

Rapid Floristic Quality Assessment for Wisconsin Wetlands

DRAFT User Guide

November 2023 - Version 1.0



**Wisconsin Department of Natural Resources
Bureaus of Water Quality and Waterways
101 South Webster Street
Madison, WI 53703**

Photo Credit: Pine Island State Wildlife Area herbaceous wetland, June 2022 by Sally Jarosz

Preferred Citation:

Gibson, M. C., S. G. Jarosz, and A. P. Willman. 2023. Rapid Floristic Quality Assessment for Wisconsin Wetlands- User Guide; Version 1.0. Wisconsin Department of Natural Resources.

Contacts for Further Information

Sally Gallagher Jarosz Bureau of Water Quality WI Dept of Natural Resources 101 S. Webster St. P.O. Box 7921 Madison, WI 53707 Sarah.Jarosz@Wisconsin.gov	Melissa Chung Gibson Bureau of Water Quality WI Dept of Natural Resources 101 S. Webster St. P.O. Box 7921 Madison, WI 53707 Melissa.Gibson@wisconsin.gov	Allison Willman Waterways Bureau WI Dept of Natural Resources 625 E. County Rd Y Suite 700 Oshkosh, WI 54901 Allison.Willman@Wisconsin.gov
--	--	--

Table of Contents

1.	Introduction	2
1.1.	Development of the Rapid FQA Tool	2
1.2.	What is a “Dominant” Species?	2
1.3.	Rapid FQA Community Classifications	2
1.4.	Rapid FQA Survey Considerations	2
1.5.	Regulatory Context	3
1.6.	Rapid FQA Limitations	3
2.	Rapid FQA Field Preparation	4
2.1.	Assessment Area Planning	4
2.2.	Equipment Needed	6
3.	Rapid FQA Field Methodology	8
3.1.	Defining Assessment Areas	8
3.2.	Meandering the AA	11
3.3.	Floristic Quality Ranking	15
4.	References	17
5.	Appendices	18
	Appendix A: Rapid FQA Field Forms	19
	Appendix B: Quick Guide to Rapid FQA Data Collection Protocol	20
	Appendix C. When to Use and Not Use the Rapid FQA	21

1. Introduction

The Wisconsin Department of Natural Resources (hereafter, “Department”) undertook the effort to create a Level 2 (rapid) assessment, as defined by the EPA (EPA, 2022). Rapid floristic quality assessments (hereafter, “RFQA”) may be utilized by those familiar with wetlands and common wetland plants but who are not trained as expert botanists. The objective of this tool is to expand the Department’s capacity to conduct routine wetland assessments throughout the state.

1.1. Development of the Rapid FQA Tool

The Department underwent two levels of testing to develop the RFQA: 1) manipulating existing wetland floristic data to assess the effects of simplifying WDNR’s intensive timed-meander survey methodology, and 2) field testing the tool across a range of wetland types and conditions.

The RFQA differs from the Department’s Timed Meander Survey (or “full FQA”) in four key aspects:

1. The RFQA asks users to only collect information about **dominant** plants.
2. The RFQA allows **genus-level plant identification** for several groups (e.g. sedges in the genus *Carex*).
3. The RFQA uses broad, structure-based wetland classes, **Cowardin classes**, instead of NHC wetland community types.
4. The RFQA utilizes a **simplified, four-tier, numeric thresholds** for floristic quality based on $w\bar{C}$ calculated using the above modifications.

For additional information about how the RFQA tool was developed and tested, please read, “Development of a Rapid Floristic Quality Assessment Methodology for Wisconsin Wetlands” (Gibson et. al., 2022).

1.2. What is a “Dominant” Species?

Dominance is defined for the purposes of this methodology as high areal cover within a wetland community, regardless of whether that cover is scattered, continuous, or patchy. Areal cover is estimated visually across the entire wetland area and is expressed as a percentage of the total area of the wetland being assessed. Because most plant species in vegetative communities are found at low amounts, i.e., 1% or less areal cover, eliminating these species can reduce the number of species to identify by 90% or more. The RFQA asks that all species that are estimated to cover 10% or more of the wetland’s area are identified, however, any taxa that are present at more than trace amounts can be included and may be required in certain situations (such as monocultures or near monocultures where only one or two species dominate at 10% or more areal cover).

1.3. Rapid FQA Community Classifications

Cowardin Wetland Classes (Cowardin et al., 1979; Federal Geographic Data Committee, 2013) divide wetlands into classes based on vegetation structure, with Forested, Scrub-Shrub, Emergent (Herbaceous), and Aquatic Bed being the most common types. Categories use a 30% cover cut-off to differentiate one from another, with the taller vegetation type taking precedence over shorter vegetation. Cowardin classes, defined further in Section 2.1.1., are easy to differentiate and do not require a user to identify plants to species,

1.4. Rapid FQA Survey Considerations

Before any RFQA surveys are completed in the field, the Assessor should familiarize themselves with the information contained within this section. The information below discusses how the tool should be utilized, how the Department has defined some of the key terms for use, and how to prepare prior to heading into the field to conduct a RFQA survey.

1.4.1. When NOT to Use the Rapid FQA

The RFQA tool, like any other commonly used field protocol, has limitations. The tool was developed to make time-efficient, broad-level, quantitative floristic assessments accessible to wetland professionals who may not

have advanced plant identification skills, or the time required to complete a full inventory. It is designed to work well for most wetland professionals familiar with common wetland plants in common wetland types. For more details about the situations that are not ideal for a Rapid FQA, see Appendix C. Assessors should become familiar with these limitations and consider using the full FQA methodology in the following circumstances:

- When a precise assessment of ecological condition is required
- When wetland condition relative to a specific community type or region is desired
- When rare sensitive plant species are suspected to be present and important to capture
- When plant diversity is an important aspect of the plant community to capture
- When the wetland has been disturbed or modified within the last 5 years
- When a high level of precision and confidence in the assessment's conclusions is required
- Aquatic Bed Class wetlands
- Upland Communities

1.4.2. When to Use the Rapid FQA with Discretion

The following are situations in which the RFQA should be utilized with caution. For more details about these situations, see Appendix C.

- High-Quality Wetlands. Tips for identifying high or exceptional quality wetland communities:
 - Wetland AA is dominated by low ericaceous shrubs and/or stunted spruce or tamarack trees.
 - Wetland AA has significant cover by Sphagnum mosses.
 - Wetland AA is dominated by large diameter cedar trees in northern Wisconsin.
 - Wetland is dominated by wiregrass sedges (*Carex oligosperma* and/or *C. lasiocarpa*) or has abundant cotton grass (*Eriophorum* spp.).
 - AA has areas of groundwater upwelling, indicated by areas of sparse, low vegetation in saturated soils, a raised peat dome, seeps, slope discharge, or the presence of fen indicators such as grass of Parnassus (*Parnassia glauca*), fen betony (*Pedicularis lanceolata*), shrubby cinquefoil (*Dasiphora fruticosa*), skunk cabbage (*Symplocarpus foetidus*), or poison sumac (*Toxicodendron vernix*).
- Rare wetland community types
- Small Wetlands (<0.5 acres)

1.5. Regulatory Context

At any point, the Department or any other regulatory agency can dictate which survey method shall be used for wetland permit or exemption applications. This tool may be used for regulatory purposes, but it may not be appropriate in all regulatory situations. The Department may require a permittee to utilize a full timed-meander survey (or other suitable survey methodology) instead of or in addition to the RFQA tool.

1.6. Rapid FQA Limitations

In addition to the community type limitations listed above, the following limitations should be considered when utilizing the RFQA.

1.6.1. Aerial Image Review

This tool was not developed or tested to be used from aerial or drone imagery. The tool was only tested for situations when a wetland professional is on the ground meandering through the AA or able to visually assess the area in person. However, aerial images can be utilized in conjunction with the in-person AA assessment and to help with establishing the boundaries of an AA.

1.6.2. Assessor Experience Requirements

Assessors need at minimum one full growing season of experience identifying Midwestern wetland plants from a wide range of community types, including herbaceous, shrub, and forested wetlands prior to conducting a RFQA survey.

The RFQA simplifies plant identification by providing approximately 73 of the most common wetland plant species or groups on forms, but wetlands are highly variable, and it is not possible to provide a complete list that would anticipate every possible wetland plant species. Therefore, Assessors should always expect to encounter one or more dominant species not found on the RFQA plant lists. Assessors should be prepared to identify plants in the field using field guides and collect any unknown dominant species for later identification. Instructions for how to handle these situations is found in Section 3.2, below.

Assessors should be able to:

1. Identify a wetland from an upland community.
2. Recognize approximately 40 common wetland plants from herbaceous, shrub, and forest communities at the species level.
3. Distinguish an additional 30 higher-order taxonomic groups including sedges (*Carex*), goldenrods (*Solidago*), asters (*Symphyotrichum*), willows (*Salix*), nettles (*Urticaceae* family), bur-reeds (*Sparganium*), buckthorns (*Rhamnus* and *Frangula*), and dogwoods (*Cornus*).
4. Identify dominant plants in the field using field guides.
5. Collect samples of plant species in the field for later identification and vouchering (see Kromrey et al., 2021).

