

## **Plotwise Floristic Quality Assessment (pFQA) in Nebraska**

### Introduction

Plotwise Floristic Quality Assessment is a relatively quick, non-subjective method of assessing change in plant community floristic quality. Ecologists Bob Unnasch, David Maddox and Chris Helzer (The Nature Conservancy) and Gerry Steinauer (Nebraska Game and Parks Commission) developed the method in 2000. It builds upon the original Floristic Quality Assessment method developed by Swink and Wilhelm in 1994 but applies it in a plotwise method to monitor change in the floristic quality of a plant community over time. It measures floristic quality within many small plots at a site and allows for calculation of mean floristic quality (and standard deviation) for a site.

### Background

Swink and Wilhelm's floristic quality index was designed as a weighted measure of plant community composition that assigned values to plant species rather than looking only at plant species richness or diversity. To use the method, you must first assign a Coefficient of Conservatism value (C value) to all plant species within your geographic area of interest. The C value is based on the idea that species display varying degrees of fidelity to native plant communities and differ in their tolerance to disturbance beyond historical types and norms (Swink and Wilhelm, 1994).

The Coefficient of Conservatism is an integer from 0-10

0-3 = Applied to species adapted to severe disturbance and found in a wide variety of habitats with little fidelity to native plant communities (all exotics are 0s).

4-6 = applied to plants that are dominant or matrix species of several native plant communities and species that are often expected, or have high consistency, in a given plant community.

7-10 = applied to species that are generally slow-growing, longer-lived, perennial plants of late seral native plant communities. Species in this category tolerate little disturbance, have a high degree of fidelity to a narrow range of ecological parameters, and usually persist only in intact plant communities.

The floristic quality index of the site can then be calculated using the following formula:

$$\text{FQI} = (C/N) * (\sqrt{N})$$

**FQI= Floristic Quality Index**

**C= Coefficient of Conservatism**

**N = Number of Species**

#### The Plotwise Method

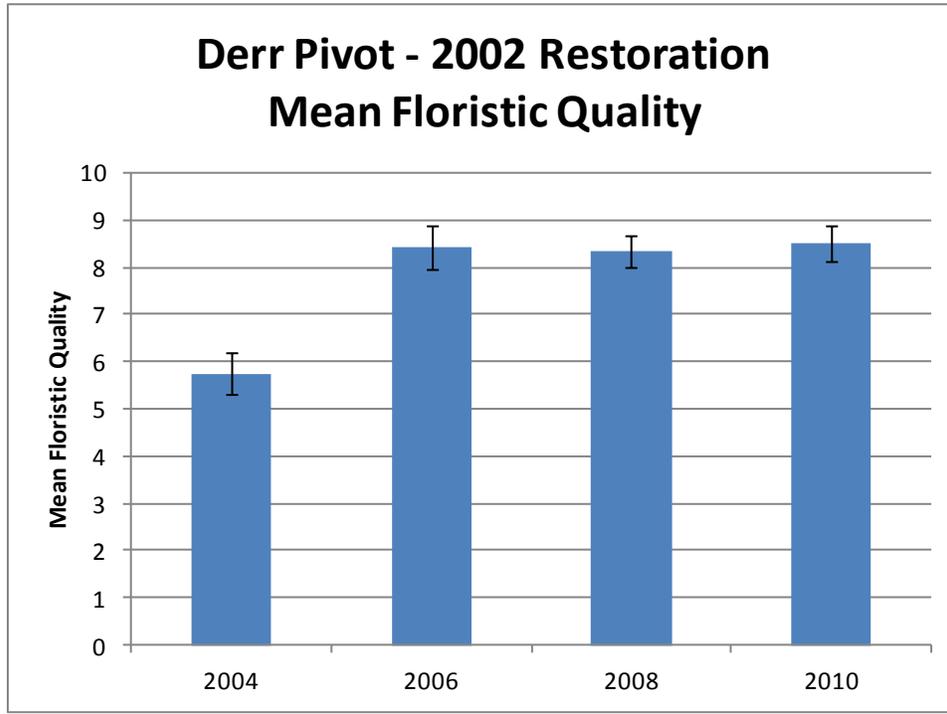
The Plotwise FQI method was developed to measure change in the floristic quality of a plant community over time using multiple sub-samples of the community. Subsamples allow one to measure the average floristic quality of a community and assess variation between sub-samples. This quantitative assessment allows for measure of confidence intervals and statistical determination of change in pFQI over time.

We spent several years testing and refining the plotwise FQI method, using various plot sizes in both virtual and actual plant communities. From that work, we determined that for most Nebraska grassland communities, the optimum sub-sample plot size is 1m<sup>2</sup> and that 100 plots per site, laid out in a stratified random design, generally provides adequate data to measure change in FQI over time. (Though the number of plots needed is dependent on site heterogeneity and desired level of confidence.)

In practice, the method is applied to a single plant community type within a prairie. If a prairie has obvious patches of wet prairie within a matrix of mesic prairie, the two communities would be sampled separately. When collecting data, we start by randomly locating the first plot in a corner of the prairie. The remaining plot locations are determined by walking a pre-determined number of paces between plots (estimated beforehand based on the size of the prairie) needed to distribute the plots evenly across the entire site. Those plots are not put in the same locations between sampling years.

Within each 1m<sup>2</sup> plot, data collection consists of simply listing all of the plant species present. This eliminates the subjectivity of cover estimation and similar data collection methods, but does require the observer to know (or collect for later identification) all plant species in the community. Based on the species lists for each plot, the floristic quality index is calculated for each plot and the mean and standard deviation are then calculated for the site (See Figure 1).

**Figure 1.** Results from four years of data collection from a restored (reconstructed) prairie seeded in 2002. The graph shows changes in mean floristic quality of the site over time, based on an average of 100 plots per year. The error bars indicate 95% confidence intervals – calculated from standard deviations.



Literature Cited

Swink, F., and G. Wilhelm. 1994. Plants of the Chicago region. Indiana Academy of Science, Indianapolis.