HAMILTON WETLANDS AND FOREST

Introducing a Beautiful Biodiverse Complex Ecosystem

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for

The Hamilton Wetlands and Forest Preservation Society

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The Hamilton Wetlands & Forest Preservation Society's mission is to integrate conservation and education for a sustainable future of the 360 hectares. The Society's goal is to ensure that the ecological integrity of the land is maintained in perpetuity, to ensure a sustainable future for all species including humans that depend upon the land, and the ecosystem that it provides.

The Hamilton Wetlands and Forest is located five kilometres south of the town of Qualicum Beach on Vancouver Island. This local treasure consists of a thirty-six-hectare marsh and multiple other wetlands surrounded by 360 hectares of maturing second-growth forest. The forest was logged between 1840 and 1950, but is gradually resuming the qualities of old growth. It can be described as "mature biodiverse forest" – and an important part of the "at risk" Costal Douglas Fir Biogeoclimatic Zone.

The area is incredibly beautiful. First-time visitors are often heard remarking, "I had no idea…" of the near-pristine forest and the marsh.

Beyond the beauty of the place, however, its importance extends well beyond its 360-hectare border. Vancouver Island's biodiversity is well known, but this area has an incredible variety of

plant, fungi, and animal populations. The impact of that diversity, within the area itself and beyond it, cannot be over-stated. Additionally, and importantly, the peat marsh makes vitally important contributions to the region's water supply, carbon sequestration, and to air quality.

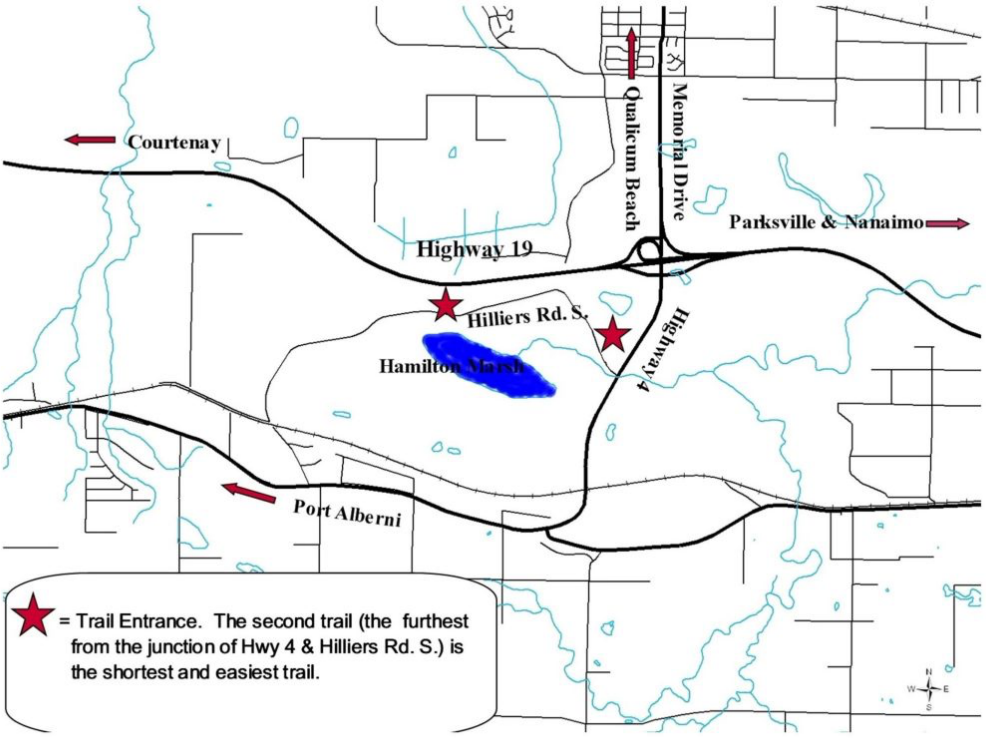
Description of the area.