Utilization of the RFQA tool is not recommended without this level of experience. Use of the RFQA for regulatory purposes will only be permitted when the wetland assessor(s) can show that these requirements have been met and may require confirmation by the Department.

1.6.3. When to conduct survey – seasonality limitations

The ideal date range for botanical surveys in Wisconsin is from June 1st to September 15th, when vegetation is at its optimal growth. However, Assessors who are comfortable doing so may extend this period to the full growing season, typically April 15 through October 15 in Wisconsin, although varying in each region. The tool is intended to only be used on living vegetation, not standing dead or thatch plants.

2. Rapid FQA Field Preparation

Prior to conducting a rapid floristic survey in the field, Assessors should complete the following preparations.

2.1. Assessment Area Planning

The RFQA requires Assessors to conduct a single survey on each AA. Assessment areas must be of a single wetland type (i.e., Forest, Shrub, or Herbaceous) following the Cowardin classification system. There is a corresponding RFQA field form (see Appendix A) for each of these three community types. It is not required that surveyors delineate wetland plant communities beyond the structural type but doing so is recommended to break up large areas or to distinguish areas with clearly different groups of dominant plants.

Community identification can be estimated using recent aerial imagery, drone photography (if available), and wetland mapping (either Wisconsin Wetland Inventory or National Wetland Inventory layers) available on the Department's Surface Water Data Viewer. This desktop analysis can provide an initial idea of how many AAs may need to be created on a given site, but this should be confirmed in the field (see Section 3.1, below).

2.1.1 Identifying Wetland Types

Each AA should be limited to one of the following structural types using the Cowardin classification ([Federal Geographic Data Committee, 2013](#)) and the corresponding RFQA Field Form should be used. In the Cowardin classification the tallest vegetation stratum with a minimum of 30% cover determines the Class (Table 1).

Table 1. Cowardin Palustrine Classes

Forested Class (PFO) <i>Mature trees >6m tall are the tallest life form with 30% minimum cover.</i>
Scrub-Shrub Class (PSS)¹ <i>Woody plants <6m tall are the tallest life form with 30% minimum cover. Or combined cover of trees and shrubs is ≥30% cover.</i>
Herbaceous Class (PEM) <i>Rooted, emergent, herbaceous plants are the tallest life form with 30% minimum cover.</i>

2.1.2 Assessment Area Size Guidelines

There are no hard rules restricting the size of assessment areas although in general the smaller the area, the more intensively it can be searched, and the more reliable estimates of areal cover are likely to be. In general, the homogeneity of the vegetation should guide AA size, with a single AA containing only a single Cowardin class and further division possible using breaks in composition.

Small Assessment Areas:

AAs less than 0.5 acres in size may require modifications to the protocol due to scale issues. At the extreme, a single tree covering more than 30% of the AA qualifies as a forested wetland. Such small areas may have dominant plants that are not on the data forms because the forms only contain species that typically spread over large areas. Therefore, greater care may be needed to identify species.

Large Assessment Areas:

This protocol recommends an AA size of approximately 5 acres or less per single RFQA survey for ideal accuracy. When AAs are larger, it becomes difficult to visually verify the entire limits of the AA. While it is not expected that Assessors will cover the entire AA on foot (unless the AA is less than an acre), Assessors are expected to be able to visually verify how far the vegetation type being assessed extends and ensure that the vegetation along the meander path is representative of the whole AA. The ability of the Assessor to visually verify homogeneity depends on visibility in the field but may be extended with high quality aerial or LiDAR imagery.

While 5 acres is recommended as a rule of thumb, applying a single RFQA survey to larger areas is allowable when the vegetation is homogenous and the RFQA meander is representative of the remainder of the area. Aerial photo documentation and LiDAR imagery can be used to show that areas outside of the meander track

¹ The Scrub-shrub class includes the common “**Shrub**” subtype dominated by tall shrubs and the “**Scrub**” subtype -typically peatlands dominated by short-statured shrubs such *Chamaedaphne* (leatherleaf) or stunted trees. Scrub communities may appear to be herbaceous wetlands at first glance, however, if herbaceous cover is shorter than the shrub cover or comprises less than 30% areal cover, scrub is the more appropriate designation.

Note also that the scrub-shrub class includes wetlands with combined tree and shrub cover greater than 30%, even if neither trees nor shrubs separately amount to 30% cover.

have the same floristic composition as the areas traversed during the meander. Google Earth imagery can also be used in the field to help assess the extent of homogeneity when imagery is of sufficiently high resolution, recently updated, and plant types are easy to distinguish.

Alternatively, any break points in plant composition, hydrology, expected condition, or other factors of interest could be used to break up a large AA into smaller units, and a separate RFQA survey performed for each area. Completing RFQA surveys of a single large wetland from multiple access points is another approach that can be used to verify the homogeneity of large wetlands.

Proposed Regulatory Impact Areas:

If a wetland is being evaluated for regulatory purposes (in the planning phases of a proposed wetland impact permit), the AA survey location should include the entirety of the proposed impact zone and adjoining wetland areas around the impact zone, if access is available. Multiple AA units may be necessary if the impact zone includes multiple vegetation community types.

Privately-Owned Riparian Wetlands Observed by Boats:

If a wetland or portion of a wetland is observable from a public waterway (e.g., from a boat), the portion of the wetland that is visible can be assessed using this protocol if the vegetation is identifiable. This tool should not be used if the dominant species are not identifiable from the riparian vantage point. Clearly indicate that the survey was conducted visually by boat in the “AA notes” section of the form.

2.2. Equipment Needed

The minimum the Assessor should utilize to complete a RFQA includes:

- RFQA field forms
- Plant identification guides
- A tool to calculate location (e.g., a smart phone or tablet is suitable to provide start coordinates)

Additional recommended equipment includes:

- GPS, smart phone, or tablet for recording meander track and start coordinates.
- Plastic bags in case it is necessary to collect a plant for later identification.
- Other necessary field gear for outdoor conditions (i.e., muck boots, rain gear, etc.).

2.2.1 Forms

The field forms can be used either in printed, hard-copy form or an electronic form – available on the Department’s Wetland Monitoring and Assessment website or by contacting the authors. It is recommended that printed forms are then transcribed into the electronic form so that floristic metrics are auto calculated appropriately. Department staff should send all completed forms to the wetland monitoring and assessment team for inclusion in a centralized database. External partners can also submit RFQA data to the Department.

There are three RFQA field forms depending on the type of wetland being assessed – there is one form for herbaceous communities (PEM), one for shrub wetlands (PSS), and one for forested communities (PFO). Each field form is divided into sections, detailed below:

RFQA Survey Information: This section is located at the top of the form in a peach color. Below is a list of information the Assessor shall include for each survey.

- **Assessment Area (AA) Name:** The name should reference the location of the AA and numerical numbering system that makes sense, especially if a single location will include more than one AA.
- **Date of the RFQA Assessment:** Survey dates should be limited to the growing season when dominant plants are identifiable. The survey should be completed in a single day.

- **AA Notes:** This can include how the AA was defined in the field, the size of the AA, notes about AA access, the length of time it took to complete the survey, etc.
- **Location of the Start of the Meander Path:** Record the Latitude and Longitude coordinates of the survey start point within the AA.
- **Name of the Assessor(s):** List the name of all qualified Assessors present for the RFQA survey.
- **NHC Wetland Type (if known):** The specific [Department Bureau of Natural Heritage Conservation's wetland classification](#) (O'Connor, 2022).

Survey Results: The second section of the form includes the auto-calculated floristic metrics. These sections will auto-fill when the Assessor identifies a dominant plant/group and enters the areal coverage of a given species. When adding a new dominant species in the "WRITE IN ADDITIONAL DOMINANT SPECIES HERE" section, the Assessor will need to enter scientific name, common name, and c-value in addition to dominance and final percent area coverage.

The following metrics are auto calculated:

- **RFQA Mean C:** This is the average C-value of all selected species in the AA (unweighted by cover).
- **Identified Taxa Count:** This is the total number of species or grouped taxa identified as "Dominant" or "Present" on the form.
- **RFQA Weighted Mean C:** This is the average C-value of all selected species, weighted by its area coverage with the AA. This is the score that should be utilized when assigning the wetland AA a rank (see Table 3).
- **Total Calculated Cover:** This is the total sum of areal cover of all identified species or group taxa. Typical values in Wisconsin wetlands can range from 70% to over 130% (coverages well over 100% are expected in shrub and/or forested communities that have multiple vegetation strata).
- **Floristic Quality:** This section will automatically fill in based on the RFQA Weighted Mean C value, utilizing the quality ranks found in Table 3.

