WI/MN Wetland Rapid Assessment Method User Guide

Version 1.0, September 2025

Version Information

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The accompanying Scientific Support Document for the Wisconsin/Minnesota Wetland Rapid Assessment Method provides detailed scientific and technical information to support the basis for the functions, indicators, and rankings used within this tool.

Table of Contents

Acronyms

AA Assessment area

AOI Area of interest

FQA Floristic quality assessment

HGM Hydrogeomorphic

NLCD National land cover database

NWI National Wetland Inventory

RAM Minnesota and Wisconsin wetland rapid assessment methodology

Definitions

Area of interest: This term is used to refer to an area of wetland identified as needing assessment. It can be a proposed wetland impact area, restoration area, portion of a wetland on a specific property, etc. It can sometimes be the same as the Assessment Area (defined below), but should not be equated with the AA. This term and its abbreviation is also used in NRCS's Web Soil Survey to indicate a defined area for which soils and related information is accessed.

Assessment area: A wetland or portion of a wetland being evaluated using this assessment method.

Catchment: The drainage area that contributes surface water runoff to a wetland.

Commercial use: A wetland-dependent activity intended to generate revenue for a business.

Bridge: Refers to a connection between different core areas of natural landcover associated with patterns of potential wildlife habitat landscape connectivity in EPA's EnviroAtlas.

Core areas: Refers to areas of natural landcover associated with patterns of potential wildlife habitat landscape connectivity in EPA's EnviroAtlas.

Cowardin System: The National Standard for mapping U.S. wetlands and deepwater habitats (Federal Geographic data Committee, 2013).

Driver: Refers to a factor or characteristic that influences a particular wetland function.

EnviroAtlas: Interactive mapping application developed by the U.S. Environmental Protection Agency to provide geospatial data, tools, and other resources related to ecosystem services, their chemical and non-chemical stressors, and human health.

Floristic quality assessment: A vegetation-based assessment tool that evaluates an area's ecological integrity based on its plant species composition.

Function: A process or series of processes that take place in a wetland.

Functional capacity: The ability of the wetland to perform a specific function.

Groundwater recharge: The ability of a wetland to recharge groundwater.

Indicator: Directly measurable or observable metrics of wetland condition.

Opportunity value: The potential for a wetland to perform a specific function and its relative value to society.

Surface water attenuation: The ability of a wetland to store surface water or otherwise delay surface water from moving downstream.

Surface water supply: The ability of a wetland to supply water to downstream/downslope waters or within a watershed via surface water outflows, saturation overland flow, and/or groundwater discharge.

Value: The worth or importance of wetland functions to society.

Water regime: Cowardin classification modifier describing the hydrologic characteristics of wetlands and deepwater habitats.

Wetland-dependent commercial activity: A commercial activity that is almost exclusively conducted within wetlands. Examples include peat mining, cranberry production, and sod farming.

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Introduction

Purpose

The state natural resource agencies of Wisconsin and Minnesota developed this rapid assessment method (RAM) for assessing wetland functions in terms of functional capacity and opportunity/value. The functions the RAM assesses are based on regulatory requirements for wetlands in Wisconsin and Minnesota.

This user manual supplements and provides guidance on completing the RAM spreadsheet tool. The separate Science Support Document details how functions were selected and how questions and answers were developed to evaluate functional capacity and opportunity/value.

Overview of Rapid Assessment Method

Intended Uses

This RAM evaluates wetland functions to inform regulatory and conservation decisions related to wetlands such as:

- The degree of wetland impact avoidance and minimization warranted in regulatory permit review processes;
- The amount and type of compensatory mitigation needed for a wetland that is impacted; and
- The amount and type of compensatory mitigation credit generated from a wetland restoration, creation, or other mitigation projects.

Examples of conservation decisions that this RAM can inform include:

- Determining which functions a particular wetland restoration project will enhance/improve;
- Monitoring, assessing and documenting wetland condition and functions; and
- Prioritizing wetland restoration and/or preservation projects for conservation funding.

The individual regulatory or conservation program will determine if and how this RAM is used for making decisions.

Functional Definitions, Scope, and Overlap

This RAM assesses 17 specific wetland functions within five broad categories. Function groups and specific functions are defined in relation to functional references in state statutes and administrative rules. Some closely related functions were consolidated under a broader function category. When this occurs, the RAM output can be used to distinguish between these related functions.

Wetland functions interact and overlap. This RAM necessarily limits the scope of each function as follows:

Hydrologic focuses on three specific functions: *Surface Water Attenuation*, *Surface Water Supply*, and *Ground Water Recharge*. Wetlands play an important role in the hydrologic cycle – influencing and controlling surface water flows in watersheds in ways that often are an interface between surface and groundwater.

Water Quality focuses on the ability of a wetland to improve water quality of downstream resources and is comprised of five specific functions: *Nitrate Removal, Phosphorus Retention, Sediment and General Pollutant Retention, Shoreline Stabilization, and Thermoregulation*. The water quality of a wetland is accounted for in other functions, specifically the ecological function related to fish and wildlife habitat. Wetland water quality influences wetland condition which drives ecological functioning.

Ecological focuses on fish and wildlife habitat of endemic species. Specific functions include *Native Plant Habitat, Wildlife Habitat, and Fish Habitat*. This group also emphasizes the natural, ecological functioning of a wetland in its landscape.

Climate relates to the physical attributes and biochemical processes of wetlands that mitigate the effects of excess atmospheric carbon and methane gas. The specific function evaluated is C*arbon Sequestration*. Wetlands accumulate carbon through internal (e.g., vegetation growth) and external (e.g., runoff) processes, and store much of that accumulated carbon in anoxic sediment over decadal and longer timescales, thereby decreasing atmospheric CO_2 concentrations as well as avoiding loss of terrestrial carbon as CO_2.

Anthropogenic function represents the attributes of wetlands that affect direct human uses, including commercial production of goods, recreation, education and research. Specific anthropogenic functions are *Historic or Cultural Uses, Scientific or Educational Importance, Commercial Uses, Recreational Uses, and Scenic Beauty*.

Many drivers and metrics from the different functions overlap. When possible, the RAM combines overlapping metrics into a single question or set of questions. The answer to some questions may have a positive effect on one function and a negative effect on another.

Existing Data and Metrics

This RAM leverages the use of existing data sets and information that are readily available to potential users such as GIS layers, guidebooks, keys, web-based applications, and similar resources. Selected data sources are all publicly available, generally accepted in the two states as reliable sources of information, and maintained or supported by public entities.

Functional Assessment Considerations

For each wetland Assessment Area (AA), each function is assigned a rating of Higher, Moderate, Lower, or Not Applicable. Functional ratings should not be combined to produce an "overall rating". The functional rankings are relative, not absolute. A lower rank implies a lower

level of a particular wetland function compared to other wetland AAs of the same hydrogeomorphic class and vice versa for a higher rank. All rankings are based on indicators of wetland function entered by the user.

The tool addresses two functional assessment aspects:

> *Functional Capacity*: The functional capacity of a wetland to perform a specific function based on the observable characteristics of the wetland and its position in the landscape.
>
> *Opportunity Value*: The societal benefit of a wetland to perform a specific function based on both the opportunity to perform the function and the value given the societal context of the wetland.

Value considerations refer to the value of the function to the general public, not to specific individuals. Public value determinations are based on state statutes and administrative rules, publicly derived plans and policies, prioritization by public agencies, and public investments in conservation and natural resources. The tool accommodates a certain level of flexibility for users and reviewers to incorporate localized public values in the assessment of some functions.

Transparency

The basis for functional rankings can be discerned from RAM outputs and the scoring formulas or decision matrices included in the RAM spreadsheet. Each ranking is based on a combination of wetland characteristics (vegetation, soils, hydrology, etc.) and drivers related to the position of the wetland in the landscape (surrounding land use, presence/absence of outside stressors, etc.). This distinction can be useful in evaluating a function's ability to be maintained into the future. Transparency in ranking also facilitates evaluation of collected data and observations by others.

Limitations of Use

Limitations of a rapid assessment

This RAM is intended to rapidly assess wetland functions in a one-day effort. More time-intensive measures of function have not been included. In some cases, alternative assessment methods and metrics may provide a more precise and robust evaluation. Users of this tool will need to evaluate if or when evaluations require assessment methods beyond the scope of this tool.

Limitations of online tools and mapping

Many RAM questions require using online tools and mapping sources. However, mapping and online data sources are often based primarily on remote sensing, which may be less accurate and precise compared to field observations and field-based sampling methods. Field observations and sampling data can be used in lieu of online tools and mapping resources to answer some questions if such information is collected, available, and documented by users.

Considerations and functions excluded

The RAM is a broad assessment of select functions based on the information gathered at the time of the assessment by the user conducting the evaluation. The functions included are based on state statutes and administrative rules, publicly derived plans and policies, prioritization by public agencies, and public investments in conservation and natural resources. There may be other non-statutory functional considerations that exist in nature and society beyond those assessed by the tool, which may require consideration under certain use scenarios or context.

Information Sources

The following information sources are recommended to be used to answer one or more questions in the RAM.

