

Flora of Coats Marsh area, Gabriola Island, BC—a summary

Definitions of terms in italics as used in [File 690](http://nickdoe.ca/pdfs/Webp690.pdf) (<http://nickdoe.ca/pdfs/Webp690.pdf>)

- area* specifically one of the six areas identified in the first pages of [File 690](#).
- lake* see *marsh*.
- marsh* specifically the body of open water in Coats Marsh RP, but generally a shallow-water wetland, flooded year round and without trees. Some times identified as “the lake” here and in the Coats Marsh field notes, even though the wetland is technically too shallow to be classified as such.
- region* all six of the *areas* identified in the first pages of [File 690](#).

There is a complete species checklist at Ref. 13. See also Ref. 2F and Ref. 1A.

Douglas-fir—salal ecosystems

Most of the *region* is immature Douglas-fir forest (*Pseudotsuga menziesii*) with an understory of stunted salal (*Gaultheria shallon*) that frequently covers all of the forest floor at typically up to hip height. Grand fir (*Abies grandis*) and dull Oregon-grape (*Berberis nervosa*) are also commonly present.

All *areas* outside of the Coats Marsh RP comprise the most-recently-logged forest (circa 1998). The current average height of the Douglas-fir stands in these areas is just over eight metres (27 ft.). Scattered “mop trees” left by loggers as seed trees are conspicuous because they are two- to three-times taller (66 ft.) and lack lower limbs. These older trees have however not managed to establish the closed-canopy/open-forest-floor nature of more mature forests because they are isolated from each other, and even they are not particularly old.

Coats Marsh RP [*area* 1] contains stands of earlier generations of trees (circa 1956) and these constitute a “young forest” stage of regeneration. The bigger trees here have a 2.8 metre-ish (9 ft.) circumference at breast height (BHCirc.), and the tallest, not always the thickest where competition for moisture is strong, are up to 35 metres (110 ft) tall.

Arbutus (*Arbutus menziesii*) frequently grows in the more open and drier areas of the Douglas-fir forest. It is a pioneer species but still competes with the younger generation of firs especially in Coats Marsh East [*area* 2]; however, leaves on its lower limbs especially are prone to disease.

Ocean spray (*Holodiscus discolor*) is a very common shrub wherever there is a break in the forest canopy.

Trailing blackberry (*Rubus ursinus*) is frequently found in open areas and along trails, as are thickets of roses (mainly *Rosa gymnocarpa*, some *Rosa nutkana*, and the rarer *Rosa pisocarpa*). Pink honeysuckle (*Lonicera hispidula*) is common. Red-flowering currant (*Ribes sanguineum*) is present, but rare; however, the expected thimbleberry (*Rubus parviflorus*) appears to be absent.

Within the moss layer, Oregon beaked moss (*Kindbergia oregana*), juniper haircap moss (*Polytrichum juniperium*) are usually abundant. Various lichens are found, especially species that grow on standing dead wood or on the dead lower limbs of taller trees.

This ecosystem corresponds to Oswald's "Shallow Soil Landscape Unit" (Ref. 11, pp.13–17) though that account is rather dated now. The Islands Trust Sensitive Ecosystems Mapping (SEM) system (Ref. 10) usually ranks this ecosystem as primarily non-sensitive (NA) blank map areas, or non-sensitive (NA) Douglas-fir/salal (DS), polygons 50207, 50245, 50296, 50313, 51152.

Western redcedar—Douglas-fir—sword fern ecosystems

In damp, but not flooded forested areas, there are mixed stands of western redcedar (*Thuja plicata*) and Douglas-fir with sword fern (*Polystichum munitum*) and often dull Oregon grape in the understory, but such "mossy rainforest" ecosystems, although not rare, are not as common as in some forests elsewhere on the island, in Kensington 9 for example. (Ref. 16) Redcedar usually shows red-flagging at the end of summer.

