

## A Comparison of Plant Species Composition in the Morrell Nature Sanctuary: 1976, 2018

Plant communities typically change over time, with some species disappearing and new ones emerging in response to habitat alteration, ecological succession, and other factors. A comparison of plant species lists compiled in 1975-76 and again in 2018 can give us some insight into such changes at the Morrell Nature Sanctuary. We cannot attach too much ecological significance to this study because the data were collected by different people using different methods and for different purposes. Nevertheless, it is instructive to consider how plant diversity in the sanctuary has varied over the 42 years between these two surveys.

In a few instances, the 1976 survey only identified plants to genus (e.g., willows, sedges), while the 2018 checklist identified to the species level (e.g., 3 willow species, 4 sedge species). For purposes of comparison, this analysis applied the lowest common denominator and only considered the genus in such cases. The degree of similarity between plant species composition in 1976 and 2018 was measured using Sorensen's Similarity Coefficient (or Sorensen Index), which calculates the number of species in common as a percentage of the total number of species (0=completely dissimilar; 100=identical). The results are presented in the table below, categorized by plant life form and followed by an overall community comparison. Mosses and liverworts were excluded from the 2018 survey and fungi were not examined in either sample, so these life forms are omitted.

Plant Life Form	No. of species (1976) (A)	No. of species (2018) (B)	Species in common (C)	Sorensen Index (2C/A+B)x100
<b>Trees</b>	17	21	16	84
<b>Shrubs</b>	26	33	23	78
<b>Herbs</b>	95	152	63	51
<b>Ferns &amp; Allies</b>	14	12	11	85
<b>Community (total)</b>	152	218	112	61

While the tree species composition remained largely unchanged from 1976 to 2018, the latter survey found several species not observed in 1976. These include giant sequoia, sweet cherry, Norway maple, English holly, and pacific crab apple. Conversely, pacific yew was recorded in 1976, but not in 2018. Giant sequoia was introduced to the sanctuary between 1975 and 1980 as part of an experimental project undertaken by Malaspina College (now Vancouver Island University). English holly is an introduced species and perhaps was not as common in the sanctuary in 1976 as it is now. The longevity of forest trees explains generally why most of the tree species identified were present in 1976 and 2018, including Douglas-fir, western red cedar, bigleaf maple, western hemlock, red alder, western flowering dogwood, arbutus, and shore pine, among others.

There is slightly less similarity between the two lists with respect to woody shrubs. The 2018 survey identified ten species not recorded in 1976, including tall oregon-grape, red-osier dogwood, hawthorn, laburnum, hairy honeysuckle, falsebox, Portugal laurel, wild gooseberry, evergreen blackberry, and common snowberry. Evergreen blackberry, laburnum, Portugal laurel, and common hawthorn are introduced species. The 1976 survey reported three species not documented in 2018; prickly currant, red-flowering currant, and soopolallie, which are all native species. Despite these differences, three-quarters of the woody shrubs were common to both checklists, including dull oregon-grape, salal, oceanspray, saskatoon, hairy manzanita, kinnikinnick, twinflower, thimbleberry, salmonberry, trailing blackberry, red elderberry, hardhack, trailing snowberry, and red huckleberry, among others. Of special note, the invasive species Scotch broom was present in both surveys.

The greatest disparity between the two inventories was in the herbaceous vegetation (forbs and grasses). Only half of the species were common to both lists. In contrast to the larger and usually more visible life forms (trees, shrubs, and ferns), herbs are often small, inconspicuous, rare, restricted to microhabitats, or seasonally absent, and therefore may easily be missed. A good example is the rare, enigmatic gnome-plant, which occurs sporadically in the sanctuary but didn't show up in either survey. The risk of missing species is perhaps most likely in the 1976

study which primarily sampled vegetation plots rather than conducting long “walk-through” transects such as those employed in 2018; this may partially explain the far fewer herbs documented in 1976. Further, the 2018 survey sought to produce a fairly comprehensive species list while the main purpose of the 1976 investigation was to describe the major plant communities occurring in the sanctuary. Grasses, sedges, and rushes are often difficult to identify and it is noteworthy that the 2018 survey contained 23 such species compared to 10 in 1976. As well, there were a number of other plants found in 2018 that were not reported in 1976; these include vari-leaved collomia, coralroot, wild carrot, Robert's geranium, tansy ragwort, Indian-pipe, and fringe-cup. Apparently, the 2018 survey closely investigated wetland species around Morrell lake and the beaver pond, finding many not documented in 1976; for example, water shield, mare's-tail, duckweed, water-milfoil, pondweed, reed canarygrass, and several rush and wood-rush species. A lake restoration project took place from 1971 through 1981, so it is conceivable the wetland vegetation wasn't completely established at the lake when the 1976 survey was undertaken. On the other hand, numerous species were found on both lists, such as yarrow, vanilla leaf, pathfinder, spreading dogbane, Vancouver ground-cone, camas, oxeye daisy, Pacific bleeding heart, miner's-lettuce, Siberian miner's lettuce, rattlesnake plantain, common St. John's wort, wall lettuce, skunk cabbage, self-heal, buttercup, hedge-nettle, tansy, foamflower, starflower, trillium, and stream violet. Interestingly, a few plants identified in 1976 but not noted in the 2018 survey have been observed personally in 2020, including goldenrod and fairy-slipper.

The fern species have remained relatively unchanged between 1976 and 2018; the following are still flourishing in the sanctuary: sword fern, deer fern, lady fern, licorice fern, and bracken fern. As well, maidenhair spleenwort, horsetail, and Wallace's selaginella were common to both lists. With regard to differences, leathery grape fern was reported in 1976, while narrow-leaved sword fern was identified in 2018.

It is difficult to make sweeping generalizations about changes in plant species composition in the sanctuary based on the results of this comparative analysis. The sanctuary forest is representative of the Coastal Douglas-fir (CDF) biogeoclimatic zone. Moister sites are characterized by Douglas-fir, western red cedar, and western flowering dogwood, with an understory dominated by salal, dull Oregon-grape, red huckleberry, baldhip rose, bracken, trailing blackberry, trailing snowberry, and western trumpet honeysuckle. Drier sites include arbutus and shore pine along with Douglas-fir, and Garry oak is often present as a minor tree species. In addition to dull Oregon-grape, trailing blackberry, and baldhip rose, the understory on dry sites frequently contains oceanspray, tall Oregon-grape, saskatoon, brome grass, fescue, honeysuckle, and starflower. Most of these typical CDF species are present in both plant species lists so the essential nature of the sanctuary's forest remains the same. Although one must be cautious when interpreting findings from this study, it is quite clear that the evident expansion of non-native species into the sanctuary is cause for concern. For example, English holly, spurge-laurel (*Daphne*), spotted knapweed, English daisy, annual hawksbeard, foxglove, tansy ragwort, rose campion, yellow archangel, Shepherd's cress, and periwinkle were noted in 2018, but not in 1976; some of these introduced species are a significant problem today, particularly holly and spurge-laurel. Likewise, there are several non-native species present in both the 1976 and 2018 lists, such as Scotch broom, common St. John's wort, hairy cat's-ear, wall lettuce, sheep sorrel, common tansy, and common dandelion. Bob Harvey has also pointed out that English ivy is present in the sanctuary, an invasive species that was not recorded in 1976 or in 2018. The proximity of the sanctuary to a major urban centre indicates that the threat posed by invasive plants will remain an ongoing problem, and curtailing encroachment of the more aggressive species is a continuing management goal today at the sanctuary.

*Lance Nordstrom, October 2020*