Instructions: This section will be slightly different depending on the form but describes how many species or species groups should be identified at a minimum. The forms are color coded with the Herbaceous form (PEM) being shown as blue, the shrub form (PSS) as green, and the forested form (PFO) as purple.

Plants: The fourth section of the field form includes common dominants for the Cowardin class. Each plant species or group includes the Latin name as well as the most-utilized common name. Plant taxa are organized by growth form, including 1) trees, 2) shrubs, 3) grasses, 4) graminoids (includes sedges, cattails, bulrushes, and other grass-like species, 5) forb species, and 6) other species (such as aquatic plants, vines, and ferns).

Near the bottom of each form is an area to enter additional dominant plant species that were not included in the list of commonly occurring dominants above. When a dominant species is encountered that is not included in the form, it should be added to this section.

Comments: This section should be utilized to note various observations, comments, or follow-up items.

Suggestions for inclusion are:

- If the AA was defined by something other than a pre-established polygon or clear community boundary, describe how the boundary of the AA was determined.
- If the AA was divided or combined, note an attached map showing this detail or discuss why the division or combination was made.
- If a large wetland was divided into sub-sections, note how many and which other surveys are part of the larger wetland complex (suggest numbering the surveys "1 of 5", "2 of 5", etc.).

- If wildlife observations were made, note what species and/or the number of animals observed.
- Describe any unknown dominant that was collected for further identification at a later date.
- Make note if the wetland is exceptionally diverse or contains other unique characteristics.
- If the Assessor observes a known threatened, endangered, or special concern species, make a note to communicate this find (and associated photo documentation) with the [Bureau of Natural Heritage's observation forms](#).
- If a regulated invasive species is identified, make a note to communicate this find (and associated photo documentation and sample collection) through the [Department's Invasive Species report forms](#).

2.2.2. Recommended plant ID guides/tools

Assessors are also encouraged to utilize other midwestern-based vegetation field guides to improve identification accuracy such as the [Online Virtual Flora of Wisconsin](#) and [Michigan Flora](#) on the internet, as well as hardcopy books with illustrations or photos.

2.2.3. Location Tools

The Assessor should have a way to establish starting meander coordinates in latitude and longitude, decimal degrees preferred. This can be accomplished with a GPS or a smart phone that can provide coordinates. Starting coordinates should be recorded at the top of each AA form. Collecting the starting latitude and longitude is required but tracking a meander path is not a requirement (although is highly recommended).

2.2.4. Aerial Imagery Tools, Maps

Recent aerial imagery can be helpful while in the field, preferably on a smart phone or tablet that has the capability of showing the Assessor's current location. The tool developers found the use of ArcGIS Field Maps and Google Earth useful but other phone/tablet applications are available. These apps can indicate where in the AA you are currently standing, and the extent of the vegetation type if the aerial imagery is of high quality. Another useful aid is to be able to measure AA sizes while in the field to determine if an inclusionary wetland is above or below the maximum threshold of 0.25 acres or to determine the estimated size of the AA. Printed hard copy maps using current aerial imagery may also prove helpful.

3. Rapid FQA Field Methodology

3.1. Defining Assessment Areas

Once on-site, the Assessor should first confirm that the previously planned AA is accurate and make any required adjustments based on field conditions. Once the AA(s) is(are) confirmed, the Assessor should complete one RFQA per AA. There may be multiple surveys completed within a single wetland complex or area of interest.

Homogeneity Requirements

The AA must at minimum consist of a single wetland structural type (Table 1). However, in addition to Cowardin class, it is recommended that a single AA have a relatively homogenous composition (i.e., that dominant species are somewhat consistent throughout the AA). This is not required, especially when the area is small, and is not always possible when the scale of patchiness is large, but when there are noticeable breaks in composition splitting will result in higher resolution and accuracy of floristic quality results.

The following scenarios of dividing a single wetland structural type into sub-AA units are optional and may be utilized to better understand a heterogenous wetland but are not required.

Example 1: There is a contiguous, primarily-herbaceous wetland with a small, forested wetland pocket. The whole wetland complex totals 20 acres and the forested pocket only makes up 0.2 acres. In this example, a single RFQA AA is required since the forested pocket makes up less than 0.25 acres in total. See Figure 1.

Example 2: There is a contiguous, primarily-herbaceous wetland with a small, forested wetland pocket. The whole wetland complex totals 20 acres and the forested pocket makes up 2.0 acres. In this example, two separate RFQA surveys should be completed since the forested pocket makes up greater than 0.25 acres in total. RFQA AA #1 would be the herbaceous wetland and RFQA AA #2 would be the forested pocket. See Figure 2.

Small inclusions of other structural types are often encountered within the context of a larger wetland type. In these cases, use a 0.25 acre size cut-off as a rule of thumb to help guide the decision to split or include. If the smaller wetland area is approximately 0.25 acres (900 m²) or less in size it can be included in the larger wetland class (see Example 1, Figure 1). If the wetland of a different structural type is larger than 900m², that wetland pocket should be excluded from the original FQA survey; the Assessor should establish a second AA for the pocket wetland and conduct a second RFQA survey (see Example 2, Figure 2).

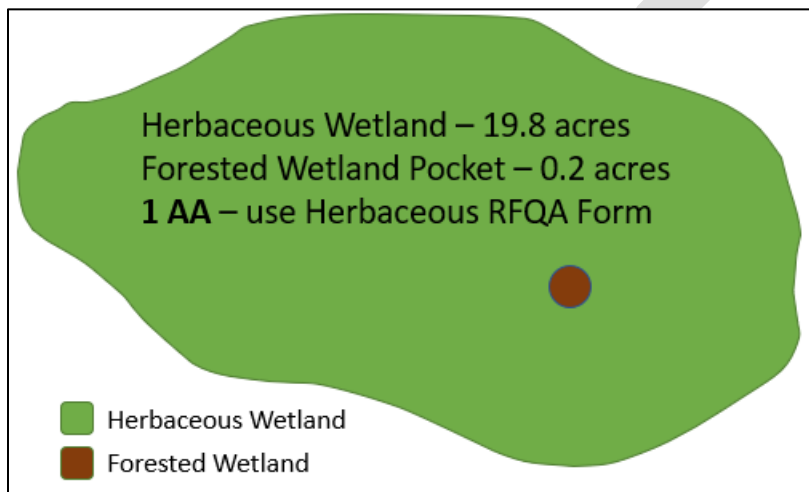


Figure 1. AA Homogeneity Example 1

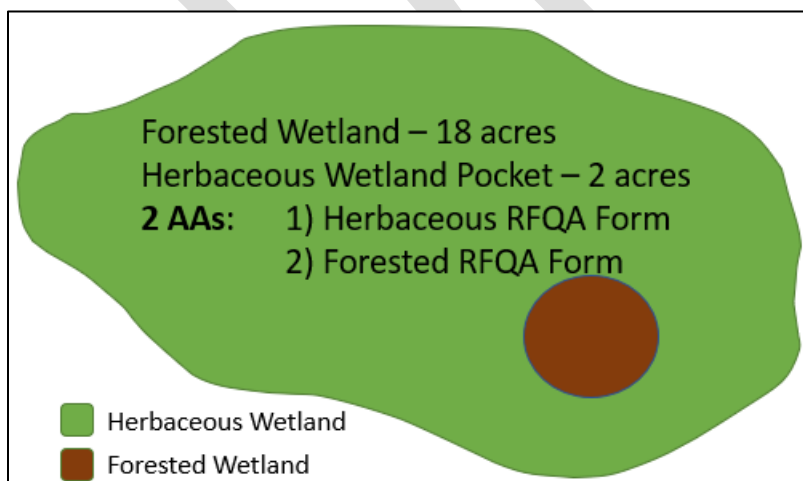


Figure 2. AA Homogeneity Example 2

Guidelines for Dividing AAs of One Structural Type into Smaller Units

Once the structural types have been determined, the AA may be further divided in the following situations:

- The presence of clear breaks in plant composition and/or hydrologic conditions (Examples 3 and 4, Figures 14 and 15)
- Large wetlands (≥ 5 acres). Even if clear breaks are not apparent large wetlands can be broken up to verify homogeneity. Exceptions can be made for larger wetlands that are clearly homogeneous or when accessibility is an issue (Example 5).

Example 3: If there is one contiguous herbaceous wetland but half of the wetland is emergent marsh along the fringe of a lake and the other half is at a higher elevation and is more of a wet prairie – this AA would ideally be divided into two separate AAs and a RFQA would be conducted separately in each of the two distinct herbaceous wetland communities. See Figure 3.

Example 4: If a single contiguous wetland is being invaded, the highly invaded portion could be separated from the un-invaded portion of the wetland. This division is not required but is recommended to achieve the most informative results. See Figure 4.