In the more open such areas, there are bigleaf maple (*Acer macrophyllum*) and deciduous shrub-trees such as Indian-plum (*Oemleria cerasiformis*), Scouler's willow (*Salix scouleriana*), bitter cherry (*Prunus emarginata*), and roses (*Rosa gymnocarpa*, with occasional *Rosa nutkana*). Pacific ninebark (*Physocarpus capitatus*) occurs along the banks of creeks.

In keeping with the relative lack of cedar and cedar stumps, red huckleberry (*Vaccinium parvifolium*) is scarce; evergreen huckleberry (*Vaccinium ovatum*) is more common. Only occasionally seen are salmonberry (*Rubus spectabilis*) and red elderberry (*Sambucus racemosa*). Snowberry (*Symphoricarpos albus*) is present but is rare, as is gummy gooseberry (*Ribes lobbii*).

This ecosystem is mapped by Oswald as a "Moderately Deep Soil Landscape Unit" (Ref. 11, pp.17–19) though that account is rather dated now there being, for example, more redcedar and far less western hemlock (*Tsuga heterophylla*) than he describes. The Islands Trust Sensitive Ecosystems Mapping (SEM) system (Ref. 10) references this ecosystem as primarily wetland (WN) with western redcedar & Indian-plum (RP), polygons 50230, 50235, 50295, or western redcedar/vanilla leaf (RV), polygon 50252.

Red-alder ecosystems

Areas that are watercourses or that fringe swamps with gleyed soils are dominated by red alder (*Alnus rubra*) with open understories of moss and flood-tolerant grasses, sedges, and with some bracken (*Pteridium aquilinum*). Any conifers present are dwarfs, and patches of salal and dull Oregon grape are low and widely spaced. The trees support a variety of lichens, principally bark barnacle (*Thelotrema lepadinum*) with minor waxpaper lichen (*Parmelia sulcata*) and occasional tufts of *Ramalina farinacea*.

This ecosystem is not recognized in the *region* by Oswald (Ref. 11) although it would be partially represented by his "Alluvial Channel Landscape Unit" (pp.13–17) which is described as having a more diverse understory ecosystem than exists at present. The soil survey (Ref. 4) always lists red alder and western redcedar occurring together on Brigantine and similar soils, but I have seen virtually no sign of this association in post-logging growth. If present at all, redcedar is there only as rotting stumps, rotting logging discards, or snags. Red alder these days is accompanied only by scattered dwarf grand fir and Douglas-fir.

These small, but ecologically important areas, frequented by barred owls for example, are not adequately represented in the Islands Trust Sensitive Ecosystems Mapping (SEM) system (Ref. 10).

Swamp ecosystems

Reed canary grass (*Phalaris arundunacea*) is ubiquitous in relatively tree-less areas regularly flooded in spring, but dry in summer. It forms monotypic (single-species) habitat in the cores of seasonal swamps, but wildflowers are abundant around the rarely-visited margins in early spring. Only locally present in wet areas are shrubby willows (*Salix* spp.), hardhack (*Spiraea douglasii*), horsetails (*Equisetum* spp.), vanilla leaf (*Achlys triphylla*), sedges, and other riparian plants.

This ecosystem is not recognized in the *region* by Oswald (Ref. 11) although it would be partially represented by his thinly covered “Marine Clay Landscape Unit” (pp.24–26) except that reed canary grass has become the dominant plant rather than hardhack (*Spiraea douglasii*), and a few other details that are out-of-date.

Riparian areas are disproportionately important ecosystems that are not adequately represented in the Islands Trust Sensitive Ecosystems Mapping (SEM) system (Ref. 10).