EnviroAtlas

EnviroAtlas was developed by USEPA in partnership with the U.S. Geological Survey (USGS), the U.S. Department of Agriculture (USDA), and other federal and non-profit organizations, universities, and communities including state, county, and city-level stakeholders. EnviroAtlas provides geospatial data alongside query tools to provide accessible information related to ecosystem services, human and community health, and ecological stressors.

EnviroAtlas informs aspects of the hydrologic and ecological functions. The EnviroAtlas Interactive Map is free and accessible at the USEPA website at www.epa.gov, search keyword “enviroatlas interactive map”.

Web Soil Survey

Web Soil Survey (WSS) provides a free and accessible portal for soil data produced by the National Cooperative Soil Survey. It is operated by the USDA Natural Resources Conservation Service (NRCS) and provides access to soil maps and data available online for most counties across the nation. Web Soil Survey informs aspects of hydrologic, water quality, and carbon sequestration functions. The Web Soil Survey is available at https://websoilsurvey.nrcs.usda.gov/app/.

Other Sources

Other question-specific sources of information are referenced in the RAM spreadsheet with links provided in both the spreadsheet and this user guide. Often these data sources are Minnesota or Wisconsin specific.

Overview of the Assessment Process

Assessment Area Overview

This RAM is intended to evaluate an entire contiguous wetland as opposed to a small wetland area, such as an area proposed to be impacted by a project. However, due to the large size of some contiguous wetlands, the presence of multiple hydrogeomorphic classes in some

contiguous wetlands, and the limitations of this RAM, it is sometimes necessary to divide a contiguous wetland into one or more separate assessment areas (AAs).

An AA is limited to 250 acres or less so that field data collection and observations may be completed in a half day of effort for most AAs. In many situations, the AA will likely be smaller than the maximum 250 acres. Larger AAs are more common in large, structurally homogonous organic flats in the northern part of Minnesota and Wisconsin. Additionally, an AA can be a combination of non-contiguous wetlands in certain circumstances as described under the *Assessment Area Establishment* section below.

Assessment Area Establishment

The following steps are the default method of defining an AA. Deviations from this method to adapt to unique situations/circumstances must be justified and documented when reporting assessment results.

Step 1. Identify the specific area of wetland needing assessment (Area of Interest or AOI).

For example, the AOI may be the location of a proposed wetland impact, the location of proposed restoration activities, or the portion of a wetland on a property or an entire wetland basin.

Step 2. Delineate the contiguous wetland area containing the AOI.

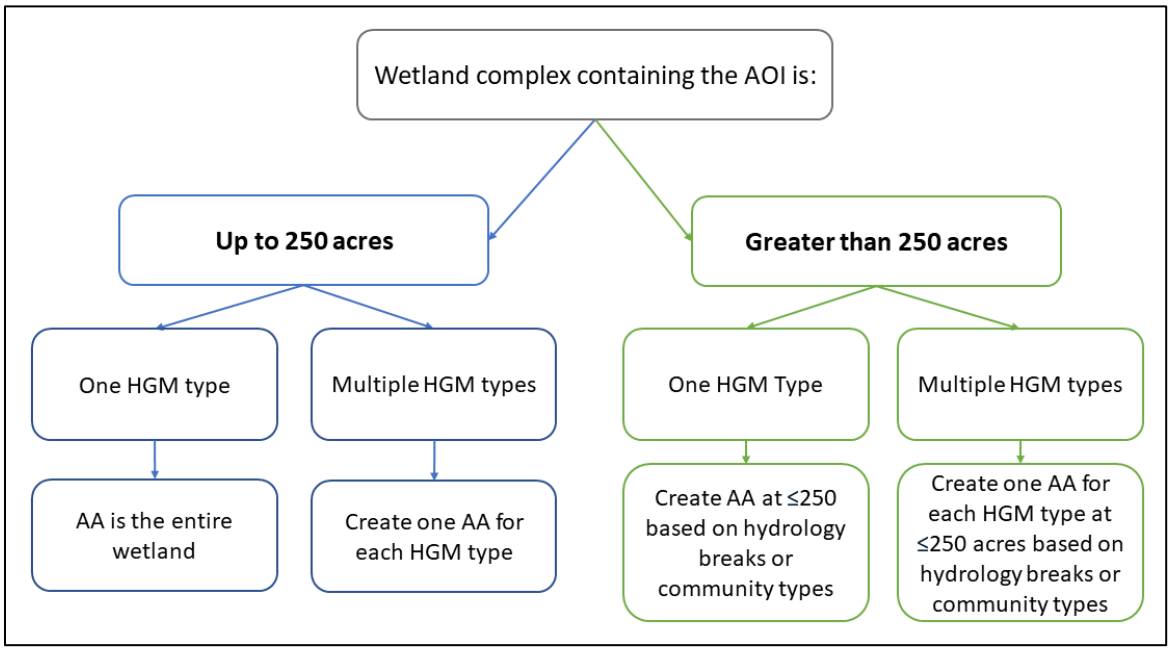
This can vary from a field-based delineation per the 87 Manual to an estimation based on interpreting aerial imagery. The RAM does not require any specific method. The degree of accuracy will vary depending on the purpose of the assessment and any requirements of the entity or program reviewing it.

Step 3. Determine the Hydrogeomorphic (HGM) class(es)of the contiguous wetland area.

Use the HGM type classification definitions and key in Appendix A. If the contiguous wetland area containing the AOI includes more than one HGM class, divide the area into separate HGM classes.

Step 4. Use the Figure 1 decision tree to determine the bounds of the AA.

***Figure 1**. Decision tree for determining wetland AA.*



Creating Assessment Areas from Contiguous Wetlands >250 Acres

Wetland complexes greater than 250 acres should be divided for separate assessment based on hydrology or plant community breaks. Property boundaries and other legal or political designated boundaries should not be used as the basis for dividing wetland complexes >250 acres in size. When dividing these areas into separate AAs, encompass as large of an area as possible within the 250-acre limit. Observable hydrologic breaks such as ditches, tiles, constriction points, beaver dams, and any other features that could potentially affect the hydrology of one portion of the wetland differently from another should be used to divide the wetland into multiple AAs. If there is no basis for splitting the wetland into manageable units based on hydrologic factors, then look for significant changes in land use and vegetative community composition. If the wetland is relatively homogenous in hydrology, vegetation, and land use, establish the AA boundary such that it encompasses 250 acres and includes AOI. Document the steps taken to refine the AA in the *User Notes & Screenshots* tab of the RAM spreadsheet.

Assessment Area Adaptations for Special Circumstances

Application of these steps may sometimes result in an AA that is difficult or otherwise inappropriate to assess in relation to the intended purpose of the assessment. Adaptations should be justified and documented in the *User Notes & Screenshots* tab of the RAM spreadsheet.

Combining Noncontiguous Wetlands in an AA

Noncontiguous wetlands should not be combined for assessment if they are of a different HGM class, have significant differences in key features (e.g. soil type, plant community types, hydrologic alterations, etc.), or are greater than 1,000 feet apart. However, under certain circumstances it may be possible to combine similar nearby wetlands for efficiency. This will depend on the purpose of the assessment and the requirements of any entity or regulatory authority involved in the review. Combined noncontiguous wetlands should not exceed the RAM's 250-acre AA size limit. Answers to some of the RAM questions will have to be combined and averaged when this occurs.

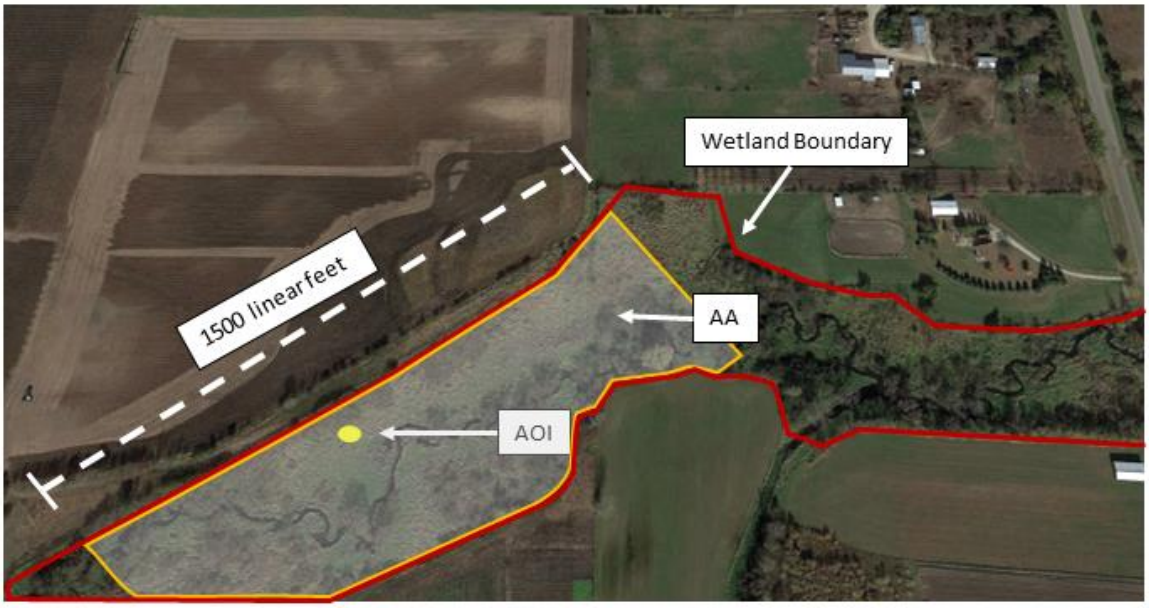
Setting the AA for Wetlands Bordering Lakes and Streams

When defining the AA, the wetland must be distinguished from any other adjacent and contiguous aquatic resources such as lakes and streams. The edge of deep open water (lakes) and the active channel (streams) are usually reasonable separation points.

