A Bibliography of North Carolina Local Floras

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ABSTRACT  Vascular plant checklists (floras) supply key information for biodiversity studies by providing a comprehensive picture of the floristic composition of a specific study area. A bibliography of floras conducted within the state of North Carolina was compiled. Eighty-six floras were completed within North Carolina between the years 1834 and 2009. Floras conducted in North Carolina cover areas of varying size, from small islands and state parks to entire counties. These studies include journal articles, government publications, technical reports and Master’s theses. More than half of the flora citations were not published in scientific journals and were often difficult to discover or obtain.

INTRODUCTION  The objective of this paper is to provide a list of floras conducted within the state of North Carolina. North Carolina has a long history of botanical exploration and subsequent publication (e.g., Croom 1837, Curtis 1867, Chapman 1883, Small and Heller 1892, Small 1933, Radford et al. 1968, Weakley 2008). In fact, the oldest herbarium in the United States, Salem College founded in 1820, is located within the state (Thiers 2009). Compilations of botanical literature for a specific geographic area can be extremely valuable to the botanical community (Bates 1985, Jones et al. 2007, Palmer 2007). Several publications have provided botanical bibliographic information relevant to the state of North Carolina (Egler 1961, Hardin and DuMond 1971, DeYoung et al. 1982, Wofford and White 1981, White 1982, Matthews and Mellichamp 1989, Burk 2006, Weakley 2008); however, only one of these focused specifically on the state (Hardin and DuMond 1971). Hardin and DuMond (1971) listed numerous publications relevant to the identification of plants (including fungi, bryophytes and algae) and few floras (vascular plant checklists) were included. Floras provide valuable information for broad-scale biodiversity analyses (Palmer 2005, Kreft et al. 2007, Qian et al. 2007), and an important reference for botanists and ecologists in the field.

MATERIALS AND METHODS  The first step in procuring the floras was to define our criteria for inclusion. For the purposes of this bibliography, a flora is a list of plants for a given area (sensu, Lawrence 1951, Palmer et al. 1995). The author of the flora must have intended for the list to be complete. Despite containing the word flora in the title, some publications were not intended by the author to be complete checklists (e.g., Craigmile 1922, McCurdy 1975, Wyatt and Fowler 1977), and such publications were excluded from this bibliography. If a list was restricted taxonomically (e.g., Poaceae excluded), or seasonally (e.g., spring flora, Glasson 1934, Palmer 1970) it was also excluded from the present list. Plot based ecological studies were also excluded, though they may contain plant data. Thus, we excluded literature containing partial floristic inventories in order to maintain clear and consistent criteria for the bibliography.

Finally, the area circumscribed must have been unambiguous and the study location clearly stated. If the area in terms of size and geographic location is not clearly stated it can severely limit the usefulness of a flora for two reasons. First, the number of species in a given list is strongly determined by its size (Rosenzweig 1995). For this reason, comparative research is difficult without an accurate

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area covered by a flora allows for evaluation of its biodiversity as compared with other areas. Second, detailed geographic location is also critical to evaluation of a flora. If exact geographic boundaries are not known, this limits use of the species list for assessing specific species distributions, range extensions and importance of occurrences. Furthermore, it can be difficult to add supplementary information for further floristic analysis. For example, if the elevational range for the site is not clearly stated by the author it can be impossible to assess this without a clear map or explanation of study area boundaries. A few floras were found that had unclear study area boundaries and were therefore excluded from the bibliography (e.g., Croom 1837, Sears 1967). Palmer et al. (1995) examined in detail data that should be included in floras. In order to enhance the value of future floristic studies, floristicians are encouraged to closely follow the standards outlined in that paper.