Shallow-water wetland (marsh) ecosystem

A few of the hydrophytic plants observed include watershield (*Brasenia schreberi*), which covers much of the surface of the Coats Marsh RP shallow-water wetland in summer, yellow pond lily (*Nuphar polysepala*), narrow-leaved bur-weed (*Sparganium angustifolium*), duckweed (*Lemna minor*), water smartweed (*Persicaria amphibia*), four species of sedges (*Carex* spp.), three of rushes (*Juncus* spp.), and two of horsetails (*Equisetum* spp.) including marsh horsetail (*E. palustre*), which, although yellow-listed is uncommon in BC.

The raising of the water level of the marsh, mostly the work of beavers, has created a rim of snags around the shoreline. They are inhabited by numerous frogs and small birds, red-winged blackbirds, cedar waxwings, snakes too are common, and appear to provide valuable cover for ducks and ducklings suffering the attention of eagles in late-spring.

This ecosystem would be expected to correspond to Oswald’s “Ponded Wetland Landscape Unit” (Ref. 11, pp.27–28), but is instead mapped as a “Shale Landscape Unit” (Ref. 11, pp.19–21) probably as a consequence of the marsh being drained at the time he wrote. Although of historical interest, neither unit accurately describes the *marsh* in Coats Marsh RP. The soil survey (Ref. 4) was also made at a time when the wetland was drained.

The Islands Trust Sensitive Ecosystems Mapping (SEM) system (Ref. 10) indicate this as open water (OW), but scarcely distinguishes it from surrounding areas designated swamp. Their Ws50 designation, polygon 50287, is not a good detailed guide; hardhack thickets are in fact now rare or absent.

Greenswards, Stump Farm site, and disturbed areas including trails ecosystems

Greenswards exist where the soil is too thin to support trees or large shrubs, the old Stump Farm site for example, where recovery from clear-cutting is only progressing slowly, or a combination of both. These sites support grasses, mosses, and spring flowers. Ladies tresses (*Spiranthes romanzoffiana*) for example were common around Stump Farm and hopefully have been spared destruction by the heavy machinery employed to clear the site. Any saplings are mostly stunted.

About two-thirds of the grass species in the *region* are introduced agronomic species. (Ref. 2F, p.A28) Common species are bentgrass (*Agrostis capillaris*) and orchard grass (*Dactylis glomerata*), but there are more than twenty others. The most common native grass is blue wild-rye (*Elymus glaucus*).

Greenswards usually contain several naturalized species of grass; none appear obnoxiously invasive.

Clearings that are only very slowly recovering from human disturbance, particularly in the Coats Marsh RP, contain relatively few plant species. Locally invasive species, but mostly scarce or absent in wooded areas, are Scotch broom (*Cytisus scoparius*), thistles, mostly Canada thistle (*Cirsium arvense*) but with some bull thistle (*Cirsium vulgare*), along with the native stinging nettle (*Urtica dioica*). Seasonally abundant in clearings everywhere are oxeye daisies (*Leucanthemum vulgare*) and tansy ragwort (*Senecio jacobaea*). Grasshoppers, butterflies, and many other insects are seasonally numerous as are birds that prey on them.

Exotic plants that have a reputation for being invasive, yet show no signs of being so, include blackberries (*Rubus discolor* in the Coats Marsh RP, and *Rubus laciniatus* in Coats Marsh East), sheep sorrel (*Rumex acetosella*), and common burdock (*Arctium minus*). Mullein (*Verbascum thapsus*) is identified in the Coats Marsh RP Management Plan as being an invasive species present, but this observation has not been confirmed and is probably a mid-winter mis-identification of foxglove.

There are a few garden plants in the burn-pile clearings in Coats Marsh RP such as shasta daisies (*Leucanthemum superbum*), marjoram (*Origanum majorana*), oregano (*Origanum vulgare*), and even conspicuously and rather ludicrously out-of-place daffodils, but none show signs of becoming a problem.