Some wetlands may exceed the 250-acre AA size limit and occur in a long and narrow band adjacent to the edge of a lake or stream. In such instances where the wetland is longer than 1,500 linear feet adjacent to a lake or stream, the AA should be limited to 1,500 linear feet or a natural break in hydrology or community type, whichever is smaller. The AOI should be centered along the 1,500-foot length to the extent possible.

For ditches and 1st and 2nd order streams that have contiguous vegetated wetlands on both sides, the AA should typically include the wetlands on both sides of the waterway. For 3rd order streams or greater, the AA should include only the wetland on the side of the AA that includes the AOI (Figure 2).

***Figure 2**. Example of setting an AA on a narrow wetland adjacent to a third order stream.*



Completing the Assessment

User Expertise Requirements

RAM users should be experienced and trained wetland professionals proficient with wetland assessment protocols and tools such as wetland delineation and use of Minnesota or Wisconsin Rapid Floristic Quality Assessments.

General Approach

Answers to RAM questions require field observations, data collection, desktop review, or some combination thereof. Answering questions related to the desktop review prior to field observations and data collection is recommended. This allows the user to identify areas to focus field observations and data collection as well as areas where field confirmation of desktop review results is needed. Completion of the RAM requires accessing online mapping coupled with field data collection. To verify assessments and their results, users should document their answers to questions by:

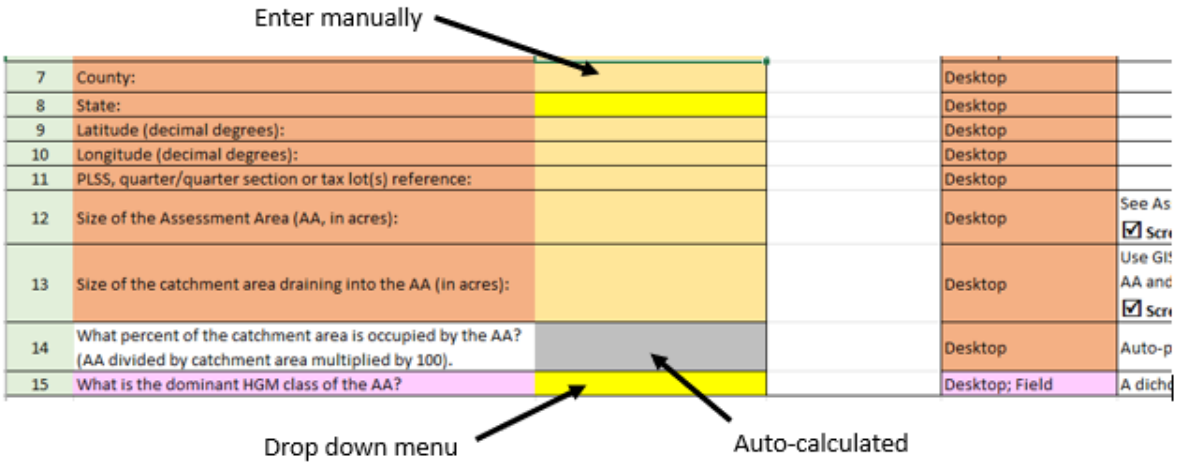
- Entering relevant information in the *User Notes & Screenshots* tab of the *AA DATA ENTRY* tab;
- Copying maps and images from desktop reviews and pasting them in the *User Notes & Screenshots* tab; and
- Including photos documenting indicator observations, wetland conditions, or notable observations in accompanying report files.

RAM Spreadsheet Data Entry

The RAM spreadsheet should **only be completed in Microsoft Excel**. Format and calculation issues can occur when the form is used in Google Sheets or other spreadsheet platforms. This user guide follows the same order as the questions in the RAM spreadsheet and is labeled similarly for quick reference. The source used for answering each question is listed in the row it is being asked.

All information is to be entered in the *AA DATA ENTRY* tab in answer cells with tan boxes or via drop down menu in answer cells with yellow boxes (Figure 3). Gray boxes either auto-populate based on earlier data entries or remain grayed out when not relevant.

***Figure 3**. Example of AA Data Entry Tab questions, answer types, and data sources.*



Conducting Desktop Review

Answers to many questions require the use of various online mapping applications and data sources. This user guide includes instructions on using EnviroAtlas and the Web Soil Survey. However, some questions can be answered using Geographic Information System (GIS) software or other tools provided equivalent data layers are used.

Conducting Field Assessment

Field observations and data collection are required to answer some RAM questions and to confirm some answers obtained from the desktop review. The RAM field assessment does not require anything beyond the standard type of field equipment used by wetland professionals when conducting wetland delineations. A soil auger or other soil sampling equipment may sometimes be necessary to confirm or otherwise determine soil characteristics identified from the desktop review using the Web Soil Survey. A paper copy of the RAM questions is recommended as a backup while conducting the field assessment in addition to an electronic version of the RAM spreadsheet and user guide. Forms and information related to completing a Rapid Floristic Assessment (Minnesota Rapid FQA or Wisconsin Rapid FQA as applicable) are required for the field assessment as the results influence several different functional ratings. Standard protocols for documenting field conditions, limitations, and other notable observations apply to conducting the field assessment. Taking photos of relevant features and including them in resulting RAM reports is highly recommended.

Interpreting Results

The results of the assessment will appear in the *Results Summary* tab of the RAM spreadsheet. A detailed breakdown of answers to relevant questions and associated scoring appears in each functional group tab (Hydro, WtrQlty, Eco, Carbon, Anthro).

Qualitative rankings in one of three tiers (Table 1) are calculated for each specific function in terms of functional capacity, opportunity-value (when applicable), and overall. The Ecological,

and Anthropogenic functional group rankings are derived from a qualitative decision matrix. The Carbon, Hydrologic and Water Quality functional group rankings are derived from a 0-100-point scoring system (Table 2). Points are only used to determine the qualitative rank for the function and should not be treated as quantitative measures. For example, if the point total for the Nitrate Removal functional capacity rank is 35 for one AA and 68 for another AA, this does not indicate that one is better at nitrate removal than the other because they both fall into the moderate ranking tier.

***Table 1**. Qualitative scale used in RAM wetland function rankings*

Tier	Description
Higher	Functional capacity or opportunity-value to provide a function is at a higher level relative to other wetlands for a specific function.
Moderate	Functional capacity or opportunity-value to provide a function is at a moderate level relative to other wetlands for a specific function.
Lower	Functional capacity or opportunity-value to provide a function is at a lower level relative to other wetlands for a specific function.

***Table 2.** Hydrologic and Water Quality specific function scoring criteria. Scores range 0-100.*

Function Rank	Score Criteria
Higher	≥ 70
Moderate	70 > x > 30
Lower	≤ 30

Results Summary

The *Results Summary* tab includes information on assessment details (dates of assessment, assessor name, etc.) and a functional group summary of all specific functions (Table 3).

***Table 3.** Functional groups and their related functions*

Functional Group	Function
Hydrology	Surface Water Attenuation
	Surface Water Supply
	Groundwater Recharge
Water Quality	Nitrate Removal
	Phosphorus Retention
	Sediment and Pollutant Retention
	Shoreline Stabilization
	Temperature Maintenance

Ecological	Native Plant Habitat
	Wildlife Habitat
	Fish Habitat
Climate	Carbon Sequestration
Anthropogenic	Historic or Cultural Uses
	Scientific or Educational Importance
	Commercial Uses
	Recreational Uses
	Scenic Beauty

Instructions for Answering Assessment Tool Questions

This section describes and/or clarifies how to answer each question in the *AA Data Entry* tab of the RAM spreadsheet. Additional details can be found in referenced appendices. The numbered questions correspond to questions in the spreadsheet. If access to the entire AA is not possible due to property boundaries, landscape barriers, flooding, or other factors, users may have to estimate or approximate the answers to some questions that require field observation or data collection. In such instances, users should describe the access restrictions and the basis for their estimation of answers as applicable in *User Notes & Screenshots* tab of the spreadsheet.

Guidance for answering questions that require desktop mapping resources is provided for EnviroAtlas and the Web Soil Survey as applicable. Other equivalent mapping resources and software may be also be used but are not described here.

Assessor Details

1. **Site Name**: Descriptive name to identify the site.
2. **Assessor Name**: The name of the individual(s) that conducted the assessment.
3. **Date of Desktop Assessment**: DD/MM/YYYY.
4. **Date of Field Assessment**: DD/MM/YYYY.
5. **If delineated, file reference number (if applicable)**: User-defined reference number.

