

Specimen Verification Summary – Botany

The ABMI Botany Team strives to assign the most accurate scientific name to each collected specimen. Ascribing a taxonomic name to a specimen with confidence is not always a rapid and straightforward exercise: proper identification often requires multiple lines of evidence.

Microscopes and related equipment – Each specimen is first examined and dissected under a dissecting microscope. With the use of the taxonomic resources described below, many common species of lichens and bryophytes, and almost all vascular plants, can be identified at this stage without any further work. Some lichens and bryophytes require sectioning and further examination with a compound microscope, and/or the use of chemistry, such as staining for cell structures, spot tests for diagnostic substances, or thin layer chromatography for secondary metabolite identification (lichens).

Taxonomic resources – Structures examined using microscopy are compared with treatments in relevant floras from North America and around the world, and with additional information from scientific papers, reports, keys, and online resources, such as photo galleries, from trustworthy sources (e.g., herbaria, academic or governmental institutions). The taxonomy of many species has recently changed or is currently in flux, so we are continually updating our reference literature and information. Each Lead Taxonomist maintains a list or compendium of resources used in their Standard Operating Procedures (in progress).

Reference collections – Species that are regionally rare, provincially tracked, at-risk, or even just phenotypically plastic, are compared against accessioned herbaria material such as PMAE at the RAM, or ALTA at the University of Alberta. Some herbarium specimens are misidentified however, so reference material is chosen with care. Where possible, specimens are selected for reference that have been identified by a botanist with known expertise in the species or species group in question. Ideally, the accessioned specimen(s) used in verification is recorded. If no collections of a taxon are available at local herbaria then a loan from outside herbaria may be required.

Data on existing collections/compiled data collections – Consortium websites (e.g., Consortium of North American Bryophyte Herbaria) are accessed to locate specimens housed at different herbaria, to examine specimen label information, and to map geographic locations of specimens. Data from ACIMS and other regional conservation data centres are referenced to assess a species' conservation status, and to understand where and how many times a species has been documented. Particular caution is used in the determination of species that are new to the province or to Canada, or are well outside of their documented range.

Outside expert opinion – For a difficult-to-identify specimen, team members discuss the specimen and attempt to reach consensus. However, when questions remain and a consensus cannot be reached, then outside experts may need to be consulted. Complicated specimens may need to be sent to outside experts for verification, as digital images of the specimen are usually insufficient for conveying detailed, fine features. In the case of vascular plants, which are

identified by a single taxonomist with no team, specimens requiring confirmation are sent directly to outside experts.

Residual uncertainty – Specimens vary in quality, and are sometimes underdeveloped or incomplete. This is unavoidable in biodiversity monitoring. In addition, plants and lichens display a high degree of plasticity with respect to reproduction, ploidy, and phenology, which complicates the task of accurately delineating taxa. When a specimen cannot be identified with certainty using the tools and resources described above, the remaining uncertainty is handled by using standard botanical annotations such as *cf.* (“compare to”) or *sensu lato* (“in the broad sense”).

Figure 1. Flow chart of identification and QAQC steps for lichens and bryophytes. Both teams currently involve work by seasonal field technicians, permanent lab technicians and a lead taxonomist.