Trails through the area, noticeably in the 4-foots, are favourite habitats of some of the more “weedy” exotic species including, just for example, English daisy (*Bellis perennis*), smooth hawksbeard (*Crepis capillaris*), Queen Anne’s lace (*Daucus carota*), St. John’s wort (*Hypericum perforatum*), cats ear (*Hypochaeris* spp.), nipplewort (*Lapsana communis*), black medic (*Medicago lupulina*), wall lettuce (*Mycelis muralis*), English plantain (*Plantago lanceolata*), tansy ragwort, chickweed (*Stellaria media*), cleavers (*Galium* spp. which may be native), common dandelion (*Taraxacum officinale*), and vetches (*Vicia sativa* and *Vicia cracca*).

Japanese hedge parsley (*Torilis japonica*) has been present in the region for several years, and this summer (2019) has been seen to be actively being spread along trails and in clearings by trail-users and deer.

Native plants seen along trails include pearly everlasting (*Anaphalis margaritacea*), little western bitter cress (*Cardamine oligosperma*), miners lettuce (*Claytonia perfoliata*), bicolored flaxflower (*Leptosiphon bicolor*), cudweeds, tarweeds, small-flowered nemophila (*Nemophila parviflora*), Scouler’s harebell (*Campanula scouleri*), and self heal (*Prunella vulgaris*).

Old growth

Mature and old-growth conifer trees are limited to a few veteran cedar trees at the far west end of Coats Marsh RP. One cedar there measures 4.9 metres (16 ft.) BHCirc., which is comparable with other old cedars on the island outside of the S’ul-hween X’pey (Elder Cedar) Nature Reserve.

One specimen of Pacific willow in the East Path Creek riparian area (Coats Marsh East) is exceptionally old { 3.1 metres (10 ft.) BHCirc. }. There is at least one large red alder { 2.5 metres (8 ft.) BHCirc. } in the alder grove near the SE corner of the 707 CP. The Gabriola Land and Trails Trust (GaLTT) big-tree registry also lists examples of old bitter cherry and Scouler’s

willow, but only in the 707 CP north of the *region*; it is however quite likely there are similar specimens along the western edge of Canary Grass Meadow (Ref. 14, Map G; Ref. 6, p.53).

Wildflowers

Of the 123 species of wildflowers positively identified in the region to-date, one—angled bittercress (*Cardamine angulata*)—is BC status red-listed (endangered), 44 are yellow-listed (native, apparently secure), and four have unassigned status. About half of the species are exotic (introduced).

Some of the more interesting wildflowers—not an exhaustive list—are fairy slippers (*Calypso bulbosa*); the common Siberian candyflower (*Claytonia siberica*); spotted coral (*Crepis capillaris*); four kinds of violet (*Viola adunca*, *Viola glabella*, *Viola palustris*, and *Viola sempervirens*); Eaton’s aster (*Symphyotricum eatonii*); foamflower (*Tiarella trifoliata*); ladies tresses (*Spiranthes romanzoffiana*); several kinds of buttercup; twinflowers (*Linnaea borealis*); wild strawberry (*Fragaria virginiana*); broad-leaved starflower (*Trientalis latifolia*); northern goldenrod (*Solidago multiradiata*), which is not common at this latitude this low down; trillium (*Trillium ovatum*); American brooklime (*Veronica beccabunga* ssp. *americana*); the early spring beautiful bittercress (*Cardamine nuttallii* [*pulcherrima*]); pinedrops (*Pterospora andromedea*); and red columbine (*Aquilegia formosa*). Camas is present but very rare and nowhere abundant (*Camassia quamash*).

When the run-off ceases in spring, former rivulets in the alder trees become showy “rivers of blue”—forget-me-knots (*Myosotis* spp.) always accompanied by bright-yellow monkey flowers (*Mimulus guttatus*).

Among the “tolerated” exotics are Deptford pinks (*Dianthus amaria*); foxgloves (*Digitalis purpurea*); and, common though they may be, herb robert and dovesfoot cranesbill (*Geranium* spp.).

