



Rapid Floristic Quality Assessment

MN Wetland Professional Certification Program



MINNESOTA POLLUTION CONTROL AGENCY

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Introduction

State & Federal Wetland Policy

- No-net-loss of wetland quantity *and quality*
 - MN Wetland Conservation Act
 - “...no net loss in the quantity, quality, and biological diversity of Minnesota’s wetlands...”
 - “...public values...must be based upon the functions of wetlands...”

How do we assess “wetland quality”?

- Functions & Values
 - Assess the goods and services the wetland is providing
 - *Example: the wetland attenuates surface water flows, improves downstream water quality, but has degraded wildlife habitat*
- Condition
 - Deviation from a ‘natural’ or least impacted state
 - *Example: the wetland has a largely intact native plant community and is in “good” condition*

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Introduction

Stressors/impacts

- Hydrologic alterations
- Excess nutrient/sediment
- Chemical pollution
- Physical alterations
- Non-native invasive species






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Introduction

Rapid Assessment Methods (RAMs)

- Simple field observations
- Qualitative/categorical
- Coarse info quickly obtained in exchange for accuracy (EPA Level 2)
- 'Rapid' = ½ day field + ½ day office

Floristic Quality Assessment (FQA)

- Vegetation based approach
- Condition measure
- Detailed veg survey (EPA Level 3)



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What is FQA?

The Coefficient of Conservatism (C)

- Reflects the fidelity of a species to natural undisturbed habitats (0-10)



Acer negundo
(Box elder)

C = 1



Carex lasiocarpa
(Lake sedge)

C = 5



Cypripedium candidum
(Small White Lady's Slipper)

C = 10

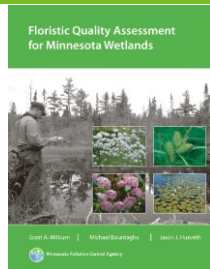
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MN Coefficients of Conservatism

Floristic Quality Assessment for Minnesota Wetlands

- Released 2007
- Wetland spp only (MN wetlist 1.4)
- C-values
- Synonymy

****MN DNR has begun to publish regional C-values – these are not currently applicable in the Rapid FQA**



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Rapid FQA Applications

The Rapid FQA was designed for natural resource professionals with a "moderate" level of botanical expertise to complete data-driven wetland vegetation condition assessments in a "rapid" time frame

Anywhere you want to do wetland condition monitoring & assessment

- Ambient/status & trend monitoring
- Mitigation sequencing
- Restoration success/mitigation performance standards
- Local/regional inventory & planning
- Preservation screening
- Problem investigation

WI-MN Wetland Rapid Assessment Method (RAM)

- Rapid FQA is now the primary component in the Ecological Function & will often require greatest amount of effort

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Follow along in the Rapid FQA manual!

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Key Concepts & Components

The site or Assessment Area (AA)

- The site or AA is the wetland area that is being represented by the Rapid FQA sampling
- Flexibility is the key
- AA's can vary in size & shape according to the needs of the observer
- Discrete or arbitrary boundaries
- Can be quite large (250 ac)

*WI-MN Fxn Assessment AA's

- Boundaries at natural breaks or HGM type changes



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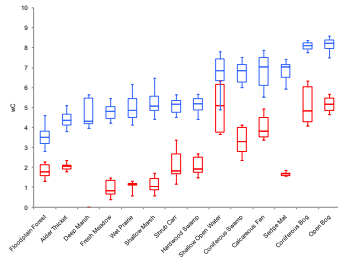
Key Concepts & Components

Plant Communities

- Plant community types should be the basic sampling & assessment unit for any FQA use
- Follows Eggers & Reed (2014) with some modifications
 - Fresh (Wet) Meadow & Sedge Meadow combined into 1 class: Fresh Meadow
 - Seasonally Flooded Basin excluded
 - Sedge Mat = DNR Rich Fen

*Mapping units equivalent to NWI

- % acre
- Matrix community & inclusions



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Key Concepts & Components

The Rapid Species List

- Detailed vegetation surveys require:
 - High level of expertise
 - Lots of time to ID tough species
- More common, dominant, & easier to ID species selected
- 290 species that cover virtually all community types
- Only the Rapid Spp are used!



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Some plants are easier to ID than others



Impatiens capensis
Orange Jewelweed



Galium trifidum ssp. *trifidum*
Three-cleft bedstraw

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Some plants are easier to ID than others



Alnus incana ssp. *rugosa*
Speckled alder



Salix planifolia
Tea leaved willow

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Some plants are easier to ID than others



Phalaris arundinacea
Reed canarygrass



Carex canescens
Gray bog sedge

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Some plants are easier to ID than others

- The ID Difficulty Score
- 3 ‘dimensions’ of ID difficulty
 - Each given a numerical rating
 - Sum of factors = ID Difficulty Score

Commonness	Distinctness	Dominance
1 - Very common	1 - Unique appearance	0 - Not dominant
2 - Occasional	2 - Several similar spp.	-1 - Dominant
3 - Rare	3 - Many similar spp.	



