

Climate Change & Endangered Plants

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B.C. is home to more than 3,000 flowering plant species; the richest flora in Canada. This botanical exuberance is our legacy of a complex geological history coupled with a varied landscape and climate. The result is the occurrence of many rare species in our province.

At the Royal British Columbia Museum Herbarium, we keep dried and pressed examples of the province's plants including at least one specimen of each of the rare species. These identified and labelled specimens are accompanied by information about place and date of collection, collector, and often details of the local environment. The specimens serve as proof, or vouchers of the species in B.C. and as a reference for comparison of newly collected material.

Rare plants can be classified into four groups:

1. Those that occur at a single or few localities, each population with few individuals.
2. Those that occur at several localities and are locally common.
3. Those that occur in many areas, but in low numbers.
4. Those that occur in a restricted area but are abundant

Rare plants, in many cases, are endangered plants because compared to widespread species even minor disturbance can cause them to disappear or be seriously affected. However, some rare species on distant difficult-to-reach mountains may not be endangered, whereas large populations in areas under intense influence from human activity can be seriously endangered. Climate change is one disruptive phenomenon that will reach all plants.

My work focuses on the environmental history of the province and how that history might explain the distribution of rare species. Furthermore, lessons learned from ancient history provide insights into the potential fate of our flora, including rare species, in the event of major climatic warming associated with the "Greenhouse Effect".

With the potential for warming of about 2-4 degrees Celsius, in the mean annual temperature, we can expect major changes in vegetation and consequently major impact on rare species. In this context all rare species on whatever scale whether local (such as Galiano Island), regional or provincial must be considered potentially endangered. The reason for this concern, is that we do not know how plant species will respond to climate change. We do know that change will effect plants somehow. Rare species are most sensitive because even the smallest impact may destroy a population; and because a species is rare, once it disappears, there will be no reservoir in British Columbia from

which it can recover. The greatest concern is for plants that are not only rare and impacted by climatic warming but also under stress from direct human activities such as logging, agriculture or urban development; For all rare plant species we must consider reducing these added stresses to help them survive the broader assault of Global warming.

As climate change proceeds we may expect some rare or endangered species to benefit and expand. These would include species of dry open habitats such as the garry oak (*Quercus garryana*) woodland and meadows of south east Vancouver Island and adjacent Gulf Islands. This region contain a very high concentration of rare plants such as the endemic Macoun's meadow-foam (*Limnanthes macounii*), bristly manzanita (*Arcto staphylos columbiana*), golden Indian Paintbrush, (*Castilleja levisecta*) a balsamroot (*Balsamorhiza deltoidea*) and many others. The rare and endangered species of the arid lands of the southern Okanagan – Thompson and Kootenay may benefit; provided we conserve sufficient habitat for them and provide corridors for their migration. These species thrive under hot dry setting and could spread northward and up-slope as forests and woodland succumb to drought. Good examples include the Mariposa lilies (*Calochortus spp*).

The losers will be plant species of moist and cool or cold settings; inhabitants of the alpine zone and wetlands. Eventually, forests will spread up-slope, eliminating open alpine habitats and species especially on southern low elevation alpine areas. In some places weedy species such as knapweed, may expand into pristine subalpine and alpine zones as live stock carry seeds through expanding grasslands.

Wetlands in all parts of the province, especially dry regions such as the Gulf Islands and adjacent Vancouver Island and the southern interior, will be at greatest risk. Studies of bog and lake cores from these areas clearly reveal that water levels, water chemistry, and as a result, plant communities change markedly as climate alters. For example, in our area many smaller lakes and ponds were neutral to alkaline, precipitating the limey sediment called marl. Some medium-sized lakes were completely dry in Interior B.C. where the mean annual temperature was about 2 C warmer. Once suitable conditions for a wetland plant disappear, the plant disappears. Unlike terrestrial plants, wetland plants can not disperse up-slope or up-valley along a corridor or gradient of suitable habitat. Somehow they must jump to the next suitable wetland before the one in which they live dries up. Combine natural change of wetlands with increased demand for water by livestock, moist sites for agriculture, drinking water, irrigation and invasion by introduced species such as Purple loosestrife and you have a prescription for very difficult times for endangered wet land plant species.

Each local area should know what rare and endangered species occur there and where they grow. Learn how to recognize your rare plant residents. Consider adopting the plants and their locality and monitor the population for increases or decreases. Develop local policies and strategies to minimize the impact on these special plants and places. Take responsibility for conserving the natural legacy of thousands of years of history; some of

those rare species may become crucial elements of the new vegetation that is to come.

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