Other tree species

Other trees recorded as isolated or scattered specimens are Pacific dogwood (*Cornus nuttallii*), cascara (*Frangula purshiana*), choke cherry (*Prunus virginiana* var. *demissa*), hawthorns (*Crataegus* spp.), English holly (*Ilex aquifolium*), Pacific willow (*Salix lasiandra*), and Pacific crab apple (*Malus fusca*). Broad-leaved trees are easily overlooked deep in the coniferous forest, only advertising their presence in the fall when their leaves turn colour.

Apparently completely absent, though present elsewhere on the island, are red-osier dogwood (*Cornus sericea*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), and trembling aspen (*Populus tremuloides*).

Western hemlock (*Tsuga heterophylla*) is represented only in Coats Marsh East, and then by only one or two trees. This appears to be a change in the character of Gabriola’s forests. Oswald (Ref. 11) in 1977 frequently listed western hemlock as being among the more common tree species in his landscape units, and old-timers on the island remembered stands of western hemlock that no longer exist in what is now the 707 CP (Ref. 12, Beacon Hill). It is now absent or very rare in the south/southeast part of the island.

There are western yew (*Taxus brevifolia*) in forested residential areas to the east of the *region* but I have seen none within the *region* itself. It is possible I have just missed seeing them among the fir saplings, or they may not have survived the recent logging. There is no Garry oak (*Quercus*

garryana) in the region, nor is there any spruce (*Picea sitchensis*), juniper (*Juniperus communis*), or shore pine (*Pinus contorta*) despite reports of these in older surveys.

Plants other than trees, shrubs, and flowers

Fungi and lichen species are numerous and everywhere. Identifying them all is an impossible task for somebody who is not an expert.

So far, over 40 species of mushrooms have been recognized, but this list is far from complete. None are particularly rare in forests in southwestern BC. Just a few of the particularly eye-catching species include panther amanita (*Amanita pantherina*), fly agaric (*Amanita muscaria*), western amethyst laccaria (*Laccaria amethysteo-occidentalis*), fluted black elfin saddle (*Helvella lacunosa*), dirty trichs (*Tricholma pardinum*), shrimp mushroom (*Russula xerampelina*), shaggy parosol (*Chlorophyllum brunneum*), and, on alder deadfalls, turkey tail (*Trametes versicolor*). Very common are white fibrecap (*Inocybe geophylla*), common laccaria (*Laccaria laccata*), lichen agaric (*Lichenomphalia ericetorum*), and bracket fungus (*Ganoderma applanatum* and others).

Edible species (*Agaricaceae*, *Cantharellaceae*, *Boletaceae*, etc.) are present but nowhere near in such abundance that would delight a forager.

Odd-balls are well represented and include among others white coral fungus (*Clavulina cristata*), purple coral (*Alloclavaria purpurea*), *Calocera cornea*, Indian pipe (*Monotropa uniflora*), Douglas-fir cone mushroom (*Strobilurus trullisatus*), snowy inkcap on horse dung (*Coprinopsis nivea*), and toothed jelly fungus (*Pseudohydnum gelatinosum*).

Lichens that catch the attention of the casual visitor in the region are lipstick cladonia (*Cladonia macilenta*), and the occasional tentatively identified Methuselah's beard (*Usnea longissima* or other *Usnea* sp.) which favours mature forest and, while still yellow-listed in BC, is becoming endangered south of the border. Liverwort (*Pellia neesiana*) can be found in the parafluvial fringe of the lake in late summer.

Of the 17 other species of plants (ferns, sedges, rushes, horsetails) positively identified in the region, all are yellow-listed.

Quite surprisingly given seemingly suitable habitats and despite searching, skunk cabbage (*Lysichiton americanum*) is rare though it is reported to be common in the lower reaches of Coats Marsh Creek. (Ref. 6, p.43, Coats Marsh Outflow Stream)

There is a very helpful list of moss species in Appendix F of the 707 CP Management Plan (Ref. 2F p.A28).

