

Chapter 8

Rare and Endangered Lichens in British Columbia

The latest inventory of the lichens and allied fungi of British Columbia appeared in 1987 (Noble et al. 1987), and listed 1,013 species in 205 genera, as well as 18 subspecies, 33 varieties, and 2 forms. Impressive though these figures appear, they conceal the disturbing fact that many records are based on one-time-only collections. What is more, scores of other lichens, some of them undescribed, remain to be added to future editions of the British Columbia checklist.

Until more is known about the lichen flora of British Columbia, it will be impossible to decide, with few exceptions (Goward, 1993), which species deserve special status as rare or endangered. Experience in boreal and temperate countries elsewhere, however, allows us to at least point to certain salient features of rare and endangered lichens, and to identify those land use practices most likely to threaten their continued existence.

In Sweden, for example, seventeen lichen species are considered to have disappeared since 1850, while another two hundred are now endangered (Floråvardskommittén för Lavar, 1987). A breakdown of Sweden's rare lichens by habitat reveals that by far the greatest number (60% to 70%) are restricted to forest habitats. Of the rest, about 20% occur in agricultural and grassland settings, 10% to 15% occur on rocky outcrops below treeline, and another 2% to 3% are restricted to alpine localities. These percentages, which probably hold also for British Columbia's lichens, differ significantly from comparable figures for vascular plants. In particular, a much lower percentage of endangered vascular plants is dependent on undisturbed forest ecosystems.

Also noteworthy is the fact that roughly half of Sweden's extirpated lichens are crustose species. In Britain, too, crustose species account for about 20 to 40 species that have disappeared during the past century (Hawksworth et al., 1974). It can be inferred, therefore, that crustose lichens, which represent roughly 60% of British Columbia's total lichen flora, are probably no less sensitive to disturbance than are the macrolichens; any attempt to maintain lichen diversity in British Columbia at its present level must be based on a careful examination of the entire lichen flora – not just the more conspicuous fruticose and foliose species.

In both Sweden and Britain, the greatest single threat to lichens is widely held to be air pollution (Floråvardskommittén för Lavar, 1987; Hawksworth et al., 1974). Because most lichens are adapted to receive their mineral requirements directly from the air, they tend to be highly efficient accumulators of atmospheric impurities, including sulphur dioxide and byproducts – concentrating them to levels beyond the

Trevor Goward
University of British Columbia
% Edgewood Blue
Box 131
Clearwater, B.C.
VOE 1N0

tolerance of many lichen species. This sensitivity to air pollution accounts, in part, for the impoverished species diversity characteristics of most cities.

Though air pollution currently poses little threat to lichens in most regions of British Columbia, it apparently does affect the lichens of the southwest corner of the province where, in some areas, an estimated twenty kilograms of sulphates per hectare are deposited annually. Observations in Bursn Bog, for example, suggest that many lichen species have already gone into decline (Goward and Schofield, 1983). Particularly disturbing is the absence in this vicinity of *Lobaria pulmonaria* – a widespread species known to be highly sensitive to air pollution.

Southwest British Columbia doubtless contains a disproportionately large percentage of the province's rare lichens, owing to the presence of several Mediterranean species which are here at or near the northern edge of their range (Noble, 1982). Particularly rich in rarities are the Gulf Islands and the east coast of Vancouver Island. For this reason, it is disturbing to see these areas being subjected to increasing demands for housing and recreational development. Any successful attempt to preserve British Columbia's lichen diversity at its current level must include the establishment of sizable nature preserves in this corner of the province. What is more, these preserves must somehow be safeguarded against increasing levels of air pollution.

Far more significant, however, than the currently localized effects of air pollution and urban sprawl, are the already province-wide ravages of logging. Logging is unquestionably the largest single threat to British Columbia's lichens. As already mentioned, 60% to 70% of British Columbia's rare lichens probably occur in forested ecosystems, where they are highly vulnerable to current forestry practices. In particular, the younger, managed forests that are replacing British Columbia's original forests at the rate of 200,000 to 250,000 hectares per year (McKinnon, 1994) are unlikely to provide the ecological stability required by many lichen species.

In Britain, lichenologists have long recognized that many lichens occur only in forests that have been undisturbed for hundreds or possibly thousands of years (Rose, 1976). Such lichens can reliably be used as indicators of environmental continuity in forests. The limited distribution, slow growth, and frequent inability of many lichen species to colonize disturbed habitats virtually ensure that clear cutting and associated practices (such as scarification and burning) on the scale practiced in British Columbia will result in the extirpation of many epiphytic lichen species. Loss of these lichens means also loss of their ecosystem services, such as organic matter decay, nutrient recycling, and wildlife food. Here, then, is a new perspective on the Ministry of Forests' current practice of "liquidating" "overmature" forests to make way for new forest plantations (Ministry of Forests, 1984).