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Key Concepts & Components

The Data Form

- Single sheet/front & back
- Bulk of the form is the Rapid Species List
- General information
- Up to 3 communities/form
- Species listed by stratum & alphabetically by scientific name
- Record spp. presence by circling the corresponding community space

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Key Concepts & Components

Seasonal Sampling Period

- June-September

Timed meander sampling

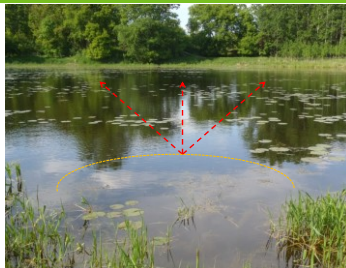
- Walk around the site making species observations
- Only care about rapid species list
- Single meander should cover all communities present in AA
- Total time (base + additional time periods) based on the complexity of the site & the rate that new species are encountered
- Cover class estimations made for each species in each community

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Key Concepts & Components

Shoreline Sampling

- Shallow Open Water community
- 3 representative shoreline sampling stations



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Key Concepts & Components



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Key Concepts & Components

Metrics

- Weighted Coefficient of Conservatism (wC)
- $wC = \sum pC$

Scientific Name	C	CC	Fresh Meadow #1		
			Mid	p	pC
<i>Calamagrostis canadensis</i>	4	5	62.5	0.5556	2.2222
<i>Phalaris arundinacea</i>	0	2	3	0.0267	0.0000
<i>Carex stricta</i>	5	4	37.5	0.3333	1.6667
<i>Carex lasiocarpa</i>	5	2	3	0.0267	0.1333
<i>Salix petiolaris</i>	5	2	3	0.0267	0.1333
<i>Solidago gigantea</i>	3	1	0.5	0.0044	0.0133
<i>Rubus idaeus</i> ssp. <i>strigosus</i>	3	1	0.5	0.0044	0.0133
<i>Lythrum salicaria</i>	5	1	0.5	0.0044	0.0222
<i>Mentha arvensis</i>	3	1	0.5	0.0044	0.0133
<i>Typha latifolia</i>	2	1	0.5	0.0044	0.0089
<i>Impatiens capensis</i>	2	1	0.5	0.0044	0.0089
<i>Rumex crispus</i>	5	1	0.5	0.0044	0.0267

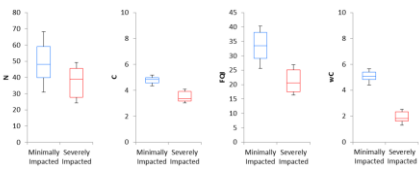
Metric	Fresh Meadow #1
Native Spp. Richness	11
Introduced Richness	1
Mean C	3.6
FQI	44.4
wC	4.3
Total Midpoint % Cover	22.5
Introduced Spp. % Cover	2
Introduced Proportion	0.09

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FQA Metric Performance

Hardwood Swamp data (n = 60/10)

- N = native sp. richness
- C = mean coefficient of conservatism
- FQI = Floristic Quality Index = $\sum N * C$
- wC = abundance weighted C



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FQA Metric Performance

Scientific Name	Fresh Meadow #1					Fresh Meadow #2				
	C	CC	Mid	p	pC	CC	Mid	p	pC	
<i>Calamagrostis canadensis</i>	4	5	62.5	0.5556	2.2222	3	15	0.1364	0.5455	
<i>Phalaris arundinacea</i>	0	2	3	0.0267	0.0000	6	85	0.7727	0.0000	
<i>Carex stricta</i>	5	4	37.5	0.3333	1.6667	2	3	0.0273	0.1364	
<i>Carex lacustris</i>	5	2	3	0.0267	0.1333	1	0.5	0.0045	0.0227	
<i>Salix petiolaris</i>	5	2	3	0.0267	0.1333	2	3	0.0273	0.1364	
<i>Solidago gigantea</i>	3	1	0.5	0.0044	0.0133	1	0.5	0.0045	0.0136	
<i>Rubus idaeus</i> ssp. <i>strigosus</i>	3	1	0.5	0.0044	0.0133	1	0.5	0.0045	0.0136	
<i>Lycopus uniflorus</i>	5	1	0.5	0.0044	0.0222	1	0.5	0.0045	0.0227	
<i>Mentha arvensis</i>	3	1	0.5	0.0044	0.0133	1	0.5	0.0045	0.0136	
<i>Typha latifolia</i>	2	1	0.5	0.0044	0.0089	1	0.5	0.0045	0.0091	
<i>Impatiens capensis</i>	2	1	0.5	0.0044	0.0089	1	0.5	0.0045	0.0091	
<i>Rumex orbiculatus</i>	6	1	0.5	0.0044	0.0267	1	0.5	0.0045	0.0273	

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FQA Metric Performance

Metric	Fresh Meadow #1	Fresh Meadow #2
Native Spp. Richness	11	11
Introduced Richness	1	1
Mean C	3.6	3.6
FQI	11.9	11.9
wC	4.3	1.0
Total Midpoint % Cover	112.5	110
Introduced Spp. % Cover	3	85
Introduced Proportion	0.03	0.77