Literature citations were obtained from a number of different sources. Large numbers of citations were initially obtained in collaboration with the FloraS of North America project. The capitol 'S' is used to distinguish it from the Flora of North America project (Flora of North America Editorial Committee 1993). More information about the FloraS of North America project can be found in Palmer (2005) and at http://botany.okstate.edu/floras/. Additional floras were obtained from standard literature searches (e.g., Agricola), bibliographies of known floras, journal scanning (e.g., Castanea, Journal of the Elisha Mitchell Scientific Society) and personal communications. In addition, we searched the library catalogs of all North Carolina colleges and universities in order to locate unpublished thesis and dissertations. This method was found to be more reliable than searching the Dissertation Abstracts database. Floras were obtained in hard copy through electronic download or Interlibrary Loan. Each publication was reviewed to make sure it fit the criteria listed above. When they did not, the reason for exclusion was noted. The full list of publications reviewed for this study is available upon request. In general, only one citation for each flora is listed in the bibliography. For example, if a thesis was conducted and then the same research was published in a journal, the most recent citation was used.

RESULTS Approximately 200 citations were examined for this study. From these examined citations, 86 floras were identified that met all the criteria for inclusion in the bibliography (Appendix A). In some rare cases floras were published in sections and therefore have more then one citation associated with them (e.g., Peattie 1928, 1929a, 1929b, 1929c, 1930, 1931, 1937 in Appendix A). The floras ranged in publication date from 1834–2009 (Figure 1). There was a conspicuous increase in the number of floras beginning in the 1950s (Figure 1). This work was largely conducted by A.E. Radford students at the University of North Carolina, Chapel Hill (Burk 2006) and J.W. Hardin students at North Carolina State University. Twenty-eight North Carolina floras were published in scientific journals such as Castanea and The Journal of the Elisha Mitchell Scientific Society. The remaining floras appeared in less widely distributed forms such as government documents (17), theses/dissertations (37) and unpublished manuscripts (4). The floras were distributed across the state of North Carolina with 37 (43%) conducted in the coastal plain, 26 (30%) in the mountains and 23 (27%) in the piedmont. The study sites of each flora fell into 5 categories: counties, military lands, mixed ownership, preserve/parks and entirely private properties (Figure 2). Not surprisingly there appears to be a strong preference for studies within preserves and parks (e.g., state parks and natural areas).

DISCUSSION The bibliography presented here is presumed to be relatively complete. This statement is based on the observation that exhaustive searches of databases, literature sources and personal communications ceased to yield new citations. However, it is difficult to accurately measure the completeness of the presented bibliography. New floras will undoubtedly be added to this list. For example, older floras (prior to 1930s) can be obscure and difficult to obtain. Some floras have vague names (i.e., the title does not suggest that a complete plant list is present) and can be easily overlooked. Lastly, technical reports from government agencies and
unpublished lists are often not well publicized. In addition, in many cases only one or two copies of theses and dissertations exist, and are not easily obtained from some libraries. A majority of the floras identified in this study are gray literature, which can be difficult to access. The community can assist with this bibliographic research by reviewing the present list and bringing additional floras to our attention. In addition, an electronic file containing all citations reviewed but not included in this study is available upon request. These citations are not floras as defined here and are being made available to avoid duplication of efforts.

Floristic bibliographies can be extremely useful to the botanical community. Floras can provide researchers with a plant list for a given area facilitating species identification. Future workers can look at areas where previous studies have not been done to target new areas for investigations. Floristic bibliographies provide locations that can be resampled and analyzed for floristic change (e.g., Harrelson and Cantino 2006). While many floras have been conducted in North Carolina, there are still many areas in need of investigation. This effort seems especially urgent in light of climate and land-use change (Mearns et al. 2003, Turner et al. 2003).

The biodiversity informatics community has recognized the need to integrate literature sources as data into global databases. Efforts

Figure 1. Years in which North Carolina floras were published. Bars represent numbers of floras published per decade beginning the year indicated. Note that the 2000 decade bar only includes floras from 2000 to 2009.
such as the Global Biodiversity Information Facility (http://www.gbif.org/) and the Biodiversity Heritage Library (http://www.biodiversitylibrary.org/) are excellent examples of large-scale databases utilizing literature. However, regional networks such as the Southeast Regional Network of Expertise and Collections (http://www.sernec.org/) and Southwest Environmental Information Network (http://swbiodiversity.org/seinet/collections/index.php) can play a vital role in this process by identifying and mobilizing locally and regionally important literature. Regional networks can be particularly effective at mobilizing more obscure forms of literature that are only deposited in their local libraries.

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APPENDIX A. Vascular plant floras written within North Carolina.


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