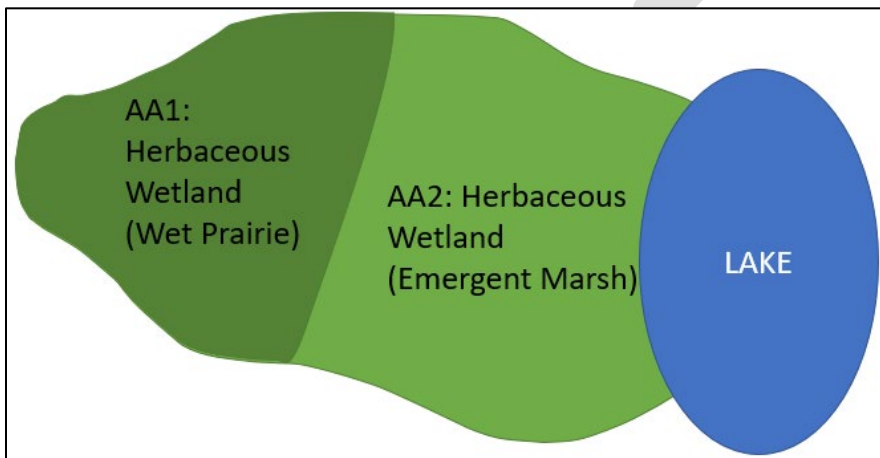


Figure 3. AA Division Example 3

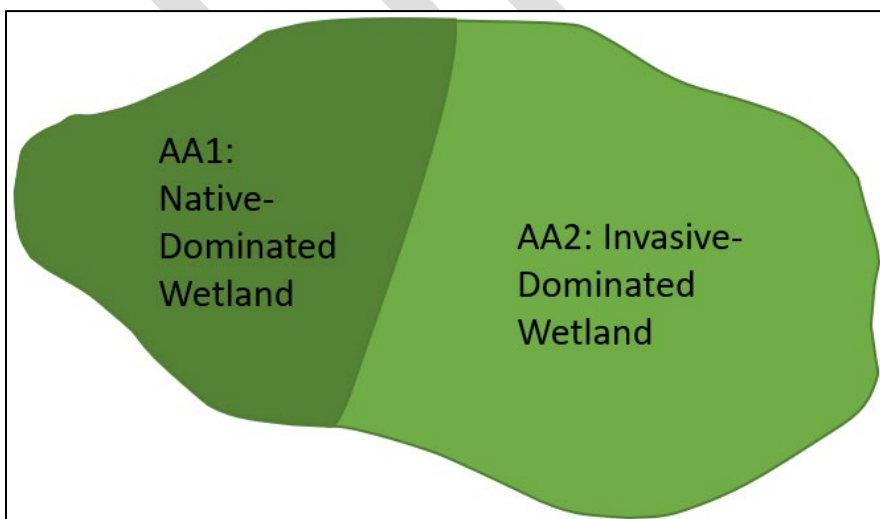


Figure 4. AA Division Example 4

Example 5: If a single, contiguous floodplain forest stretches along a river system and is 50 acres but long and linear in shape, the wetland could be divided into smaller units with a single RFQA survey conducted within each sub-unit.

Combining Similar, Nearby Wetlands into a Single AA

Wetlands often occur in a matrix of different community types – to account for this natural variability and to reduce survey effort, there are situations when wetlands which are physically separated but have nearly identical vegetation can be combined into a single AA. These combinations can occur only when the AA's are of the same structural type (see Table 1), are of similar vegetative composition, similar hydrologic conditions, and are physically situated nearby (and can be meandered within the same sampling event).

Example 6: If two similar wetlands are divided by a stand of a different type of wetland, but are of similar HGM type and composition, a single survey can be completed for both wetlands. Best professional judgement can be used to determine if a given wetland is of similar composition to combine into a single RFQA AA. In this example, two forested wetlands are of similar composition and hydrologic condition and can be combined into a single RFQA AA; FW3 is somewhat different and should have a separate RFQA survey completed. See Figure 5.

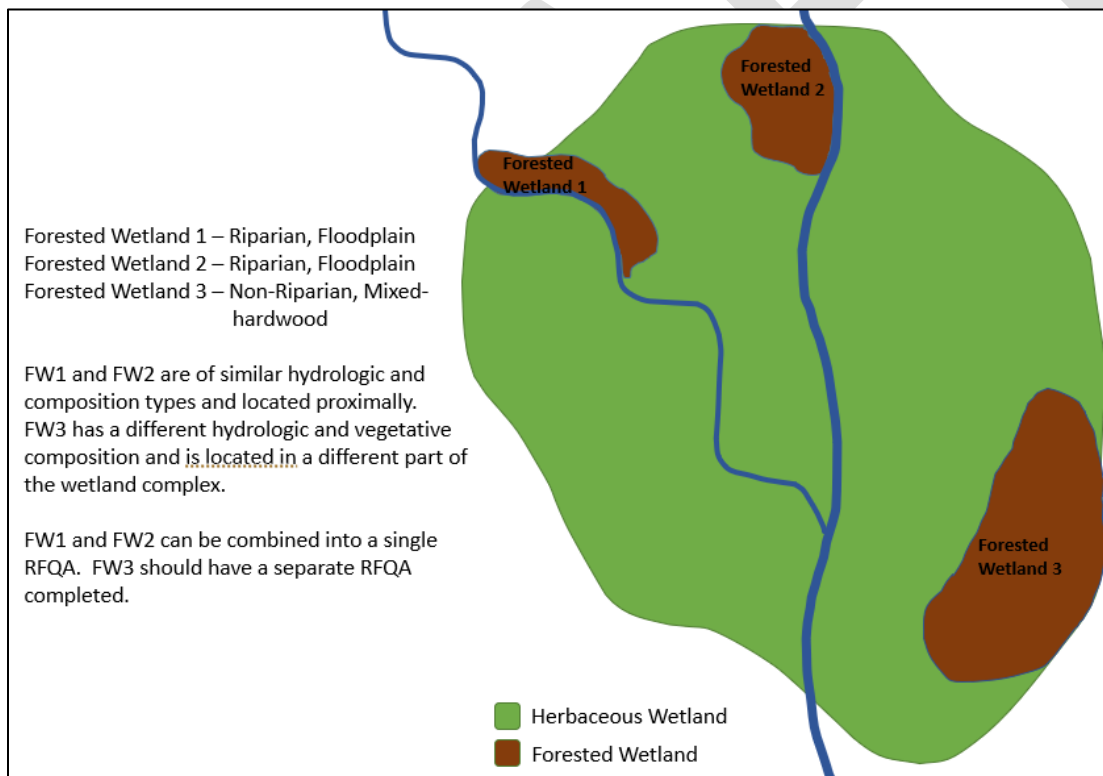


Figure 5. AA Combination Example 6

3.2. Meandering the AA

Locate the Start Point

First confirm the boundaries of the AA are within wetland. Once the boundaries of the AA are determined, a representative location within the AA should be selected as the meander start point. This location ideally should be located away from the edge of the AA or within a central portion of the AA, if accessible (see Figure 6).



Figure 61. Typical AA starting point and meander path.

At the start point, the Assessor should choose the RFQA Field Form appropriate to the Cowardin Class of the AA and begin filling out the top of the form.

Identify Dominant Plants

The Assessor can then begin identifying plants from the tree, shrub, and herbaceous layer that appear to dominate (cover at least 10% of the total visible area) and mark these plant taxa as “Dominant” on the RFQA form. Because it can be difficult to gauge 10% areal cover, another approach could be to identify the top 3 -5 most abundant plant taxa in any given area.

Any observed plants not already on the list can be added at the bottom under the “Write In Additional Dominant Species Here” Section. If the Assessor is confident of an identification at the species-level, they can ignore the genus or group-level identification option on the form and write the species name in this section – this will result in a more accurate final RFQA wC score. Unknown plants should be given a temporary name in the “Comments” section and collected for later identification.

To assist with identifying what 10% cover looks like, the back of each field form (Appendix A) includes a figure showing what multiple coverage classes could look like (Oldham, et. al., 2000).

Note that it is encouraged to err on the side of over-reporting potential dominant taxa rather than under-reporting. As the Assessor proceeds through the wetland, they should identify all plants that are locally dominant or occurring throughout the wetland. At the end, the Assessor should assign coverage for all those taxa identified, even if not all of those species or taxa occur above 10% cover. By including some of the species occurring a less than 10% cover, the Assessor will improve the final score. Taxa over 10% cover can be listed as “Dominant” and all other less-than-dominant species can be labeled as “Present”.

Meandering the Wetland

The Assessor should continue moving through the wetland within representative areas, staying away from edges. While meandering the Assessor should be seeking out new dominant taxa, keeping in mind the abundance of the taxa already identified to help estimate areal cover for these plants at the end of the survey.

Minimum Number of Dominants

Surveyors are asked to record (at minimum) all dominant species over 10% areal cover occurring within the AA. However, in some cases, especially when invasive species are present the wetland is structured so that there is only 1 species that exceeds 10% cover. To overcome this potential problem, the RFQA includes a minimum taxa requirement for each survey: 3 for herbaceous wetlands, 4 for shrub wetlands, and 5 for forested wetlands (Table 2). In some wetlands meeting this requirement means including species with less than 10% cover in the survey; user can use the “Present” selection instead of the “Dominant” selection under the “Present?” column. The total number of dominants identified and selected will be indicated on the form.

