRG cum. 585.7 mm (norm. 566 mm).

The major inflow to the "lake" is sometimes quoted by RDN consultants to be East Path Creek (EPC). In fact, observations (File: 673u) at the EPC culvert have shown that the creek contributes on average only about 35% of the total annual input. The inflow from the NE Arm sometimes exceeds this at certain times of the year, but this is more difficult to measure, and depends on the lack of infiltration in the NE Arm Wetland, which is only low later on in the season.

Although variable and difficult to quantify, there seems to be on occasions significant sources of inflow other than the combined inflows from EPC and the NE Arm Creek.

One interesting discovery was what appeared to be a drainage channel noted last summer when the lake water level was extraordinarily low (File: 673zc, p.ZC 544). On investigation today (there were no ducks



around), I found that this channel extends into the bush where it is obviously natural. The channel was ponded but no flow could be observed, even though EPC was flowing gently at the culvert; however, there was little doubt that at times this is a significant ephemeral watercourse. It and other smaller ones nearby appear to have attracted the beaver's passing interest.

This ties in nicely with my observations of years ago that the glaciofluvial smectite clay underlying the lake suggests the lake was more extensive at the time of its deposit at the end of the Pleistocene (File: 668). My guess is that the lake was blocked by massive amounts of ice at its western end, and its immediate catchment area was thereby extended beyond the wetted perimeter of the lake today. This extension of the lake's perimeter acts to funnel runoff into the modern lake evidently often as subsurface or poorly-defined flows, with almost none infiltrating through the gleysol into the

sandstone bedrock while *en route*. Whether this is enough to account entirely for the "excess" inflow, I'm not sure. [see Jan.9 entry]

Rainfall statistics (File: 698) updated to include years 2022-2023.

Jan.08, 2024 (day 3096, 2922+174):ViGRG cum. 653.9 mm (norm. 595 mm).

Weir 579 mm WPB scale. [cal.datum: weir -0.068 m].

Wet snow.

<u>Jan.09, 2024</u> (day 3097, 2922+175): ViGRG cum. 679.9 mm (norm. 601 mm). Weir 637 mm WPB scale. [cal.datum: weir -0.010 m]. Cistern +166 mm SCB. [cal. datum: cistern +0.533 m].

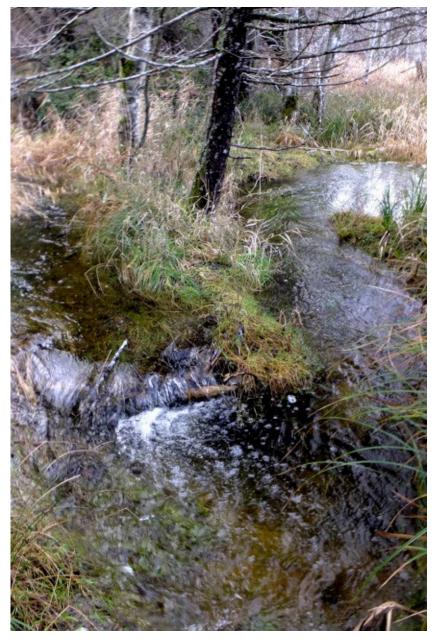
Heavy rain with passage of a cold-front overnight. EPC culvert full. NE Arm spillway (shown below) flooded with a flow over and under East Path comparable with that observed at the EPC culvert.



The "drainage" channel observed last week [Jan.3) has a heavy flow, so heavy that I suspected some or most of it might be the principal estuary of EPC, not as I surmised an entirely new source. Why not traverse EPC to see where it goes? The watercourse is through dense rose thickets that are not a comfortable survey, but it wasn't too difficult this time of year. And yes indeed EPC does flow northward sub-parallel to the shore line for a bit before meandering down toward the lake and through the reeds along the shore (photo next page).

The two springs near the park entrance are flowing independently into the lake, each with roughly equal flows and each somewhat less than the EPC culvert flow but constituting together a significant fraction of that flow. Sorry, no measurements attempted.

Discussion with the resident at the west end (Lot 5) on the source of the drainage on his side of the berm. I'd convinced myself that it was leakage under the berm based on the results of WQ tests showing that the pH and mineralization on either side of the berm was practically identical. (File: 673n, p. N232) However, it is true that the flow usually stops in August when there still is water in the weirpool, but this could be because the leak is fairly high up.



The resident however assures me that the lot to the south of his (Lot 4), which is on higher ground, does have a small natural pond, and this area might be where the water needing to be drained is coming from. What the source of this water is has thus reverted to being an open question.

I notice that the latest consultant's report (File: $\underline{6110}$, p.14) to the RDN records that the authors are "not qualified to quantify the beaver dam's stability or likelihood of failure; however, the following information is provided for discussion based on our professional experience…".

Any quantitative assessment of risk involves two factors: the probability of an event happening, and the consequences if it does. The two multiplied together give a measure of the overall risk.

I can only repeat regarding the first factor my conversation with Professor Richard Brazier of Exeter University. He has been researching beaver dams in the UK since 2013. He wrote to me that: "considering the system that you refer to - which is a low-energy lake system - in my opinion, especially given the maturity of the dam, the chance of any catastrophic failure is non-existent". (File: 6111)

The second factor is the business of the three downstream landowners but I gather no in-depth discussions with the RDN have occurred.

A risk assessment has thus yet to be made.

♦ previous file