Location Details

The questions in this section identify the AA's location, size, and surrounding features of importance. Questions are answered from desktop review with HGM type verifiable in the field. There are eight manual entries, two drop down entries, and two auto-populated entries in this section.

6. **Nearest Town**: In EnviroAtlas municipalities are shown on the *Topographic* basemap.

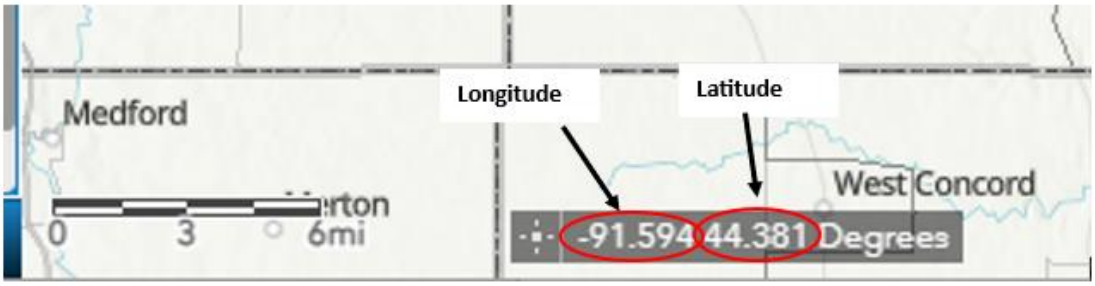
7. **County**: The county or counties in which the assessment area lies. In EnviroAtlas select the *Political Boundaries* layer group, and then select *States, County, and Census Block Group boundaries*.

8. **State**: The state in which the assessment area lies. In EnviroAtlas select the *Political Boundaries* layer group, and then select *States, County, and Census Block Group boundaries*. Choose from drop-down menu of applicable states.

9. **Latitude (decimal degrees):** Enter latitude decimal degrees for the approximate center of the AA. In EnviroAtlas position the cursor at the center of the AA and record the latitude decimal degrees that appears in the lower left corner of the screen (Figure 4).

10. **Longitude (decimal degrees):** Enter longitude decimal degrees for the approximate center of the AA. In EnviroAtlas position the cursor at the center of the AA and record the latitude decimal degrees that appears in the lower left corner of the screen (Figure 4).

***Figure 4**. Screenshot of EnviroAtlas showing latitude/longitude in lower left corner.*

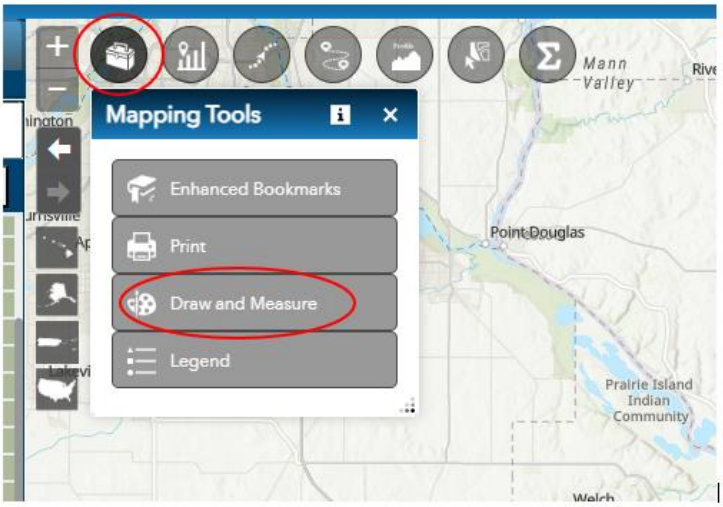


11. **PLSS, quarter/quarter section or tax lot(s) reference**: Optional. Available in county or state online mapping tools.

Size of the AA (in acres): In EnviroAtlas, the size of the AA can be determined by drawing a polygon around the boundaries using the *Draw and Measure* mapping tool and selecting *acres* for the area units (Figure 5). Acreage will automatically be converted to square kilometers in question 12.1. See Appendix Drawing a polygon and determining the size of an AA in EnviroAtlas for more detailed instructions and illustrations. Screenshot of AA outline required.

12.

***Figure 5**. Screenshot of EnviroAtlas showing location of Draw and Measure mapping tool.*



Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the *Raindrop Tool* in EnviroAtlas can be used to define the catchment area and determine its size as detailed in Appendix C

Determining catchment of an AA in EnviroAtlas

The scale of the catchment area depends on HGM class and stream order (if associated stream present). For all HGM classes except Riverine (upper and lower perennial) and Depressional-floodplain, the catchment is the drainage area that contributes runoff directly to the AA. Riverine and Depressional-Floodplain HGM wetlands are influenced at larger stream drainage scales and established watersheds are used as a basis for determining the catchment area.

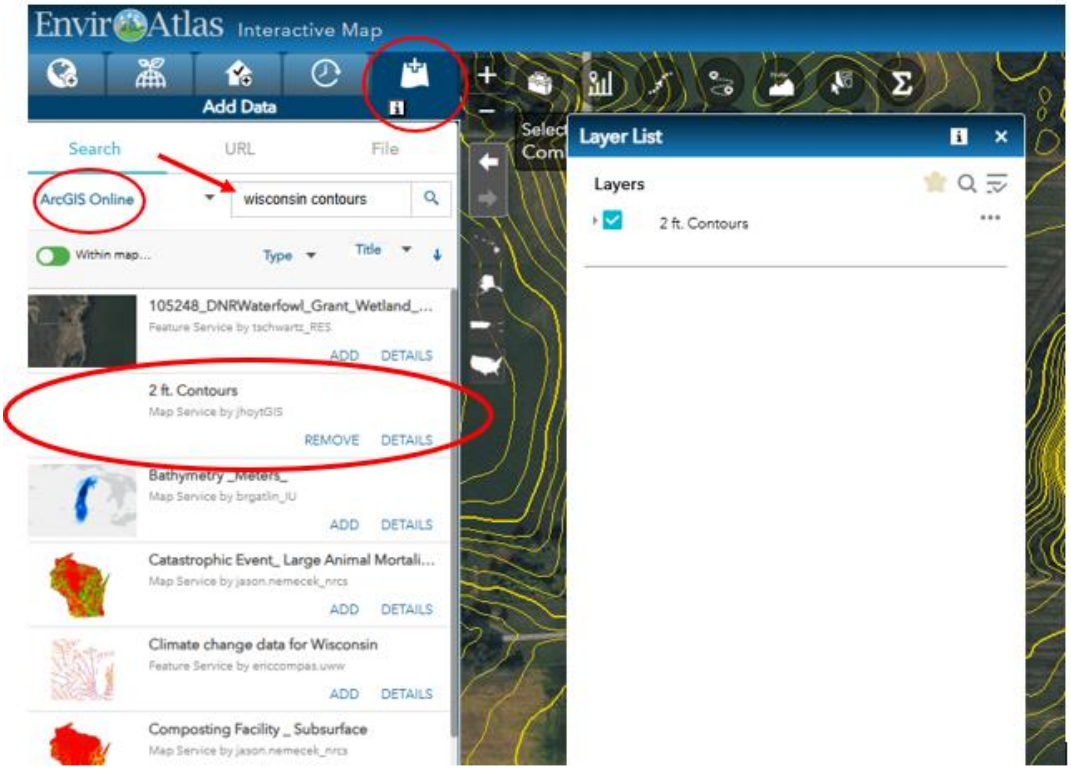
Determining catchment for Depressional, Organic & Mineral Soil Flat, Slope, and Lacustrine Fringe HGM class AAs)

The upper elevation limits of an immediate catchment are the topographic breaks where precipitation can possibly drain towards the AA and the pour points of any upgradient depressional wetlands and lakes. Upgradient depressional wetlands and lakes should be excluded from an immediate catchment. The lower elevation limit of an immediate catchment is the AA boundary.

To delineate an immediate catchment in EnviroAtlas, select an appropriate basemap (e.g., aerial imagery) and zoom to AA.