Table 2. The minimum number of dominant plant species or groups that should be included in a RFQA form by wetland type

Wetland Type	Minimum # Dominant Taxa
Herbaceous (PEM)	3
Shrub (PSS)	4
Forested (PFO)	5

Ending the Meander

The survey can end once the Assessor is satisfied no additional dominant taxa at 10 % minimum cover will be encountered AND the minimum taxa requirements (see Table 2) have been met. When visibility is poor and the Assessor is not sure if more dominant taxa lie ahead, the use of aerial imagery, such as Google Earth, is recommended to check for signatures of possible changes in composition. When imagery shows different signatures, it is recommended that the Assessor travel to those areas to assess dominant species.

A typical RFQA survey will take no more than 15 minutes to complete (not counting time spent consulting identification guides). However, the duration of a survey is dependent on size of the AA, accessibility, ease of meandering the site, visibility, and heterogeneity of the wetland community.

All species or species groups that the Assessor determines may be occurring at a dominant level, should be indicated under the “Dominant” column by selecting “Dominant” from the dropdown (see Figure 7 below). Additional species that may not be occurring at dominant levels may also be included by selecting “Present”.

A		B		C	D	E	H		I	J	K	L
1 WISCONSIN RAPID FQA CALCULATOR: SHRUB/SCRUB WETLANDS: Trees ≥ 6ft tall comprise < 30% cover; combined cover of trees and shrubs ≥ 30% cover. Shrubs may be any height.												
2 Assessment Area Name:		Shrub Wetland EXAMPLE 1					Date:		07/01/2023			
3 Assessment Area Notes:							Location of Start of Meander Path:		Start Lat: 43.0753			
4 Name of Assessor(s):		Jane Doe					NHC Wetland Type (if known):		Start Long: -89.38032			
5 SURVEY RESULTS:												
6 RFQA Mean C:		3.8					RFQA Weighted Mean C:		0.0			
7 Identified Taxa Count:		6					Total Cover of Identified Taxa:		0			
8 INSTRUCTIONS: Select at minimum the top 4 most-dominant plant taxa including ALL taxa with 10% or greater areal cover.												
9 Species not appearing on list can be written in space provided at bottom. Stop meander when when no new dominant taxa are apparent. Estimate areal cover for marked taxa.												
10 Trees:												
11	Scientific Name	Common Name	C-Value	Present?	Final % Cover	Scientific Name	Common Name	C-Value	Present?	Final % Cover		
12	Acer negundo	Box elder	0			Populus spp.	Aspen/Cottonwood	2.1				
13	Larix laricina	Tamarack	8			Salix X fragilis	Crack willow	0				
14 Shrubs:												
15	Scientific Name	Common Name	C-Value	Present?	Final % Cover	Scientific Name	Common Name	C-Value	Present?	Final % Cover		
16	Alnus incana	Speckled alder	4	Dominant		Rubus spp. *Erect	Raspberries, Blackberries	3				
17	Betula pumila	Bog birch	7			Rubus spp. *Ground-creeping	Dewberries, Dwarf Rasp.	3.6				
18	Chamaedaphne calyculata	Leatherleaf	9			Salix spp. *ID to sp.-level if possible	Willows (shrubs)	5.2				
19	Cornus spp.	Dogwoods	3	Dominant		...Salix discolor	...Pussy willow	2				
20	Frangula/Rhamnus spp.	Buckthorns (Non-native)	0			...Salix interior	...Sandbar willow	2				
21	Ilex verticillata	Winterberry	7			...Salix petiolaris	...Meadow willow	6				
22	Lonicera spp.	Honeysuckles (Non-native)	0			Spiraea spp.	Meadowsweet; Hardhack	4.4	Dominant			
23 Graminoids:												
24	Scientific Name	Common Name	C-Value	Present?	Final % Cover	Scientific Name	Common Name	C-Value	Present?	Final % Cover		
25	Calamagrostis canadensis	Blue-joint grass	5	Present		Phalaris arundinacea	Reed canary grass	0	Present			
26	Carex spp. (PSS)	Sedges (Shrub Wetlands)	6.4	Dominant		Poa pratensis	Non-native bluegrass/ lawn grass	0				
27	Glyceria striata	Fowl manna grass	4			Typha spp.	All Cattails	0.3				
28	Leersia oryzoides	Rice cut grass	3									

Figure 7. Excerpt of a sample RFQA form showing a survey after the initial meander but before coverages are assigned. Dominant species highlighted here in yellow.

Estimating Areal Cover

Once dominants have been identified the Assessor should estimate the percent cover of each identified dominant by assigning a number from 1% to 100% based on what percent area of the AA the taxa covers (see Figure 8). The coverage amount should be typed into the “Final % Cover” Column in the field form. Note that it is normal for total cover amounts to exceed 100%; this is especially common in wetlands with multiple strata such as shrub wetlands or forested wetlands, or any wetland where vegetation is dense and overlapping. A cover estimate table can prove helpful when assigning coverages.

	A	B	C	D	E	H	I	J	K	L	
1	WISCONSIN RAPID FQA CALCULATOR: SHRUB/SCRUB WETLANDS: Trees ≥ 6ft tall comprise < 30% cover; combined cover of trees and shrubs ≥ 30% cover. Shrubs may be any height.										
2	Assessment Area Name:	Shrub Wetland EXAMPLE 1				Date:	07/01/2023				
3	Assessment Area Notes:					Location of Start of Meander Path:	Start Lat: 43.0753				
4							Start Long: -89.38032				
5	Name of Assessor(s):	Jane Doe				NHC Wetland Type (if known):					
6	SURVEY RESULTS:										
7	RFQA Mean C:	3.8				RFQA Weighted Mean C:	4.1		Floristic Quality:	Medium	
8	Identified Taxa Count:	6				Total Cover of Identified Taxa:	96				
9	INSTRUCTIONS: Select at minimum the top 4 most-dominant plant taxa including ALL taxa with 10% or greater areal cover. Species not appearing on list can be written in space provided at bottom. Stop meander when no new dominant taxa are apparent. Estimate areal cover for marked taxa.										
10	Trees:										
11	Scientific Name	Common Name	C-Value	Present?	Final % Cover	Scientific Name	Common Name	C-Value	Present?	Final % Cover	
12	<i>Acer negundo</i>	Box elder	0			<i>Populus spp.</i>	Aspen/Cottonwood	2.1			
13	<i>Larix laricina</i>	Tamarack	8			<i>Salix X fragilis</i>	Crack willow	0			
14	Shrubs:										
15	Scientific Name	Common Name	C-Value	Present?	Final % Cover	Scientific Name	Common Name	C-Value	Present?	Final % Cover	
16	<i>Alnus incana</i>	Speckled alder	4	Dominant	45	<i>Rubus spp.</i> *Erect	Raspberries, Blackberries	3			
17	<i>Betula pumila</i>	Bog birch	7			<i>Rubus spp.</i> *Ground-creeping	Dewberries, Dwarf Rasp.	3.6			
18	<i>Chamaedaphne calyculata</i>	Leatherleaf	9			<i>Salix spp.</i> *ID to sp.-level if possible	Willows (shrubs)	5.2			
19	<i>Cornus spp.</i>	Dogwoods	3	Dominant	10	....<i>Salix discolor</i>	....Pussy willow	2		
20	<i>Frangula/Rhamnus spp.</i>	Buckthorns (Non-native)	0			....<i>Salix interior</i>	....Sandbar willow	2		
21	<i>Ilex verticillata</i>	Winterberry	7			....<i>Salix petiolaris</i>	....Meadow willow	6		
22	<i>Lonicera spp.</i>	Honeysuckles (Non-native)	0			<i>Spiraea spp.</i>	Meadowsweet; Hardhack	4.4	Dominant	10	
23	Graminoids:										
24	Scientific Name	Common Name	C-Value	Present?	Final % Cover	Scientific Name	Common Name	C-Value	Present?	Final % Cover	
25	<i>Calamagrostis canadensis</i>	Blue-joint grass	5	Present	8	<i>Phalaris arundinacea</i>	Reed canary grass	0	Present	8	
26	<i>Carex spp.</i> (PSS)	Sedges (Shrub Wetlands)	6.4	Dominant	15	<i>Poa pratensis</i>	Non-native bluegrass/ lawn grass	0			
27	<i>Glyceria striata</i>	Fowl manna grass	4			<i>Typha spp.</i>	All Cattails	0.3			
28	<i>Leersia oryzoides</i>	Rice cut grass	3								

Figure 8. Excerpt of Sample RFQA form showing a survey after the final percent coverages are assigned. Dominant species and other commonly found taxa highlighted here in yellow. Note that RFQA Weighted Mean C is 4.1 which translates to a Rapid Floristic Quality rank of Medium.