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Wetland Veg Bio Condition Gradient
(condition categories)

Wetland vegetation
condition categories

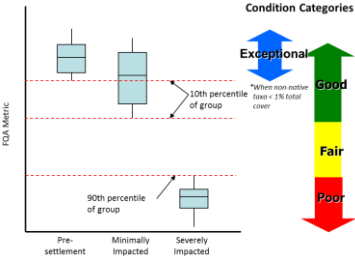
Condition Category	Description
Exceptional	Composition/structure completely intact
Good	Minor composition/structure changes
Fair	Moderate composition/structure changes
Poor	Large-extreme changes in composition/structure
Absent	Devoid of wetland vegetation



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FQA Assessment Criteria

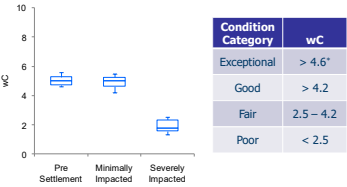
- Assessment criteria derived for 4 condition categories
- Classify data as:
 - Pre-settlement
 - Minimally impacted
 - Severely impacted
- Apply the "lowest/highest scoring reference site" concept
- wC calibrated for each community
- Data driven (n = 725)
 - DNR MN Biological Survey
 - Relieve db
 - PCA targeted data



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FQA Assessment Criteria

- Hardwood Swamp Assessment Criteria
- Pre-Settlement n = 30
 - Minimally Impacted n = 30
 - Severely Impacted n = 10



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Worked Example

Community Type	wC	Condition Category	# Cat.	Prop of AA	Prop x # Cat.
Shrub-Carr	3.3	Fair	3	0.50	1.5
Fresh Meadow	2.3	Fair	3	0.35	1.05
Shallow Marsh	1.4	Poor	4	0.15	0.6
Weighted Average # Cat.					3
Overall Condition Category					Fair

Community						
Condition Category	Shallow Open Water	Deep Shrub	Shallow Shrub	Shrub Shrub	Shrub Shrub	Shrub Shrub
Excellent	1.0	1.0	1.0	1.0	1.0	1.0
Good	1.0	1.0	1.0	1.0	1.0	1.0
Fair	1.0	1.0	1.0	1.0	1.0	1.0
Poor	1.0	1.0	1.0	1.0	1.0	1.0

Community						
Condition Category	Shrub Carr	Shrub Carr	Shrub Carr	Shrub Carr	Shrub Carr	Shrub Carr
Excellent	1.0	1.0	1.0	1.0	1.0	1.0
Good	1.0	1.0	1.0	1.0	1.0	1.0
Fair	1.0	1.0	1.0	1.0	1.0	1.0
Poor	1.0	1.0	1.0	1.0	1.0	1.0

* Total Wetland Species Index = 1 percent

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Rapid FQA Adaptations

Adapting alternative sampling approaches or applying existing data to assessment criteria must meet the following conditions

- Sampling is done by community types
- Sampling intensity is adequate to produce a 'representative' sample
- Cover estimates are made
- Species are ID'd at least to the level of the Rapid Species List

What if I'm collecting high quality/all species data?

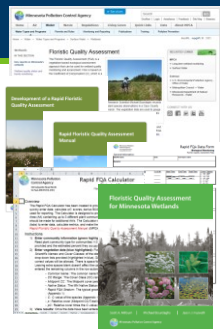
- Are you sure?
- Have the above first 3 conditions been met?
- You can use the FQA "all species" assessment criteria (Appendix B Table B-8 of the 2019 PCA status & trends report)
- You will have to make the calculations on your own!

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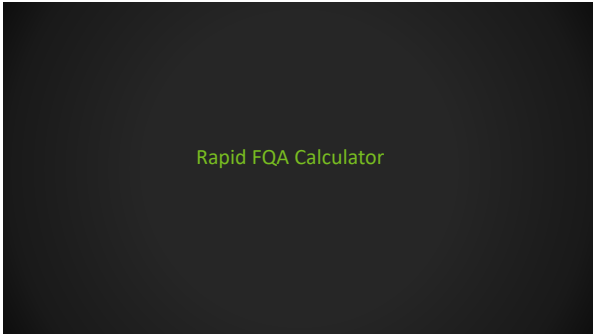
FQA Products

www.pca.state.mn.us

- Search for 'Floristic Quality Assessment'
- Rapid FQA Manual
- Datasheets
- Excel calculator
- Rapid FQA Development Report
- Base FQA Report
- C-values & synonymy in Excel format



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Rapid FQA Limitations

- Moderate level of botanical expertise required
- Dominant/co-dominant spp. at a site is not on the list
- Not all communities are covered
- Community interpretation inconsistencies can cause large errors
- Communities can be interpreted as former types under certain conditions
- Assessment criteria for some types are preliminary

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Corps Wetland Determination

Delineation Manual (1987) & Regional Supplements (ca. 2010)

- Vegetation Sampling
 - By community type
 - Representative
 - Species composition (recommended) & aerial cover
- With minor modifications, users should be able to derive Rapid FQA from delineation veg data
- Guidance provided in Appendix 5



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