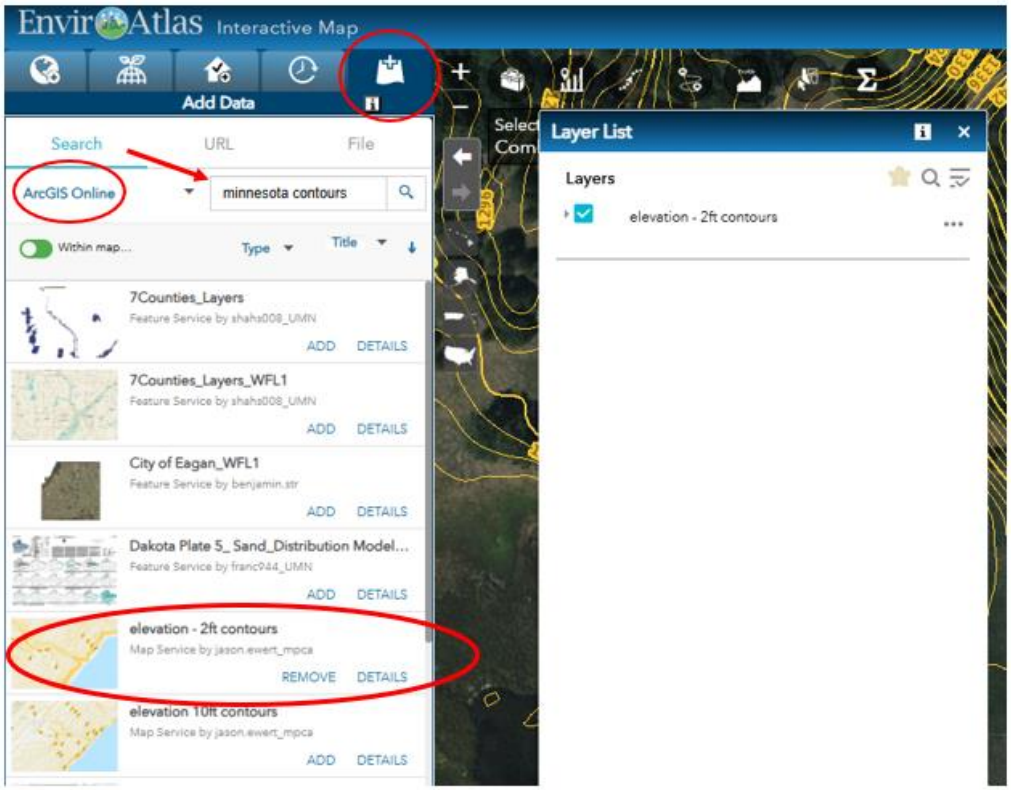
When working in Wisconsin, add a 2-foot contour map to your EnviroAtlas interactive map by selecting *Add Data* and search *ArcGIS Online* using the search term “Wisconsin contours”, and then selecting *Add* for the *2 ft. Contours* layer (Figure C.1).

FIGURE C.1



When working in Minnesota, add a 2-foot contour map to your EnviroAtlas interactive map by selecting *Add Data* and search *ArcGIS Online* using the search term “Minnesota contours”, and then selecting *Add* for the *elevation - 2ft. contours* layer (Figure C.2).

FIGURE C.2



13. . Screenshot of catchment area outline required.

14. **What percent of the catchment area is occupied by the AA? (AA divided by catchment area multiplied by 100)?** Auto-calculated from answers to Q12 and Q13, no input required.

15. **What is the dominant HGM class of the AA?** The dominant HGM class is determined by using the Wetland HGM Determination Key in Appendix A. Choose from drop-down menu of applicable HGM classes.

Land Cover and Connectivity

All questions in this section relate to the AA's location within the broader, surrounding landscape. Information can be sourced entirely from desktop review.

16. **Use the Summarize My Area Tool in EnviroAtlas or a GIS software program with the latest National Land Cover Database map layer to determine the following land cover percentages:**

    Percent of catchment area (excluding the AA) that is developed and agricultural cover classes combined.

    Percent of the catchment area (excluding the AA) that is natural cover classes (deciduous, evergreen and mixed forest; shrub/scrub; grassland/herbaceous; and emergent herbaceous wetlands).

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

Percent of the land area within 0.1 miles (0.161 km) from the edge of the AA (excluding the AA) that is natural cover classes (deciduous, evergreen and mixed forest; shrub/scrub; grassland/herbaceous; and emergent herbaceous wetlands).

See Appendix D for detailed instructions and illustrations on using EnviroAtlas' Summarize My Area tool to determine these percentages. Use Table 4 below to classify National Land Cover Database (NLCD) cover categories as Developed, Natural, and Agricultural cover. Choose from drop-down menu of cover class percentage ranges. Screenshots of NLCD cover types for the three areas are required.

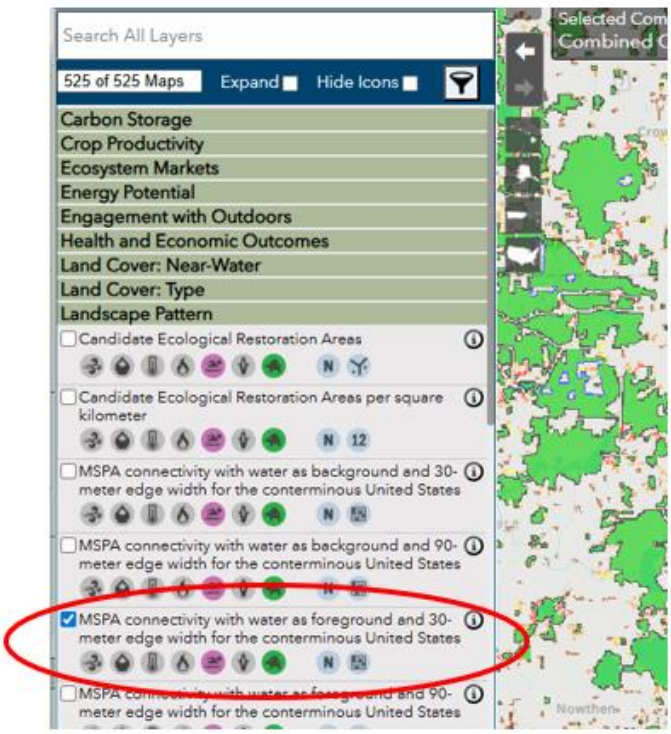
Table 4. *RAM and NLCD cover category equivalents.*

Scoring Metric	**NLCD Land Cover Category**
NA	Open Water (11)
Developed Cover	Developed, Open Space
	Developed, Lower Intensity
	Developed, Moderate Intensity
	Developed, Higher Intensity
NA	Barren Land (Rock/Sand/Clay)
Natural Cover	Deciduous Forest
	Evergreen Forest
	Mixed Forest
	Shrub/Scrub
	Grassland/Herbaceous
	Woody Wetlands
	Emergent Herbaceous Wetlands
Agricultural Cover	Pasture/Hay
	Cultivated Crops

17. **To assess landscape scale habitat and connectivity of the AA (Q17 & Q18), use the MSPA connectivity with water as foreground and 30-meter edge width for the conterminous United States map (found in the Landscape Pattern Data Layers) in the EPA's EnviroAtlas Interactive Map.**

    Is the AA in a core (green symbol) area? In the *Landscape Pattern* map layer of EnviroAtlas select the *MSPA connectivity with water as foreground and 30-meter edge width for the conterminous United States* map (Figure 6) and overlay the AA boundaries. Choose yes from the drop-down menu if any portion of the AA overlaps with a core area. See Appendix E for illustrations and detailed instructions on using EnviroAtlas to answer this question.

***Figure 6**. Screenshot of EnviroAtlas showing location of Landscape Pattern layers.*



18. **What is the coverage of core (green) area within a 2 mi / 3.2 km buffer of the AA boundary? If the core (green) containing the AA is connected to other core areas by a bridge (red), include all connected cores in the estimate.** Use the *Landscape Pattern* map layer of EnviroAtlas and select the *MSPA connectivity with water as foreground and 30-meter edge width for the conterminous United States* map (Figure 6). Overlay a polygon representing a 2-mile distance from the outer edges of the AA (which includes the AA) and visually estimate the amount of core area within it. See Appendix E for illustrations and detailed instructions on using EnviroAtlas to answer this question. Choose from drop-down menu of cover class percentage ranges. Screenshot of core areas required.

Watershed Catchment Area

The two questions in this section evaluate the relationship of the AA to its catchment area (as identified in Q13). Information can be sourced entirely from desktop review.

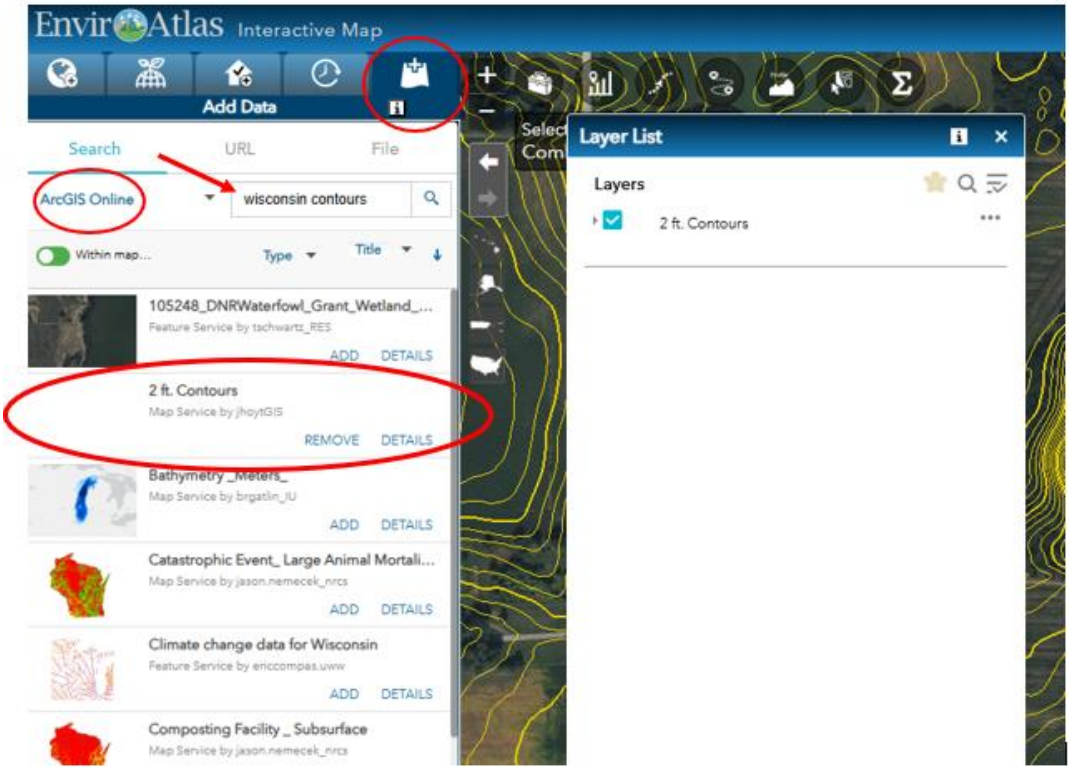
An elevation contour map is required to answer these questions. Separate sources of 2-foot contours are available in EnviroAtlas for Minnesota and Wisconsin.