Including more taxa than the minimum

Once areal cover is assigned to each taxa marked as dominant it is often the case that more taxa have been marked than were necessary given the stated minimum requirements. These additional entries should remain in the calculation since additional species will improve the weighted mean C score and therefore will result in a more accurate final score. That said, the protocol is intended to save time compared to a full FQA survey by not requiring minor species be identified. Therefore, The Department does not recommend spending extra time capturing all species encountered – only those that appeared potentially dominant at one point in the meander survey and may have final coverages between 3% - 9%. Utilize the “Present” option under “Present?” instead of “Dominant”.

Additional species not on the list

Users should expect at any time to encounter dominant species not listed on forms. The list of species provided on the field forms are the most commonly occurring dominant plant species or group identified by the Department, but the forms do not list all possible species that may be encountered. If an Assessor encounters a plant occurring at a dominant level that is NOT already listed on the corresponding form, the Assessor should utilize one of the provided blank spaces at the bottom of the form under the heading “Write in Additional Dominant Species Here” by writing in the Latin name, common name, accepted c-value, selecting “Dominant” from the drop-down box, and entering the coverage of the species. Additional blanks may be added, as needed. Officially-recognized c-values can be found on [Wisconsin's Floristic Quality Assessment Calculator](#) or by contacting the Department.

Separating grouped species

If the Assessor has the expertise and can identify a plant down to species level, then the Assessor can utilize one of the blank spots at the bottom of the form to call out a specific species that is otherwise included in a grouped species. This is most appropriate when the plant encountered may have a c-value that differs from the group-level c-value included in the form. It is also possible to divide the total cover of a plant group between those known to species-level and those known only to the group level (Example 7).

Example 7: If an herbaceous wetland AA has 20% coverage of *Carex pellita* and another 20% coverage of other *Carex* species (for a total of 40% cover by *Carex* plants), the Assessor can check the “*Carex* spp.” box and enter 20% for the coverage and then utilize the blank space to enter:

“*Carex pellita* – Broad-leaved woolly sedge – 4 – 20%”.

See Figure 9, below.

Graminoids:				
Scientific Name	Common Name	C-Value	Present?	Final % Cover
<i>Bolboschoenus fluvialis</i>	River bulrush	6		
<i>Calamagrostis canadensis</i>	Blue-joint grass	5		
<i>Carex</i> spp. (PEM)	Sedges	6.4	Dominant	20
<i>Juncus</i> spp.	Rushes	4		
<i>Leersia oryzoides</i>	Rice cut grass	3		
<i>Phalaris arundinacea</i>	Reed canary grass	0		
<i>Phragmites australis</i>	Common reed grass	0		
<i>Poa pratensis</i>	Non-native bluegrass/ lawn grass	0		
WRITE IN ADDITIONAL DOMINANT SPECIES HERE:				
Scientific Name		C-Value	Present?	Final % Cover
<i>Carex pellita</i>	Broad-leaved woolly sedge	4	Dominant	20

Figure 9. Example form entry showing how to add additional species in the extra spaces provided (see Example 7).

There are certain circumstances where identification to species level may be beneficial. Alternatively, the Assessor can instead perform a Level 1 Timed Meander Survey instead of the Level 2 RFQA survey to provide a more-accurate floristic metric result.

Combining separate surveys for reporting

If multiple surveys were completed on AAs that were later determined to be similar enough to combine into a single AA, an acreage-weighted average of the surveys can be calculated as the final wC for the entire area. A similar approach can be used when there is a need for site-level reporting; however, in this case results should be provided for both individual AAs and as a site average.

3.3. Floristic Quality Ranking

Once data entry into the Excel version of the RFQA Field Form has been completed, and the RFQA weighted mean C (wC) has auto-calculated, consult Table 3 to determine a Floristic Quality Category.

Table 3. Floristic quality tiers based on RFQA wC results

RFQA wC	Floristic Quality Tier	Description	Restorability ²
7.1+	Exceptional	Unimpacted to mildly impacted, highly nutrient-poor and stable, flora almost exclusively specialists, minimal to zero non-natives.	None currently known.
4.8 -7.0	High	Unimpacted to mildly impacted, at least somewhat nutrient-poor, flora has significant coverage by habitat specialists, non-natives may be present in small amounts.	Unlikely but possible in certain circumstances. ³
2.1 -4.7	Medium	Moderately impacted, or mesotrophic to eutrophic; may have significant displacement of conservative species by non-natives or consist almost exclusively of native generalists.	Very possible, may require management.
<2.1	Low	Highly impacted, eutrophic, at least 3/4 of wetland has been displaced by non-natives, or consists entirely of ruderal natives.	Likely, especially in surface water dominated wetlands in agricultural watersheds, or when restoration is incomplete.

RFQA surveys will result in 4 possible floristic quality categories based on wC: Exceptional, High, Medium, and Low. RFQA results should be thought of as conservatism relative to all wetlands across the Wisconsin landscape, rather than condition in relation to a specific wetland community type in a specific ecoregion (for this analysis, a Timed Meander Survey is recommended with the resulting score being evaluated using Wisconsin's Wetland Floristic Condition Benchmarks; Trochlell, 2016).

² Assumes the method of restoration is via re-establishment (i.e., from a fully-drained state) and is based on surveys of 106 wetland restorations up to 30 years old (See Gibson & Jarosz (2020) for full report).

³ Scores up to 6.4 are known from oligotrophic, calcareous, or groundwater dominated areas.

4. References

- Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deepwater habitats of the United States. U.S. Fish and Wildlife Service. FWS/OBS-79/31. Washington, DC.
- Federal Geographic Data Committee. 2013. Classification of wetlands and deepwater habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and U.S. Fish and Wildlife Service, Washington, DC.
- Gibson, M. C., S. G. Jarosz, and A. P. Willman. 2022. Development of a Rapid Floristic Quality Assessment Methodology for Wisconsin Wetlands. Final Report to US EPA Region 5, Grant #CD00E02743. Wisconsin Department of Natural Resources. WDNR EGAD 3200-3500-2022-03.
- Gibson, M.C., and S.G. Jarosz. 2020. Long-Term Trends in Mitigation and Wetland Restoration: Ecological Condition and Soil Organic Carbon. Wisconsin Department of Natural Resources.
- Kromrey, M., Mikulyuk A., Hein C., and Nault M. 2021. Wisconsin DNR Voucher Protocol for Aquatic & Wetland Plants: Collection, Identification, and Pressing. Wisconsin Department of Natural Resources Bureau of Water Quality, EGAD NUMBER 3200-2021-26.
<https://prodoasint.dnr.wi.gov/swims/downloadDocument.do?id=303339222>
- O'Connor, R. 2022. "Key to Wetland Natural Communities". Version 1.3. WDNR, Natural Heritage Conservation.
<https://dnr.wi.gov/topic/EndangeredResources/documents/KeyToWetlandCommunities.pdf>
- Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). Herpetological Journal 10(4), 143-155.
- Trochlell, P.A. 2016. "Timed-Meander Sampling Protocol for Wetland Floristic Quality Assessment." Wisconsin Department of Natural Resources.
<https://dnr.wi.gov/topic/Wetlands/documents/TimedMeanderSamplingProtocol.pdf>
- U.S. EPA. 2002. Methods for Evaluating Wetland Condition: Introduction to Wetland Biological Assessment. Office of Water, U.S. Environmental Protection Agency, Washington, DC. EPA-822-R-02-014.
- U.S. EPA. Updated June 2022. Wetlands Monitoring and Assessment. United States Environmental Protection Agency Wetlands Protection and Restoration. Website access 12/12/2022.
<https://www.epa.gov/wetlands/wetlands-monitoring-and-assessment>

5. Appendices

Appendix A: Rapid FQA Field Forms

Appendix B: Quick Guide to Rapid FQA Data Collection Protocol

Appendix C: When to Use and Not Use the Rapid FQA

DRAFT

Appendix A: Rapid FQA Field Forms

DRAFT

Wisconsin DNR Rapid Floristic Quality Assessment Protocol	
Once the AA has been determined, data collection can begin. Data collection should result in a list of all dominant plant taxa present within the AA with accompanying areal estimates of cover.	
Step 1: Select a field form based on wetland community type (Herbaceous, Shrub, or Forested) and complete top portion of form (Assessor name, date, AA name, etc).	
Step 2: Locate a start point in a representative area within the AA, away from the edge. Record your latitude and longitude and start your meander track (optional).	
Step 3: Begin identifying and recording plant taxa that appear most abundant by cover in the tree, shrub, and herb layer by marking the appropriate taxonomic group as "Dominant" or "Present" on the form under the "Present?" column. If a dominant species is not on the form, it can be written in the blanks at the bottom of each form. If the dominant species is unknown, enter a descriptor in the comments section provided and collect for later identification.	
Step 4: Begin meandering through the wetland seeking out and recording all new locally dominant taxa observed. Avoid upland communities.	
Step 5: Stop the survey when you have: a) visually scanned most of the AA, b) you are no longer finding new dominant taxa, and c) you are satisfied you have captured all taxa dominating at least 10% of the AA. The survey should take approximately 15 minutes; however, some wetlands may take longer. Stop the meander track (if using).	
Step 6: Assign areal cover estimates to each taxa identified by writing in a number from 1% to 100% under the "Final % Cover" columns.	
Step 7: Determine if you have met the minimum number of taxa required for the wetland type. The top 3, 4, or 5 most-abundant taxa (depending on Cowardin class), including all taxa with 10% or more areal cover.	
Tips for estimating visual cover of plant species in wetlands:	
1) Cover totals, even for only dominant species, often exceed 100% in densely vegetated wetlands and wetlands with multiple vegetation strata.	
2) In the middle ranges of cover i.e. 30 - 70% , estimating cover to the nearest 10% is acceptable. Otherwise, estimate to the nearest 5% or less.	
3) Estimate cover in pairs with another observer whenever possible to avoid over-estimated or under-estimated cover values.	
4) If the area is small it can be helpful to use absolute area amounts as a guide, i.e. in a 1 acre wetland 10% cover is 440 sq feet.	