Exotics and invasives

Of the 16 species of tree positively identified in the region, 13 are yellow-listed, one has unassigned status, and only two are exotic (English holly and a lone common hawthorn in Canary Grass Meadow). Of the 23 species of shrub positively identified in the region, 18 are yellow-listed, two have unassigned status, and three are exotic (blackberries and broom). Most of the exotics are wildflowers and grasses that thrive in disturbed sites and along trails.

Gabriola Land and Trails Trust and other volunteers help keep the broom under control in the old burn-pile clearings in the Coats Marsh RP, which are about the only places where it is a concern. The single clump of Himalayan blackberry there also gets sporadically clipped and has very few

berries. A relative newcomer that is spreading rapidly on the island is Japanese hedge parsley (*Torilis japonica*) and it is present in Coats Marsh RP, but without as yet attracting much attention. Yellow flag (*Iris pseudacorus*) grows in Coats Marsh Creek but is not yet a problem.

Daphne laurel (*Daphne laureola*), an invasive forming monotypic understory that is becoming a major problem on the island, has not yet been seen in the region. Periwinkle (*Vinca minor*) and field bindweed (*Convolvulus arvensis*) have not been observed, although hedge bindweed (*Calystegia sepium*) has.

The most troublesome invasive by far is reed canary grass, but there is little that can be done about it. Some would argue that the wildflower species suffer a great deal from over-grazing by a too-high population of deer.

Gallery







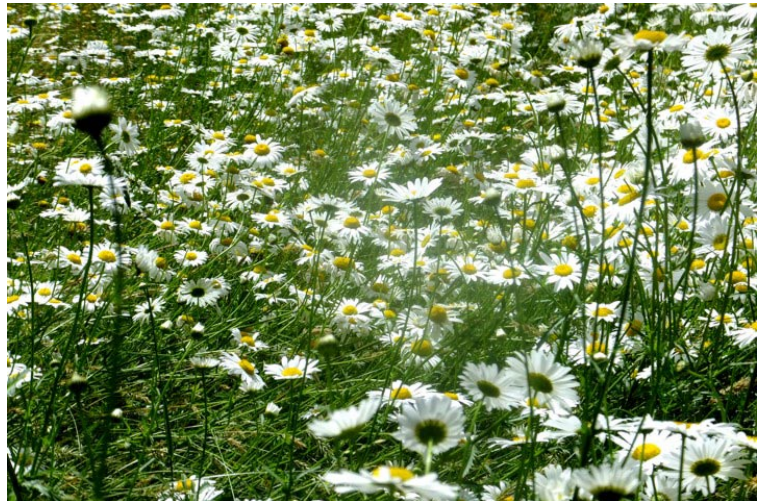




























Ref. 10 extract. Sensitive Ecosystem Mapping:

50207 (CDFmm, 8NA DS3, 2WD:co DA3);

50235 (CDFmm, 5WN:sp RP5, 5WN:sp RP3);

50252 (CDFmm, 10WN:sp RV5, -);

50295 (CDFmm, 9WN:sp RP5, 1NA RW0);

50313 (CDFmm, 8NA DS4, 2WD:co DA4);

50230 (CDFmm, 10WN:sp RP4, -);

50245 (CDFmm, 5NA DS4, 5WN:sp RV4);

50287 (CDFmm, 6WN:sp Ws50 3, 4WN:sw OW);

50296 (CDFmm, 9NA DS3, 1WN:sp RP4);

51152 (CDFmm, 8NA DS4, 2WD:co DA4)

The following is my personal interpretation of data in Ref. 10 and should not be taken as being authoritative. The source must be consulted and cited for details.

- TNT-A...E = The Nature Trust (TNT) study sites (Ref. 1A, pp.14–15)

Biogeoclimatic unit: CDFmm = coastal Douglas-fir, moist maritime.