When working in Wisconsin, add a 2-foot contour map to your EnviroAtlas interactive map as follows (Figure 7):

- Select *Add Data* and search *ArcGIS Online* using the search term “Wisconsin contours”.
- Select *Add* for the *2 ft. Contours* layer.

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

***Figure 7**. Screenshot of EnviroAtlas showing addition of 2-foot contour layer for Wisconsin.*

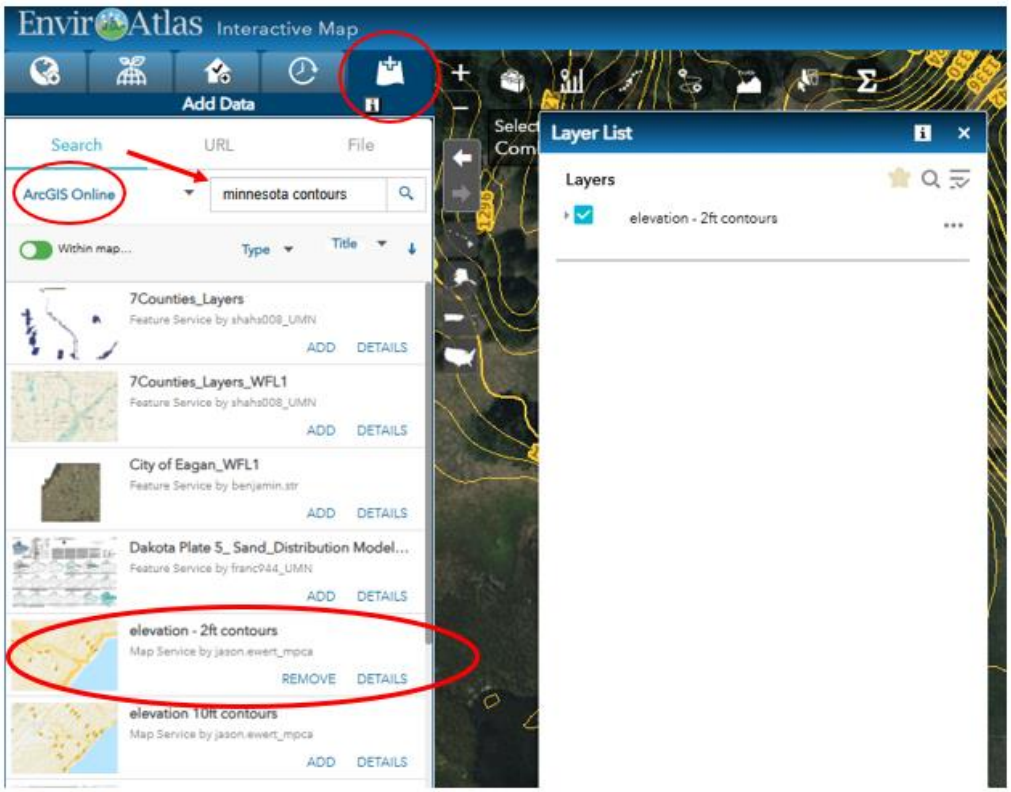


When working in Minnesota, add a 2-foot contour map to your EnviroAtlas interactive map as follows (Figure 8):

- Select *Add Data* and search *ArcGIS Online* using the search term “Minnesota contours”.
- Select *Add* for the *elevation - 2ft. contours* layer.

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

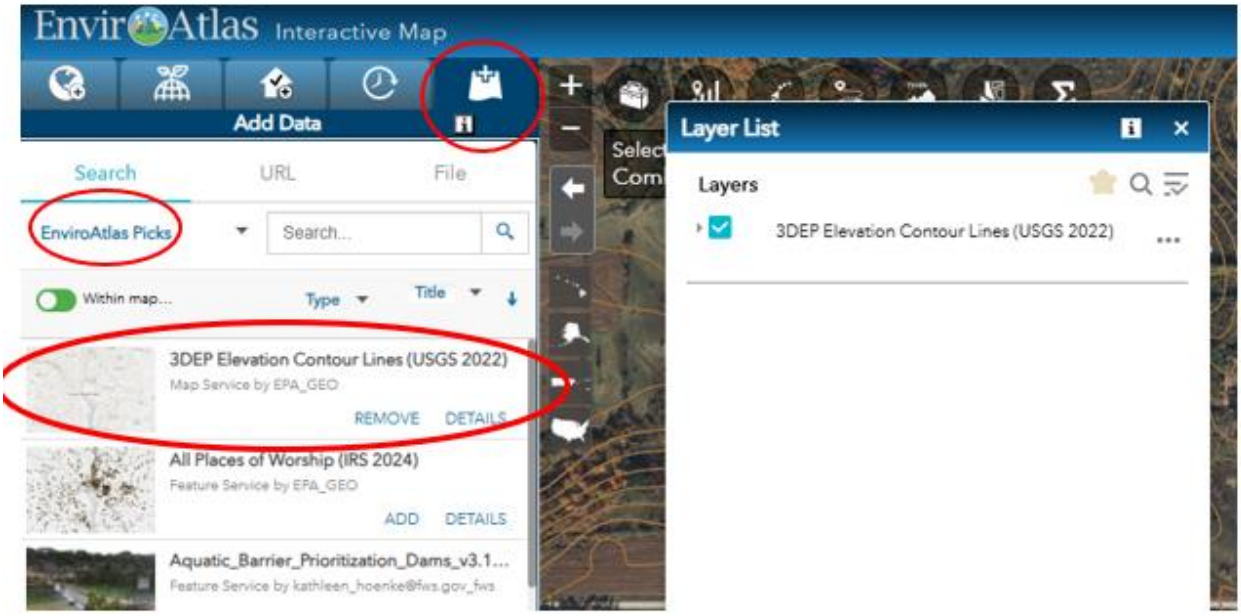
***Figure 8**. Screenshot of EnviroAtlas showing addition of elevation – 2ft contours layer for Minnesota.*



If 2-foot contour layers are not available, add the *3DEP Elevation Contour Lines (USGS 2022)* layer from the *EnviroAtlas Picks* and use this 10-foot contour map as an alternative (Figure 9).

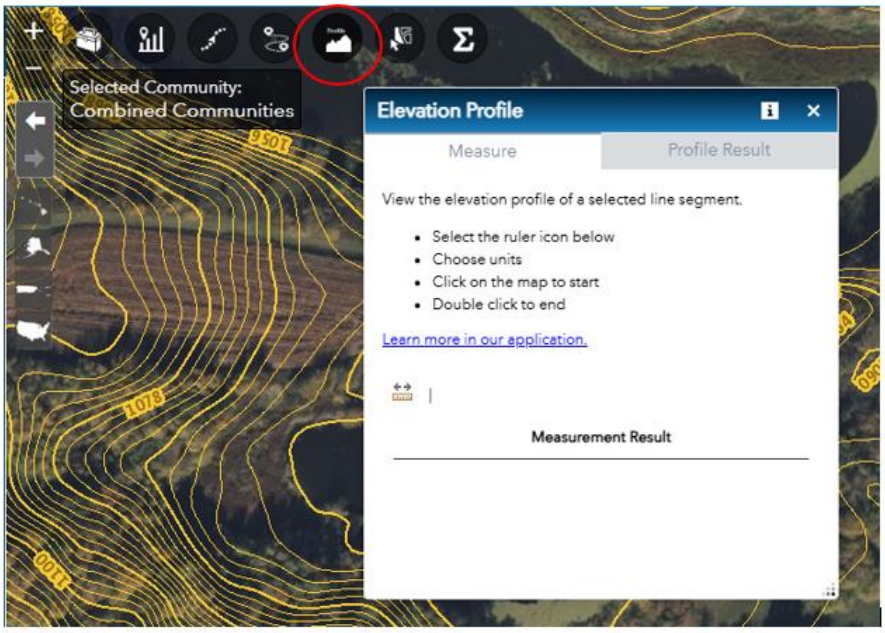
Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

***Figure 9**. Screenshot of EnviroAtlas showing addition of 3DEP Elevation Contour Lines (USGS 2022) layer of 10-foot contours.*



19. **What is the slope across the AA's catchment area?** In EnviroAtlas overlay the AA's catchment with a contour elevation map. Then use the *Elevation Profile* tool (Figure 10) by first determining the change in elevation from highest point in the upstream portion of the catchment to the lowest point in the downstream portion of the catchment. Then determine the distance between the two points. Then divide the change in elevation by the distance and multiply the result by 100. Select the percent slope range category from the drop-down menu. See Appendix F for illustrations and detailed instructions. Screenshot showing the distance between high and low points within the catchment is required.