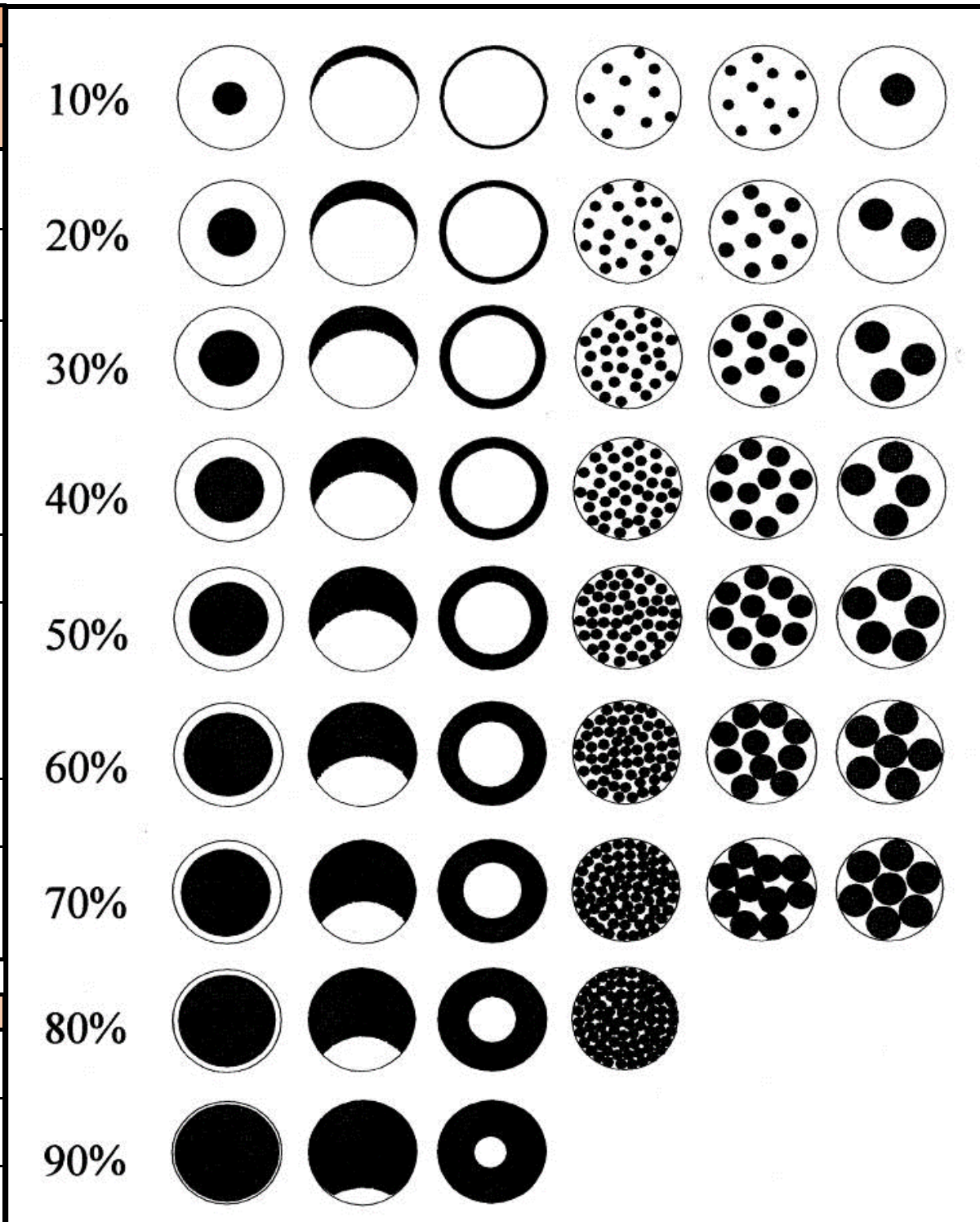


Figure citation: Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal* 10(4), 143-155.

WISCONSIN RAPID FQA CALCULATOR: HERBACEOUS WETLANDS										Rooted, herbaceous plants are the tallest life form with 30% min. cover; Trees and shrubs together comprise ≤30% cover.																		
Assessment Area Name:															Date:													
Assessment Area Notes:										Location of Start of Meander Path:					Start Lat:													
															Start Long:													
Name of Assessor(s):										NHC Wetland Type (if known):																		
SURVEY RESULTS:																												
RFQA Mean C:					#DIV/0!					RFQA Weighted Mean C:					0.0		Floristic Quality:											
Identified Taxa Count:					0					Total Cover of Identified Taxa:					0													
INSTRUCTIONS: Select at minimum the <u>top 3</u> most-dominant plant taxa including ALL taxa with 10% or greater areal cover. Additional taxa over the minimums is acceptable.																												
Species not appearing on list can be written in space provided at bottom. Estimate areal cover for marked taxa.																												
Trees:																												
Scientific Name					Common Name					C-Value		Present?		Final % Cover		Scientific Name					Common Name		C-Value		Present?		Final % Cover	
Shrubs:																												
Scientific Name					Common Name					C-Value		Present?		Final % Cover		Scientific Name					Common Name		C-Value		Present?		Final % Cover	
Alnus incana					Tag alder					4						Salix spp. *ID to sp.-level if possible					Combined willows		2.9					
Cornus spp.					Dogwoods					3						....Salix discolor					....Pussy willow		2					
Frangula/Rhamnus spp.					Buckthorns (Non-native)					0						....Salix interior					....Sandbar willow		2					
Spiraea spp.					Meadowsweet; Hardhack					4.4						....Salix petiolaris					....Meadow willow		6					
Graminoids:																												
Scientific Name					Common Name					C-Value		Present?		Final % Cover		Scientific Name					Common Name		C-Value		Present?		Final % Cover	
Bolboschoenus fluviatilis					River bulrush					6						Poa palustris					Marsh bluegrass		5					
Calamagrostis canadensis					Blue-joint grass					5						Sagittaria latifolia					Broad-leaved arrowhead		3					
Carex spp. (PEM)					Sedges					6.4						Schoenoplectus spp.					Bulrushes (Hardstem&Softstem)		5.4					
Juncus spp.					Rushes					4						Scirpus spp.					Wool-grasses		3.8					
Leersia oryzoides					Rice cut grass					3						Sparganium spp.					All bur-reeds		5.3					
Phalaris arundinacea					Reed canary grass					0						Spartina pectinata					Prairie cord grass		5					
Phragmites australis					Common reed grass					0						Typha spp.					All cattails		0.3					
Poa pratensis					Non-native bluegrass/ lawn grass					0						Zizania spp.					All wild rice		8					
Forbs:																												
Scientific Name					Common Name					C-Value		Present?		Final % Cover		Scientific Name					Common Name		C-Value		Present?		Final % Cover	
Eutrochium maculatum					Spotted Joe-Pye-weed					4						Pilea, Boehmeria, Laportea spp. (PEM)					Nettles Group *Not U. dioica		5.0					
Helianthus spp.					Sunflowers					2.2						Solidago spp. (PEM)					Goldenrods		1.5					
Impatiens capensis					Orange jewelweed					2						Symphyotrichum/Doellingeria (PEM)					Asters Group		5.6					
Lythrum salicaria					Purple loosestrife					0						Thalictrum dasycarpum					Purple meadow-rue		4					
Persicaria amphibia					Water smartweed					5						Urtica dioica					Stinging nettle		1					
Other Plant Groups (Aquatic plants, ferns, vines, etc):																												
Scientific Name										C-Value		Present?		Final % Cover		Scientific Name					Common Name		C-Value		Present?		Final % Cover	
Equisetum arvense					Field horsetail					1						Lemna spp.					Duckweeds		2.4					
Equisetum fluviatile					River horsetail					7						Sphagnum spp.					Sphagnum moss		7					
Ferns (PEM)					Ferns (Herbaceous Wetlands)					5.2						Utricularia spp.					All Bladderworts		8.3					
WRITE IN ADDITIONAL DOMINANT SPECIES HERE:																												
Scientific Name										C-Value		Present?		Final % Cover		Scientific Name					Common Name		C-Value		Present?		Final % Cover	
Comments:																												

#PEM = Cowardin classification indicating that this is a grouped c-value only to be used on the herbaceous wetland RFQA forms.