The marsh is drained by three small creeks, one locally called Hamilton Creek, which flows through the marsh then runs eastward into French Creek. French Creek then flows through the watershed to the French Creek Estuary, then empties into the Salish Sea. A second drainage, seemingly unnamed, runs through a farm to the northwest of the marsh and eventually joins the Little Qualicum River. A third drainage feeds Grandon Creek, which empties into the Salish Sea below the town of Qualicum Beach.

About 20% of the 36-hectare marsh is open water, which diminishes during dry summers, revealing peat and clay along the edges. The marsh is fringed with willow and hardhack. Beds of sedge line the shore and extend into the marsh. At the southeast outlet of the marsh there is evidence of human modification—channels were cut into the area as part of an unsuccessful attempt to farm beaver and muskrat.

The forest, although logged earlier, has regrown with remarkable vitality, containing at least 14 tree species and 19 shrub species. Within the forest there are numerous ephemeral pools that fill with water in winter and spring rains and then dry out in the summer season.

A .8 km long path through the forest runs from a parking area along South Hilliers Road to the large marsh. There is a small floating dock with a bench at its end, a popular spot for visitors to sit and observe birds and insects.



HISTORY

This marsh area was initially called Little Hamilton Swamp. A much larger marsh, Big Hamilton Marsh, covered an area in which the Pheasant Glen Golf Course now lies. The Parksville Historical Society reports that there was a family of Hamiltons who lived in the area and who owned several acreages. It is conjectured that the marshes and creek were named after them.

An early account of the marsh relates that it dried in summer, and was treated as a source of hay by early settlers. The old-growth forest surrounding the marsh was clear-cut and burnt in the 1920s. An early resident (Mr. Albert Topliffe) recounted that the area then regenerated with successional growth that drew an increased population of wildlife. Beavers, previously not present in the area, dammed the marsh's outflow and doubled its size. By the 1930s there was a year-round wetland with areas of standing water.

The land was purchased in the mid-1930's by General A.D. McCrea. When his initial attempt at farming beaver and muskrat proved unsuccessful, McCrea introduced bullfrogs into the area. Although the now unwelcome bullfrog population persists, the attempt to farm them failed. Beavers reclaimed the area, and the hydrology of the marsh as it now exists was established.

THE WETLANDS, FOREST, AND EPHEMERAL PONDS AS AN INTERDEPENDENT ECOSYSTEM

Technically, the large marsh, the contiguous forested area, and each ephemeral pond each comprise different ecosystems on their own. All together, they constitute the larger ecosystem complex of the Hamilton Marsh and Forest.

Taken as a whole, the ecosystem is shaped by its location. It lies near the base of a slope of land topped by the Arrowsmith Massif. Snowmelt and rainwater accumulated in the higher regions feed into the marsh's water supply, either directly through run-off or into underground sources that emerge in the marsh as springs. An aerial photo dated 2009 shows seven inflow points along the southern side of the marsh. It shows one outflow, from Hamilton Creek, and three beaver dams. The report in which the map is situated suggests that the rate at which the marsh retains water in summer indicates the presence of springs within the marsh as additional sources of water.[1]

Throughout the year water is absorbed into the marsh's peaty substrate, which supports vegetation, and provides water for the surrounding forest and wildlife. Both the forest and the growing peat absorb carbon from the atmosphere, while the below-surface peat itself is full of carbon.

The Marsh

[1] Hamilton Marsh Storage Feasibility Investigation (2010) Fisheries and Oceans Canada, Resource Restoration Unit.

The marsh provides habitat for a great variety of animal life. Insects, both aquatic and terrestrial, abound, providing food for birds, for fish, and for the amphibian population of the marsh. Resident and migratory bird species depend on this area for nesting sites and for food. Many of the birds that nest in the forest also feed on the insect life of the marsh. At least thirty species of dragonfly, some red- or blue-listed, can be found there.[2] Beaver and muskrat make their homes in the marsh. Other mammals, inhabitants of the surrounding forest, are visitors to the marsh. Deer and occasionally elk graze on the marsh vegetation.