While politicians are finally awakening to the need to preserve habitat for wildlife, their commitment to the preservation of Canada's flora is tentative at best. Even the full name of our national forum for rare and endangered species is Committee on the Status of Endangered *Wildlife* in Canada (emphasis added), commonly known by the acronym COSEWIC (Cook and Muir, 1984). Its Plants Subcommittee, formed in

1980, was something of an afterthought. By plants, furthermore, COSEWIC means only vascular plants: lichens lie entirely outside its purview.

To date, there have been few attempts (and none at all in Canada) to accord conservation status to North American lichens. The most ambitious is the Rare Lichens Project of the Smithsonian Institution, in Washington, D.C. (Pittam, 1991). In this program, each candidate lichen is placed in one of five categories, depending on: 1) the estimated number of sites in which it occurs; 2) its abundance within those sites; 3) its global range; and 4) its vulnerability to existing or potential threats.

Only six lichens occurring in British Columbia have been assigned conservation status under this program. These designations, however, are meant to indicate global status, and therefore do not always reflect the status of these species in British Columbia. In short, the problem remains that too little is known about the abundance of most of British Columbia's rare and endangered lichens.

To help correct this situation and ensure that future land-use decisions do not inadvertently bring about the extirpation of lichens currently present in British Columbia, I here propose four courses of action. Several other, more detailed recommendations are included in Goward (1993).

First, inventory lichen populations in critical portions of the province – especially the Lower Mainland, the West Coast, the Bunchgrass Zone, and the old-growth Interior Cedar-Hemlock forests of the Southern Interior.

Second, incorporate lichen protection into resource planning and management. Steps to this include: assembling a database of probable rare and endangered lichens; encouraging naturalist groups to prepare and maintain species lists of lichens in carefully delimited areas; ensuring that the selection of future protected areas is consistent with the requirements of lichen conservation; and coordinating lichen conservation efforts in British Columbia with similar initiatives in other parts of the world. These steps might be best accomplished through the appointment of a provincial coordinator of lichens.

Third, set aside sizeable ecoreserves in critical areas in this southwest corner of the province, as well as in lowland old-growth forests elsewhere.

Fourth, identify and implement some means of maintaining air quality in forests intended to preserve lichen diversity. For example, British Columbia parks and ecoreserves might be granted some degree of jurisdiction over air quality in their preserves.

Whether British Columbia's original lichen flora remain intact, or whether some species have already been lost through logging, agriculture, pollution or urban sprawl is not certain. What is certain is that British Columbia's lichen flora still remains *essentially* intact – a claim that applies to very few regions on earth. Will British Columbia's lichen flora remain essentially intact thirty years from now? The answer to that question depends on whether British Columbians take up the challenge and responsibility of actively preserving the lichen diversity of this province. For if we do not do so soon, we will have forfeited the opportunity to do so forever.

Acknowledgements

Dr. Bruce McCune, Oregon State University, reviewed the manuscript.

References

- Cook, F.R. and D. Muir. 1984. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC): History and Progress. *Canadian Field Naturalist* 98: 63-70.
- Floravårdskommittén för Lavar. 1987. A preliminary list of threatened lichens in Sweden. *Svensk Botanisk Tidskrift* 81: 237-256.
- Goward, T. 1993. *Lichen Inventory Requirements for British Columbia*. Unpublished report. B.C. Ministry of Environment and Parks. Victoria, B.C.
- Goward, T. and W.B. Schofield. 1983. The lichens and bryophytes of Burns Bog, Fraser Delta, southwestern British Columbia. *Syesis* 16: 53-69
- Hawksworth, D.L., B.J. Coppins and F. Rose. 1974. Changes in the British lichen flora. In: *The Changing Flora and Fauna of Britain*. D.L. Hawksworth (ed.). Academic Press. London, England. pp. 47-48.
- McKinnon, A. 1994. British Columbia's old growth forests. *Bioline* 11(2):1-9.
- Ministry of Forests. 1984. *Kamloops Timber Supply Area Strategic Plan*.
- Noble, W.J. 1982. *The Lichens of the Coastal Douglas-fir Dry Subzone of British Columbia*. Ph. D. Thesis. University of British Columbia. Vancouver, BC.
- Noble, W.J., T. Ahti, G.F. Otto and I.M. Brodo. 1987. A second checklist and bibliography of the lichens and allied fungi of British Columbia. *Syllogeus* 61:1-95.
- Pittam, S.K. 1991. The rare lichens project: a progress report. *Evansia* 8:45-47.
- Rose, F. 1976. Lichenological indicators of age and environmental continuity in woodlands. In *Lichenology: Progress and Problems*. D.H. Brown, D.L. Hawksworth and R.H. Bailey (eds.). Academic Press. London, England.