Appendix B: Quick Guide to Rapid FQA Data Collection Protocol

Once the boundaries of the AA have been determined, data collection can begin. Data collection should result in a list of all dominant plant taxa present within the AA with accompanying areal estimates of cover.

Step 1: Select a field form based on wetland type (Herbaceous, Shrub, or Forested) and complete top portion of form (Assessor name, date, AA name, etc).

Step 2: Locate a start point in a representative area within the AA, away from the edge. Record your latitude and longitude and start your meander track (optional).

Step 3: Begin identifying and recording plant taxa that appear most abundant by cover in the tree, shrub, and herb layer by marking the appropriate taxonomic group as "Dominant" or "Present" on the form under the "Present?" column. If a dominant species is not on the form, it can be written in the blanks at the bottom of each form. If the dominant species is unknown, enter a descriptor in the comments section provided and collect for later identification.

Step 4: Begin meandering through the wetland seeking out and recording all new locally dominant taxa observed. Avoid upland communities.

Step 5: Stop the survey when you have: a) visually scanned most of the AA, b) you are no longer finding new dominant taxa, and c) you are satisfied you have captured all taxa dominating at least 10% of the AA. The survey should take approximately 15 minutes; however, some wetlands may take longer. Stop the meander track (if using).

Step 6: Assign areal cover estimates to each taxa identified by writing in a number from 1% to 100% under the "Final % Cover" columns.

Step 7: Determine if you have met the minimum number of taxa required for the wetland type. The top 3, 4, or 5 most-abundant taxa (depending on Cowardin class), including all taxa with 10% or more areal cover.

Appendix C. When to Use and Not Use the Rapid FQA

The RFQA tool, like any other commonly used field protocol, has limitations. The tool was developed to make time-efficient, broad-level, quantitative floristic assessments accessible to wetland professionals who may not have advanced plant identification skills, or the time required to complete a full inventory. It is designed to work well for most wetland professionals familiar with common wetland plants in common wetland types. Assessors should become familiar with these limitations and consider using a the full FQA methodology in the following circumstances:

When a precise assessment of ecological condition is required

The RFQA will provide a fairly accurate assessment of condition based simply on what dominant plants are occurring in the community as Exceptional, High, Medium, or Low. Occasionally more nuanced rankings are needed. In these situations, the RFQA methodology would not suffice, and a full FQA is recommended.

When wetland condition relative to a specific community type or region is desired

The RFQA will only provide a condition rating relative to the full range of wetland types across the state. This means that a floodplain forest (which typically results in lower *wC*-values) in the south will be rated on the same scale as an open bog (which typically results in higher *wC*-values) in the north of the state. When a user is interested in assessing a wetland's condition relative only to other wetlands of the same community type or region, a full FQA survey must be completed, and results compared with a condition benchmark table specific to the wetland's ecoregion and natural community type.

When rare sensitive plant species are suspected to be present and important to capture

Usually rare, threatened, or endangered plant species do not occur at coverages greater than 10% areal cover and therefore might not be identified using this protocol. If identification of rare species is an important goal of a given survey or project, the RFQA should not be utilized.

In addition, some wetland communities such as calcareous fens and forested seeps are by nature poorly suited to a dominants-only assessment because they are known for hosting rare, conservative species within a matrix of more common and tolerant dominants. A RFQA is not expected to capture the value of these communities. If an Assessor suspects that a wetland may be one of these community types, an expert botanist should be consulted and a full FQA should be completed.

When plant diversity is an important aspect of the plant community to capture

Plant species richness is an important aspect of ecosystem health that will not be captured using the RFQA. A full floristic survey should be used when plant diversity is important to better understand a wetland's functions, condition, and/or community type.

When the wetland has been disturbed or modified within the last 5 years

The flora of recently disturbed wetlands, such as farmed wetlands, restored wetlands, or recently exposed mudflats, can differ markedly from mature wetlands, especially in the first 4 years post-disturbance. These early successional communities may contain a high proportion of annuals that will disappear in subsequent years and may lack the long-lived perennials that will come to dominate these sites in coming years. Because such wetlands and their flora were not included in the development of this tool and furthermore the *C*-values of these early successional species have an untested relationship with wetland condition, neither the RFQA nor a full FQA is likely to result in a meaningful assessment of condition.

When a high level of precision and confidence in the assessment's conclusions is required

The RFQA bases its results on only a small number of plant taxa rather than the 25 to 100+ that are typically present in any given wetland community and there may be cases when the dominant plants provide a misleading picture of the overall health of the wetland. The RFQA also carries a risk of misidentification of plant species because its users may not have a high level of experience with wetland plant identification. In addition, the use of the optional genus-level plant identifications will also play a role in reducing the precision of the *wC* score when compared to a full FQA survey. Because of these factors the RFQA is a coarser-level and less precise assessment than the full FQA methodology.

Aquatic Bed Class wetlands

Aquatic Bed Class wetlands, Submergent Marsh, Oligotrophic Marsh, Floating-leaved Marsh, American Lotus-lily Marsh, and Wild Rice Marsh were not included in the development of the tool. These types generally require a boat and modified methods that include a rake to capture plant species.

Furthermore, the C-values for the aquatic flora have been shown to be inflated relative to the C-values assigned to the rest of Wisconsin's flora. Until the relationship between the C-values for the aquatic flora and wetland condition are verified, use of the RFQA tool for these wetland types is not recommended.

Upland Communities

The RFQA was developed solely for the use of wetland communities. If it is uncertain whether the Assessment Area (AA) is a jurisdictional wetland, at the very least the vegetation should be determined to be predominantly hydrophytic (FAC, FACW, or OBL) before proceeding.

When to Use the Rapid FQA with Discretion

The following are situations in which the RFQA should be utilized with caution:

High-Quality Wetlands

It is not a requirement of the RFQA that users know the quality or type of wetlands in advance; this methodology can be used on most wetlands as a screening tool to identify the quality of the wetland. However, users should be aware that there are several ways in which the use of the RFQA in high-quality wetlands carries a risk of undervaluing these communities. First, high-quality wetlands have a higher chance of hosting rare or sensitive species and exceptionally high diversity that would be missed in a dominants-only survey. Also, because the tool was optimized for use in the most commonly occurring wetlands (which tend to be low-to medium-quality), using genus-level identifications in high-quality wetlands may result in a lower *wC* score than expected from a full FQA. Because of these factors users should learn to recognize high quality communities (see below). In addition, the Department recommends that if a RFQA is completed in high-quality communities, that the Assessor identify dominant plants to species-level and identify additional known non-dominant plants. Known high-quality communities are better assessed by an experienced botanist using a full FQA.

Tips for identifying high or exceptional quality wetland communities:

- Wetland AA is dominated by low ericaceous shrubs and/or stunted spruce or tamarack trees.
- Wetland AA has significant cover by Sphagnum mosses.
- Wetland AA is dominated by large diameter cedar trees in northern Wisconsin.
- Wetland is dominated by wiregrass sedges (*Carex oligosperma* and/or *C. lasiocarpa*) or has abundant cotton grass (*Eriophorum spp.*).
- AA has areas of groundwater upwelling, indicated by areas of sparse, low vegetation in saturated soils, a raised peat dome, seeps, slope discharge, or the presence of fen indicators

such as grass of Parnassus (*Parnassia glauca*), fen betony (*Pedicularis lanceolata*), shrubby cinquefoil (*Dasiphora fruticosa*), skunk cabbage (*Symplocarpus foetidus*), or poison sumac (*Toxicodendron vernix*).

Rare wetland community types

Some wetland community types are not well supported by this tool due to lack of data. Users should expect that the dominant species of these types may not appear on field forms and should NOT use the provided genus-level identifications. These include ephemeral ponds, great lakes ridge and swales, white pine-red maple swamps, forested seeps, bog relicts, patterned peatlands, great lakes shore fens, interdunal wetlands, coastal plain marshes, inland beaches, and moist sandy meadows. Users are encouraged to make use of Natural Heritage Conservation's Key to Wetland Communities (O'Connor, 2022) when unusual wetland communities are encountered and follow-up with a full FQA survey.

Small Wetlands (<0.5 acres)

The RFQA was designed using data from wetlands with a minimum of 1 -2 acres in size. Small wetlands may be dominated by species that do not typically colonize large areas and therefore would not have been captured on field forms and included in genus-level C-values.