Some 20% of the wetlands consists of open water, with a maximum depth of 2 metres. Another 20% is described as shrub swamp, The remaining 60% is described as marsh, with floating peat, root mats and other vegetation. The water level varies seasonally, dropping in the summer and recharging in winter. Even as the marsh's water level drops in dry seasons, it still retains water that continues to feed local aquifers and wells.

[2] Simaika, John & Cannings, Robert. (2006). The Odonata of Hamilton Marsh, Vancouver Island, British Columbia, Canada. Notulae odonatologicae. 6. 72-79. In https://hamilton-marsh.com/

The marsh vegetation varies. Much of it consists of sedges and reeds, with patches of aquatic herbaceous plants within areas of open water. Buckbean and water cinquefoil are abundant, as well as patches of yellow pond lily.

The vegetation of the marsh provides nesting areas for migratory waterfowl, including mallards, wigeons, teal, and Canada geese. Other migratory birds may nest or use the marsh as a staging area in their flights. These include Tundra Swan, American Coot, and cackling goose. During winter storms, the marsh offers shelter to waterfowl and sea birds.

Resident species including killdeer, sparrow species, warblers and the iconic red-winged blackbird also nest in the marsh, and feed on the insect populations and small fish. In spring and summer, marsh insects are hunted by flocks of violet-green swallows by day and bats by night. Birds of prey hunt above the marsh, including bald eagles, Northern harriers, sharp-shinned hawks, and several owl species. Golden eagles have been reported. Turkey vultures are a frequent presence.[3] Many of the bird species that are resident in the forest visit the marsh, feeding on its insect life.

In addition to the 30-plus species of dragonflies, pond beetles, caddisflies, ~~and~~ water striders, and more occupy the waters of the marsh. The abundant damselfly, noted for its sensitivity to pollution, attests to the quality of the marsh water. In addition to nurturing the bird population, insects feed the fish of the marsh, including resident cutthroat, coho salmon, and the three-spine stickleback.

Amphibians, like the damselfly, are an indicator species that demonstrate the health of the marsh's water. In the spring, visitors to the marsh are welcomed by a chorus of frogs, including the red-listed red-legged frog, Pacific tree frogs, and (unfortunately) introduced northern leopard frogs and bullfrogs. Many species of salamanders live and breed in the marsh and in the forest's vernal pools. All feed on the insect population, and they in turn, feed garter snakes, some of the larger bird species, and mammals, including mink and raccoon.

The shrub swamp circling the marsh consists primarily of hardhack and willow. Situated between the forest and the marsh, it is a transitional zone, occupied by vegetation that is technically facultative – it grows and flourishes in wetlands but can also be found in drier settings. This zone acts as a reciprocal filter for exchanges of biological and mineral matter between the marsh and the forest. Decaying vegetation of the transitional zone contributes to the soil that nourishes the trees and understory of the adjacent forest.

The Forest

The forest, although once clear-cut, is maturing and beginning to take on the appearance of old growth. It is almost entirely free of invasive species, a remarkable condition for the area. It is a mixed forest, with both coniferous and deciduous trees. Conifers include red cedar, Douglas fir,

[3] Guy Monty, (undated) Birds Identified at Hamilton Marsh in https://hamilton-marsh.com/

Sitka spruce, western hemlock, Pacific yew, and grand fir. Deciduous trees include red alder, cascara, bigleaf maple, bitter cherry, and black cottonwood.

A variety of shrubs are present among the trees, including salal, ocean spray, two species of wild rose, red elderberry, and red-osier dogwood. The abundance and variety of herbaceous plants, grasses, ~~and~~ ferns, mosses, lichens and fungi is striking.

The forest's understory, shrubs and herbaceous plants, host diverse insect species. In their turn, the insects provide food for birds, amphibians in the marsh, and other insects. Mosquitos, definitely regarded by human visitors as one of the forest and wetlands' less welcome summer residents, are food for dragonflies as well as for swallows and bats.