***Figure 10**. Screenshot of EnviroAtlas showing Elevation Profile tool.*



20. **Is the AA situated in elevation closer to the Hydrologic Unit Code 12 (HUC 12) watershed's local high or the local low for topography?** The answer defaults to "Local low" for an AA that is Slope, Riverine, or Lacustrine Fringe HGM wetland class.

    For all other HGM classes, turn on the Hydrologic Unit Code (HUC) Boundaries and labels layer under *Hydrologic Features* in EnviroAtlas (Figure 11) and an elevation contour map. Locate the AA within the HUC 12 watershed and identify the highest elevation near the AA's HUC 12 watershed boundary and the lowest elevation at the downstream end of the HUC 12 watershed. Use the *HUC12 Navigator* tool to navigate upstream and downstream of the HUC 12 watershed to determine the general flow direction (Figure 12). Note that you may have to adjust the transparency of the layers for increased contrast between the contours, HUC 12 boundary, and chosen base map (see Figure 11). Visually estimate the relative location of the AA relative to the high and low elevations within the HUC 12 watershed. Screenshot of HUC12 watershed with AA location identified is required.

***Figure 11**. Screenshot of EnviroAtlas showing HUC boundary layer and transparency adjustment.*

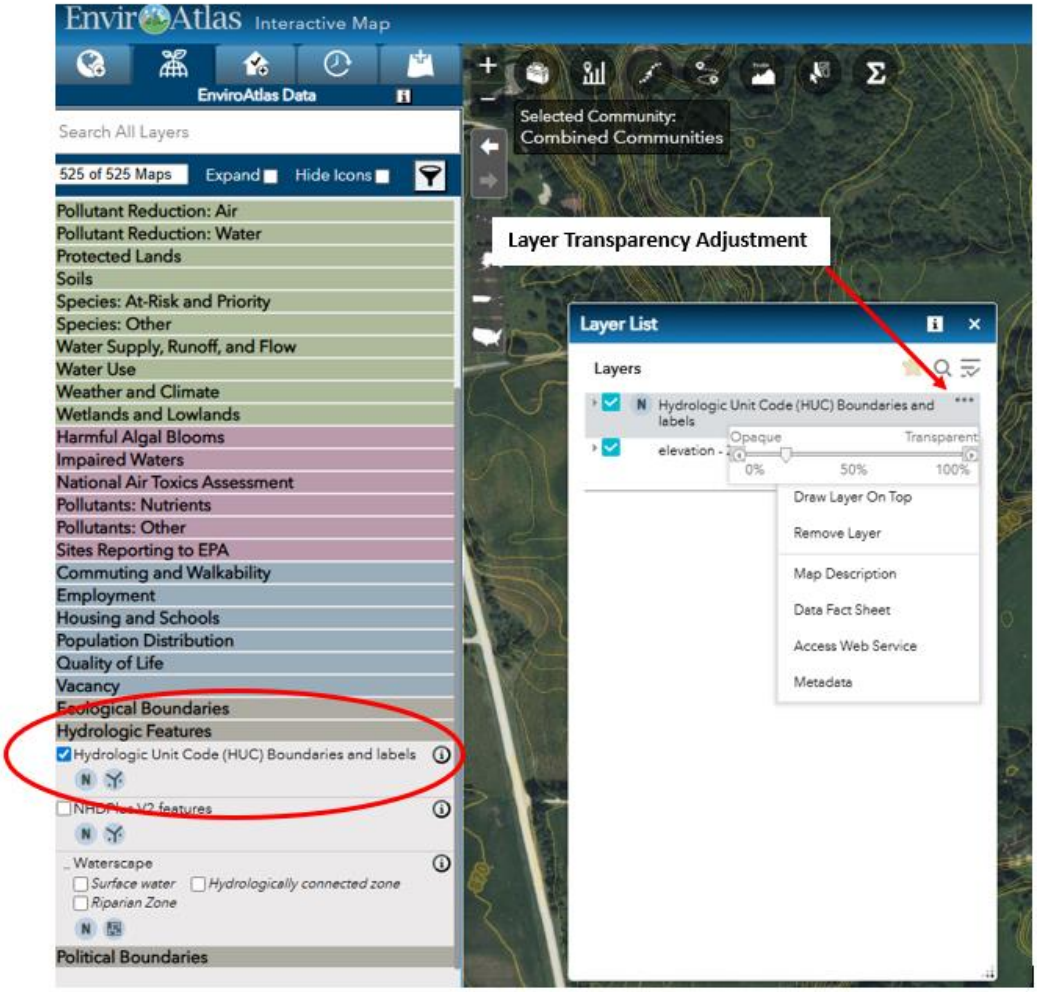
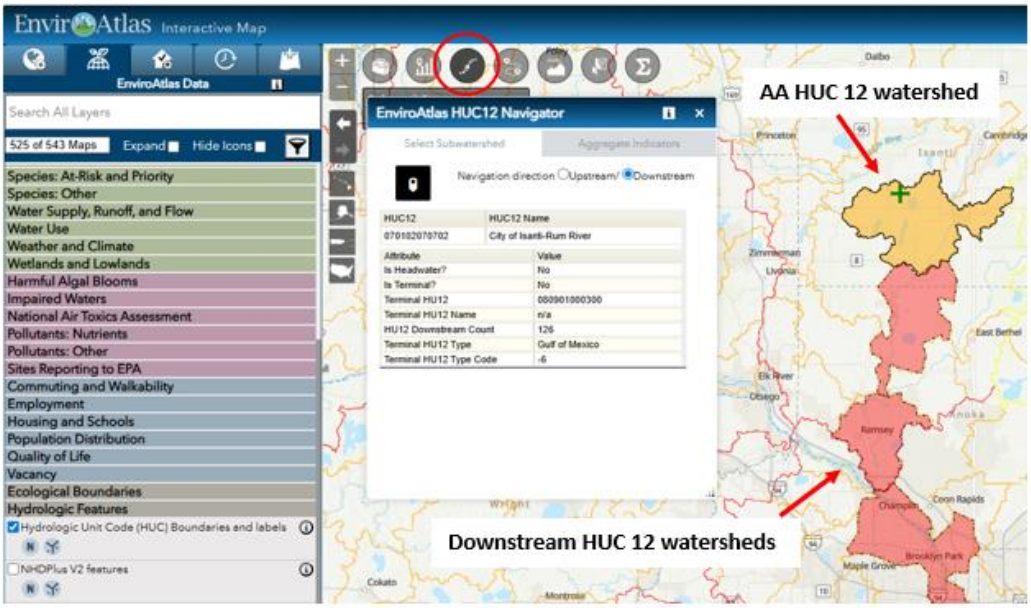


***Figure 12**. Screenshot of EnviroAtlas showing HUC12 Navigator tool used to identify upstream and downstream HUC 12 watersheds.*



Hydrology

The questions in this section evaluate how water moves in, through, and out of the AA. Questions 28 through 35 are "grayed out" in the tool spreadsheet and will only appear if applicable based on answers to previous questions. To see which answers trigger the appearance of each question, hover your cursor over the ⓘ icon in column H in the row of each grayed out question.

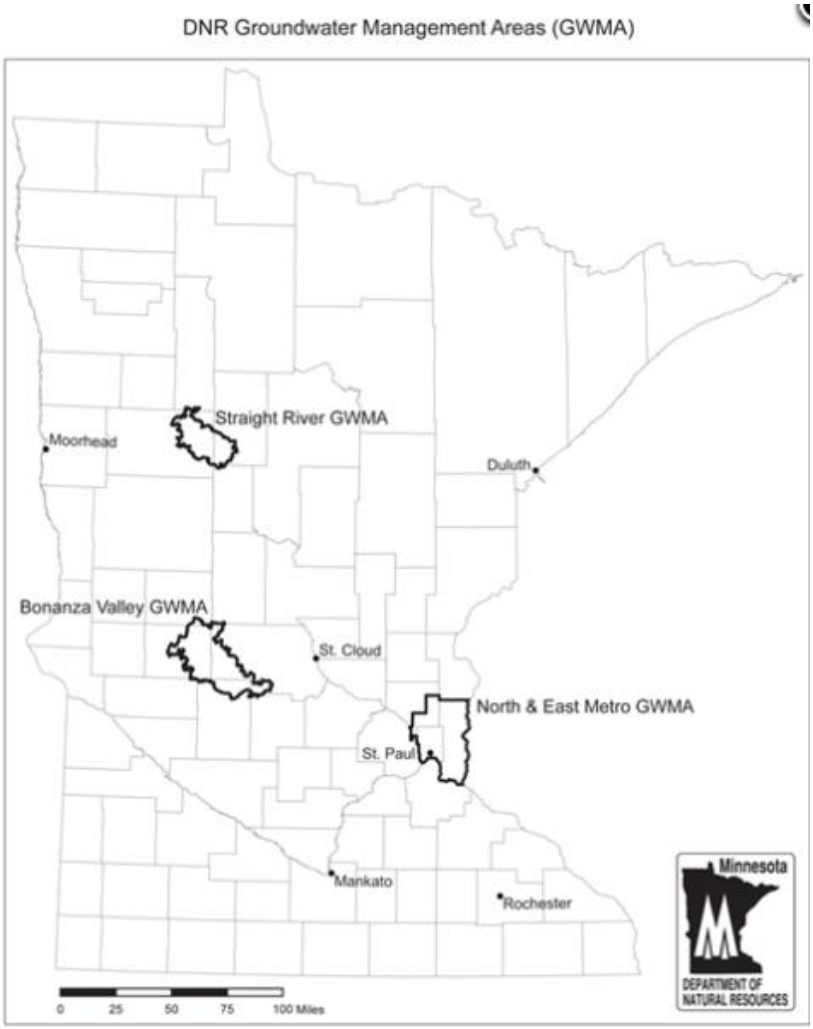
21. **What is the percent of the AA with each water regime listed and defined below?** Water regimes should be determined using the best available information such as field observations, aerial imagery, and NWI classification (if any), Determinations should be based on the normal conditions and circumstances of the AA. Enter the percent cover for each water regime, total must equal 100%.