Primary codes (solid colours):

$n = n \times 10\%$;

NA = non-sensitive ecosystem; WN:sp = wetland (swamp); MF:co = mature forest (conifer).

DS = Douglas-fir/salal;

RP = western redcedar & Indian-plum;

RV = western redcedar/vanilla leaf;

Ws50 = pink spirea, Sitka sedge swamp

Structural stages: 3 = shrub/herb; 4 = pole/sapling; 5 = young forest.

Secondary codes (//// coloured lines):

$m = m \times 10\%$;

MF:co = mature forest (conifer); WD:co = woodland (conifer dominated); WN:sp = wetland (swamp);

WN:sw = wetland (shallow water).

DA = Douglas-fir, shore pine, arbutus;

OW = open water;

RP = western redcedar & Indian-plum;

RV = western redcedar/vanilla leaf;

RW = rural residential

Structural stages: 0 = none; 3 = shrub/herb; 4 = pole/sapling

References

- Ref. 1: Coats Marsh Regional Park — 2011–2021 Management Plan, RDN Recreation and Parks Department, August 29, 2011. Online at <https://www.rdn.bc.ca/2222>
- Ref. 1A: Coats Marsh Regional Park — 2011–2021 Management Plan, Appendix A, Ecological Features and Management Recommendations
- Ref. 2: 707 Community Park — 2010–2020 Management Plan, RDN Recreation and Parks Department, August 2010. Online at <https://www.rdn.bc.ca/cms.asp?wpID=2019>
- Ref. 2F: 707 Community Park — 2010–2020 Management Plan, Appendix F, 707CP Ecological Inventory
- Ref. 3A: Doe, Nick, Geology of Coats Marsh area, February 2019. Online at <https://nickdoe.ca/pdfs/Webp691.pdf>
- Ref. 4: E.A. Kenny et al., Soils of the Gulf Islands of British Columbia, vol. 4, Soils of Gabriola and lesser islands, Agriculture Canada, 1990. Online at http://www.env.gov.bc.ca/esd/distdata/ecosystems/Soils_Reports/bc43-4_report.pdf
- Ref. 6: Madrone Environmental Services, Gabriola Island Riparian Area Regulation Stream Identification, February 24, 2012. Online at <http://www.islandstrust.bc.ca/media/342841/gbrptriparianarearegulation.pdf>
- Ref. 9: Doe, Nick, Hydrogeology of Coats Marsh, Gabriola Island, May 2015 plus 2019 Addenda. Online at <https://nickdoe.ca/pdfs/Webp668.pdf>
- Ref. 10: Gabriola Island Sensitive Ecosystem Mapping, Airphoto 2007. Online at <http://www.islandstrustconservancy.ca/media/20227/orgmapsemgabriola.pdf> downloaded November 2018. See pp.22–23 of File 692 for an extract.
- Ref. 11: E.T. Oswald, Gabriola Island and neighbouring islands—a landscape analysis, Environment Canada, 1977.
- Ref. 12: Fafard, Phyllis, Gabriola Plant List. Online and regularly updated at <https://www.galtt.ca/gabrielawildplants.pdf>
- Ref. 13: Doe, Nick, Observations at Coats Marsh, Gabriola Island, British Columbia—species checklists. Online and regularly updated at <https://nickdoe.ca/pdfs/Webp679.pdf>
- Ref. 14: Doe, Nick, Trail Maps of the 707 Community Park with Coats Marsh. Online and regularly updated at <https://nickdoe.ca/pdfs/Webp656.pdf>
- Ref. 16: Doe, Nick, Personal maps of trails on and around Government lands, central Gabriola. Online at <https://nickdoe.ca/pdfs/Webp689.pdf>
- Ref. FN-F: Coats Marsh observations 2016 (Apr.-Jun.). Online at <https://nickdoe.ca/pdfs/Webp673f.pdf>