The abundance of mosses on the vegetation and earth within the forest is sometimes mistaken for an indicator of poor forest health. With fungi and lichens, however, mosses contribute to the of decomposition of fallen vegetation, recycling nutrients into the soil. They interact with host species, such as trees and shrubs, stabilizing moisture, and recycling nutrients.

Throughout their lifespan and after their death, trees contribute to the vitality of the forest in many ways. The forest—from canopy to floor--acts as a climate regulator, capturing rainfall, slowing the rate of run-off, and promoting infiltration of water into the soil. Forests also maintain moisture in the air in and round them and cool the land beneath during summer heat. In addition to benefitting the forest and wetlands, these processes contribute to the health of the area's watershed, preventing erosion from heavy run-off during rainfall events and providing a moister and cooler microclimate within for many forms of life—including our own.

Dead and downed trees, although they may look untidy to some, contribute to the forest environment in several ways. Standing snags are often wildlife trees. They provide nests for cavity dwellers, including birds and mammals. In Hamilton Forest, abandoned tree cavities near the marsh that have been excavated by woodpeckers can become nesting sites for the marsh's wood ducks, swallows, and bats. Downed trees, as they decompose, host insects and other arthropods which nourish populations of resident and migrant birds, as well as mammals, reptiles and amphibians. These fallen trees are often further broken down by bears seeking grubs and ant nests for food. Many dead trees, as fallen logs or tree stumps, become nurseries for other vegetation—supporting and nourishing new trees and shrubs.

Beyond their plant and animal occupancy, forests host an immense biodiversity below their surface~~.~~

> Soil organisms exhibit levels of biodiversity *several orders of magnitude greater* (italics added) than those found in their aboveground counterparts on a per-area basis.[4]

[4] Parker, Sophie. (2010). Buried treasure: soil biodiversity and conservation. Biodiversity and Conservation. 19. 3743-3756. 10.1007/s10531-010-9924-8.

This diversity includes plant roots and their associated mycorrhizal fungi, microorganisms, such as bacteria and fungi, and a wide range of micro-fauna. This is linked together in a complex food web, at once nourished by and in turn nourishing the forest's above-ground flora. Investigation of forests' underground biodiversity as a potential source of new medications is generating much interest.

The diversity of species in the forest helps ensure its health. Hamilton Forest has regenerated since being clear-cut and burnt, but its regrowth was natural, not shaped and limited by tree-planting monoculture. The variety of trees and other living matter is itself protective. It reduces the likelihood of transmission of pests and disease, which often specifically target single species. If a single species of tree is the sole occupant of an area, it is more vulnerable to disease and insect predations than it would be in a mixed species forest. The intervening presence of a tree species, to which a specific disease or insect species is not drawn, slows or halts its transmission to vulnerable species. This holds true, not just for trees but for other biota as well. In addition, forests of mixed tree species appear to be less vulnerable to fire spread. In these respects, Hamilton Forest should be recognized as an important example of healthy biodiversity.

Ephemeral Ponds

Within the forest there are a number of ephemeral ponds (sometimes called vernal pools) that are small, discrete ecosystems of their own. They are fed by rainfall, present in spring and early summer, and dry out as the summer continues. Several species of salamander breed in these ponds. Their shallow depth and transient existence protect these small creatures from predators that can only exist in permanent bodies of water.

Interdependence

The Hamilton Wetlands and Forest exemplifies a healthy a complex ecosystem. The abundant vegetation and animal life within these wetlands and forest provide one another nourishment through the food web maintaining stable populations. A particular species, beaver, through its dam-building activity, helps manage the water level of the largest marsh to the benefit of many species.

