

RATING NATURAL AREAS: THE FLORISTIC QUALITY ASSESSMENT INDEX

By Barbara Andreas, John Mack, and Jim McCormac

The outstanding scientific discovery of the twentieth century is not television, or radio, but rather the complexity of the land organism. Only those who know the most about it can appreciate how little we know about it. The last word in ignorance is the man who says of an animal or plant: "What good is it?"

– Aldo Leopold, from *Round River*

Many times, when someone asks what we think of a particular piece of land, we reply with subjective superlatives like “good”, “significant”, or “excellent”. These terms don’t necessarily tell the true story, as what’s “high quality” in your book may not be in mine, or vice-versa. Many factors go into forming the opinion a biologist – or anyone for that matter – will have regarding a property. Opinions are dictated by experience, and in our business of land preservation, the opinions are shaped by the degree of statewide familiarity with various habitats, the level of knowledge of botany and zoology, and firsthand comparative experience with the best and worst of ecosystems. Since everyone has varying degrees of experience with these factors, few opinions regarding a natural area will be equal. This subjectivity in describing the supposed significance of a site leads to rather arbitrary viewpoints, or at least ones that are sometimes difficult to defend.

What is a “Natural Area”, anyway? Generally, at least from the Division of Natural Areas and Preserves’ (DNAP) perspective, these are habitats that approximate the conditions found prior to European settlement. After this time, changes in the environment rapidly occurred as Ohio was settled. Very little in the way of undisturbed plant communities remain in the state, and some sobering statistics bear this out. Of our estimated 1,000+ square miles of original prairie, less than 1% is left. 98% of Ohio’s bogs and fens have been destroyed. And even though forest once blanketed 95% of Ohio, virtually all of it has been cut over at least once, resulting in fragmented and disturbed woodlands in most cases. So, DNAP tries to identify and protect the “best of the best” that remains.

With very limited fiscal resources at our disposal, it’s important for us to be able to justify and rationalize our acquisitions, and how we decide upon one area over another. And, there is a better way to scientifically assess the quality of a particular site, rather than rely exclusively on the old opinion method.

“Floristic Quality Assessment Index” was a term coined by Floyd Swink & Gerould Wilhelm in their 3rd Edition of the *Plants of the Chicago Region* (1979). Essentially, a floristic quality assessment index (FQAI) is a method of assessing the “naturalness” or degree of ecological integrity of an area, and expressing its value numerically. This technique hinges on a basic ecological tenet, that a given plant species has a certain fidelity – or likelihood – of occurring in a particular habitat. Of course, some plants are more tolerant of a range of habitats (facultative), while others will only grow in a very narrow niche (obligate). So, the crux of an FQAI is dependent upon evaluating an association of plants from a defined area, and determining the percentages of obligates to facultatives, and everything in between.

In an FQAI, such as one currently under development for Ohio, all plant species are assigned a number known as a coefficient of conservatism (C of C). C of C’s range from 0 to 10, with zeros being non-natives or natives that are very generalistic in regards to habitat preference. As the scale slides upward, the plants become more habitat specific, culminating with the tens, which are extremely habitat specific. An example of a low C of C plant is the Broad-leaved Cat-tail, *Typha latifolia*, which is a 1, as it will grow in just about any sunny, moist site, and does not by itself reveal much about the habitat. At the other end of the spectrum is Northern Monkshood, *Aconitum noveboracensis*, a 10. This Federally Threatened species only grows in the shaded sandy soil of rock overhangs in cool sandstone gorges. Just because a plant is rare doesn’t guarantee that it will have a high C of C. Running Buffalo Clover, *Trifolium*

stoloniferum, which is also Federally Threatened, has a C of C of only 5. Even though rare, it doesn't occur in a well-defined niche in specific natural communities. As a rule of thumb, when assigning C of C values, we think of how exacting we could be in describing the habitat a plant came from, if someone brought it to us and asked where it was found. In Ohio, almost 3,000 species of vascular plants have been collected in the wild, and about 1,800 of these are native. C of C's had to be assigned to all of these natives, and that by far is the most arduous task involved with the development of an FQAI.

There are several ways that the FQAI can be used. For the first, the only requirement is good botanical field skills. When assessing an area, the surveyor need only delineate the boundaries of the site, and collect as complete a list of vascular plant species as possible. It's critical to note, though, that a comprehensive list of flora must be gathered; recognition of at least 80-90% of the species that are present at the time of the survey is necessary. Furthermore, it's important to have the ability to recognize the more obscure floristic elements, such as sedges, as they often have the greatest habitat fidelity and consequently the highest C of C's. Once the plant list is compiled, the surveyor adds the coefficients for all native species, and divides this figure by the square root of the total number of native species. This simple formula yields as FQAI score which is also known as the Natural Area Index.

Alternatively, the surveyor can standardize the level of sampling effort by using quantitative vegetation sampling techniques like relevés or transects and quadrats and only calculate the FQAI score from the plants that were present within the sample plots. This allows for relative comparisons to be made between sites where the same level of sampling effort was applied. Ohio EPA has successfully used this approach in its wetland bioassessment program. Again, good botanical field skills are essential.

Finally, the components of the FQAI can be linked to quantitative plant data like percent cover or stem density to yield measures of tolerance or intolerance to human disturbance. For example, plants with low C of C's (0, 1, or 2) can be considered "tolerant" of human disturbance. The % cover of plants with low C of C's can be summed to yield a measure of the amount of tolerant plants at a site. In areas where restoration management is taking place, the FQAI can be used to monitor the effectiveness of management techniques. As more non-native species are eliminated, the index value will increase.

An example of a very high scoring site would be Cedar Bog, the famous fen near Urbana. Sampling the prime fen meadows yields a natural area index of >73, which is the highest score we've recorded anywhere in Ohio. This is due to the large number of fen-obligate species that are present at Cedar Bog, plants with C of C's of 8, 9, or 10. Daughmer Savannah, a high quality relict savannah-prairie area, has a natural area index of 46. Contrarily, an old successional field dominated by Canada Goldenrod and New England Aster would score very low, probably having a natural area index of <5.

Oftentimes, the technical expertise of DNAP staff and others involved professionally in conservation is called upon to provide an opinion as to an area's "quality". Usually, opinions are sought in cases where the site is faced with development of some sort, and a decision must be made as to whether to proceed or not. Very often these situations get bogged down in emotion, which tends to cloud the true facts regarding the biology of the area. Appropriate utilization of the FQAI provides an unbiased approach to assessing the rarity – or natural value – of the land in question, in a very defensible way.

As the recognition of need for an unbiased, scientific approach to natural lands evaluation has grown, many states have begun to develop FQAIs. Currently, in addition to the landmark Chicago-area FQAI published by Swink & Wilhelm, several states have completed FQAIs, including Michigan and Missouri. In Ohio, Barbara Andreas published a floristic index for northern Ohio in 1995, in collaboration with Robert Lichvar of the U. S. Army Corps of Engineers. Building upon the usefulness of that project, Andreas joined with John Mack, a biologist with the Ohio

Environmental Protection Agency and Jim McCormac, botanist with the Ohio Division of Natural Areas and Preserves. Barb's initial effort has been expanded to produce an FQAI that encompasses all of Ohio, and can be applied to any site in the state.

The authors have secured a Wetland Program Development Grant from Region 5 of U. S. EPA (CD975762-01) to pay for publishing costs, and the completed document should be available late in the fall of 2002. Over two years of regular meetings between the authors was necessary to complete the project, but when done, land managers and those involved in decision-making that impacts natural areas will have a powerful tool to help guide them.

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