The forest and wetlands work together to maintain this ecosystem. The forest, understory vegetation, and leaf litter below capture and slow rain and snowmelt run-off, prevent erosion, and maintain water quality in the marsh. The Forest also provides protection from the effects of periodic high winds and other weather events. Through exposure to wind, trees growing on the outer margins of a forest become resistant to windthrow.[5] Although there has been

[5] Fenger, M. et al. (2006) Wildlife & Trees in British Columbia. BC Ministry of Forests and Lone Pine Publishing, Vancouver, BC., pp. 64-65 et passim.

discussion of preserving the large marsh leaving it surrounded by only a border of trees, reduction of the forest presently surrounding the marsh would leave the remaining trees vulnerable to windthrow and to eventual loss of the forest's capacity to support the large marsh and other interior wetlands so important to the watershed and wildlife.

The large marsh, in turn, receives, filters, and absorbs water from the forest, preventing flooding during high rainfall and snowmelt. In times of drought, the stored water is gradually released into the aquifers that provide natural irrigation for the forest, the watershed, and wells in the area.

At present, this is a healthy wonderfully functioning ecosystem. It would be in the best interests of the watershed, local communities, and myriad wildlife to protect this very special place.

Ecosystem Health

Despite the current status of the Hamilton Wetland and Forest, there are potential threats to its health:

Mt Arrowsmith, devoid of snow, August 2023

Climate change challenges the well-being of all around us—and of us.

At various levels, a changing climate poses a threat to ecosystems. The Hamilton Wetlands and Forest receives its water from the high ground above it, including the annual snowpack on the Arrowsmith Massif. The snowpack never attained average seasonal levels this past winter[6], and has been completely depleted since the beginning of August. Despite the storage capacity of the marsh, there will be limits to the amount of groundwater that it can store.

The heat and drought of 2023, in addition to its effect on water supply, has resulted in an unprecedented number and intensity of forest fires throughout the province. In past years Vancouver Island has seen fewer forest fires than the mainland, but the Island has had several wildfires of note since the beginning of the season. As the Hamilton Forest dries it becomes increasingly at risk of fire.

In addition to the effects of climate change, increased clear-cutting timber in the area to the southwest of this ecosystem would most likely affect run-off quantity and quality and water transfer into watersheds.

Even if the Hamilton Wetlands and Forest are protected, forestry management and development must acknowledge and address the effect that logging and development in adjacent areas may have on its hydrology and the ecosystem services it provides two watersheds.

Preservation

As it now stands, the Hamilton Wetlands and Forest is a healthy functional ecosystem. It is privately owned, but there is substantial interest in its preservation among the general public and organizations committed to preserving Vancouver Island's natural history. The 360 hectares of this special place must be maintained in its natural state for the good of the local watersheds and managed to allow public access without affecting its ability to nurture the watersheds and wildlife that depend on this special place.

Hamilton Wetlands and Forest is an invaluable educational resource for present and future generations, demonstrating the richness that layers of biodiversity can ensure.

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[6] July 2023 Update Arrowsmith Water Service and Englishman River Water Service. http://www.parksville.ca/cms/wpattachments/wpID600atID11274.pdf

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.

Gerard Manley Hopkins, Inversnaid

ADDITIONAL READINGS

Available online.

https://hamilton-marsh.com/ Welcome to Hamilton Marsh: A hidden gem of a wetland located ten minutes from Qualicum Beach. Included two videos with information about the wetlands and forest.

https://www.facebook.com/HamiltonMarsh/

https://hamiltonmarsh.blogspot.com/ Reporting weekly visits to the Forest and Wetlands.

https://www.biodivcanada.ca/home Welcome to biodivcanada, the website of the federal, provincial and territorial working group on biodiversity. Here you will find information about Canada's National Biodiversity Strategy and Action Plan, Canada's reports to the United Nations Convention on Biological Diversity, studies and resources related to biodiversity and the conservation of nature, information on important topics related to biodiversity, and tips on how you can get involved in protecting biodiversity.

https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-planning-strategies/wetlands-in-bc Includes a link to Wetlands in British Columbia: a guide to identification

https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-planning-strategies/wetlands-in-bc The BC Wildlife Federation's Wetlands Workforce. Site includes accounts of projects and Wetlands of British Columbia: Field Guide to Indicator Species for Wetland Classification, a downloadable .pdf guide.