22. **Is the AA located in an area of notable groundwater importance?** Areas of notable groundwater importance are where there is a high volume of groundwater extraction and/or areas that are designated by the state or local government for groundwater protection or management. Use one of the available state resources below.

Minnesota: Select yes from the drop-down menu if the AA is located in any of the following:

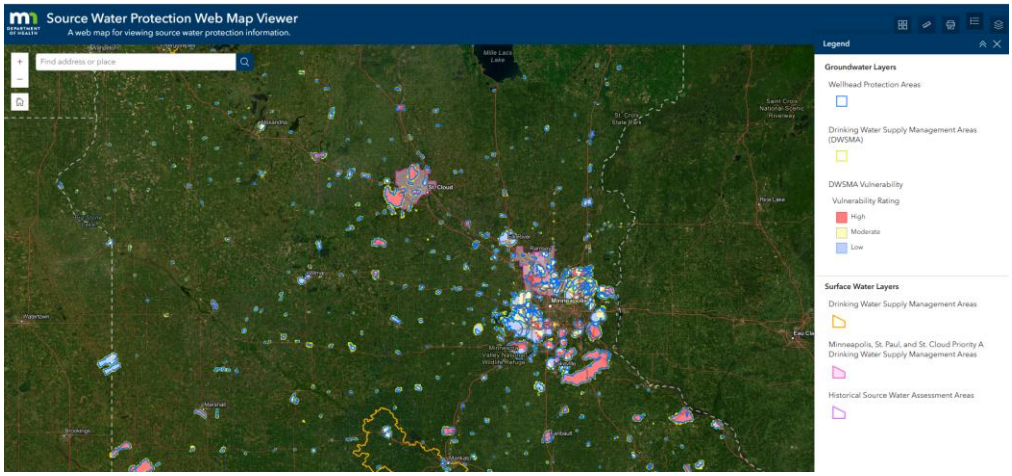
State or local government designated groundwater management or protection area (https://www.dnr.state.mn.us/gwmp/areas.html) (Figure 13).

***Figure 13**. Screenshot of Groundwater Management Plan Areas from Minnesota DNR.*



AA is within a drinking water supply management or wellhead protection area (https://www.health.state.mn.us/communities/environment/water/swp/mapviewer.html) (Figure 14).

***Figure 14**. Screenshot of Surface Water Protection Web Map Viewer from Minnesota DNR.*



AA is within 2 miles of a center-pivot irrigation. Use recent aerial imagery to identify center-pivot irrigation systems within 2 miles of the AA.

Wisconsin: Select yes from the drop-down menu if there is a high capacity well within a 2-mile radius of the AA. Use the Wisconsin Water Quantity Data Viewer to identify high capacity wells

- Turn on the *High Capacity Withdrawal Locations* layer and then turn OFF the *Surface Water Withdrawals* layer.
- Under the *Tools* tab, utilize the *Buffer Tool* to buffer 2 miles from the center of the AA. In the buffer settings tab, change *Buffer Units* to *Miles* and *Buffer Distance* to "2".
- Select *Point* under *Buffer Tool* and click near the center of the AA. The 2-mile radius will automatically generate.

23. **Are there springs or seeps in the AA?** Use one of the available state resources below to determine if springs or seeps are mapped within 2 miles of the center of the AA. The field review should include a search for presence of springs or seeps within or near the AA using the following indicators:
    - Abnormally cold water (especially observed during hottest summer months).
    - AA is located near a groundwater divide or headwater wetland.

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

- Iron and marl deposits in AA soils.
- Rainbow film on surface water that breaks apart, unlike an oily film (Figure 15).

Figure 15. Photo showing rainbow sheen on the surface of groundwater-fed water. Note that the sheen can be broken apart unlike the sheen from oils. (Photo credit: Sally Jarosz, WDNR).

- Prevalence of any groundwater indicator plants such as skunk cabbage (*Symplocarpos foetidus*), marsh marigold (*Caltha palustris*), great angelica (*Angelica atropurpurea*), or watercress (*Nasturium offianale*).

Minnesota: Access the following web app viewer sponsored by the Minnesota Department of Natural Resources and zoom into the area of the AA: https://arcgis.dnr.state.mn.us/portal/apps/webappviewer/index.html?id=560f4d3aaf2a41aa928a38237de291bc

Wisconsin: Access the Wisconsin Water Quantity Data Viewer and complete the following steps:

- Turn on the *WGNHS Spring Monitoring* layer.
- Turn on the *Groundwater Protection Features* layer.

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

- Under the *Tools* tab, utilize the *Buffer Tool* to buffer 2 miles from the center of the AA. In the *buffer settings* tab, change *Buffer Units* to *Miles* and *Buffer Distance* to “2”.
- Select *Point* under *Buffer Tool* and click near the center of the AA. The 2-mile radius will automatically generate.

24. **Does the AA have a surface water outlet to another waterbody?** A combination of aerial imagery, field observations, and EnviroAtlas' Raindrop Tool (Appendix C) or GIS software equivalent can be used to answer this question. The Raindrop Tool can be used to show the direction of surface water flow on the landscape and hence potential surface water outlets. Aerial images may show surface water exiting the AA to other water bodies depending on the time of year and climatic conditions at the time the image was taken. Field observations should confirm the presence/absence of a surface water outlet to the AA. Select the answer most representative of the AA from the drop-down menu. When more than one answer applies select the option where the greatest volume of water is discharged to. Make sure that the selected answer corresponds with the HGM class selected in Q15. For example, if the AA is adjacent to a river/stream/ditch and a lake, select the answer that corresponds to the HGM class is Riverine then the selected answer should “yes, river, stream, or ditch
25. **What is the primary source of surface water input into the AA?** Use a combination of field observations and mapping resources (aerial imagery, topographic information, etc.) to characterize the primary source of surface water inputs. Consider surface water sources from runoff, streams, and flooding from adjacent water bodies, but ignoring direct precipitation and groundwater discharge into the AA. When characterizing surface water inputs consider size and slope of the catchment draining into the AA, any direct stream inputs or structures that may direct flow to the AA, and the surface water interaction with adjacent wetlands, streams, and lakes. The answer should be based on normal hydrologic conditions of the AA, not rare and extreme events/conditions such as catastrophic flooding or extreme drought. Select the option most representative of the AA from the drop-down menu. When more than one answer applies select the option that provides the greater volume of water.
26. **Characterize predominant water flow through the AA:** The answer should be based on field observations supplemented with hydrologic features visible on aerial imagery or from other data sources as applicable. Select an answer from the drop-down menu that represents the predominate flow. Only functioning ditches or straightened streams that significantly facilitate flow within the AA should be considered when selecting an answer.
27. **What is the average, overall density of live or dead, rooted vegetation material capable of intercepting surface water flowing through the AA?** Observe the density and overall coverage of persistent, erect vegetative stems that stand vertically on their own in the absence of standing water and are evident throughout the year (excluding annual crops and other vegetation that is periodically harvested or removed). This includes living plants and plants that are senesced but are still rooted/connected (e.g., last year’s sedge leaves that are still attached – Figure 16). Do not include unrooted vegetative material subject to movement by surface water such as fallen leaves, broken

off twigs, and unattached cattail thatch. The assessment should consider the normal vegetative condition of the wetland during a normal growing season.

Figure 16. Photo showing living and dead vegetation that are both rooted/connected. Both the living and dead sedge leaves in this photo should be counted in the stem density. (Photo credit: Sally Jarosz, WDNR).

28. **What is the predominate outflow of surface water from the AA?** This question is only applicable and activated if the AA is not isolated (Q24). Consider the amount of water that would move through the AA during precipitation events or seasonally high surface water flows as well as how restricting the outflow would be. Use field observations of the outlet, aerial imagery, and other sources as applicable. Explanations and examples for drop-down menu options are as follows:

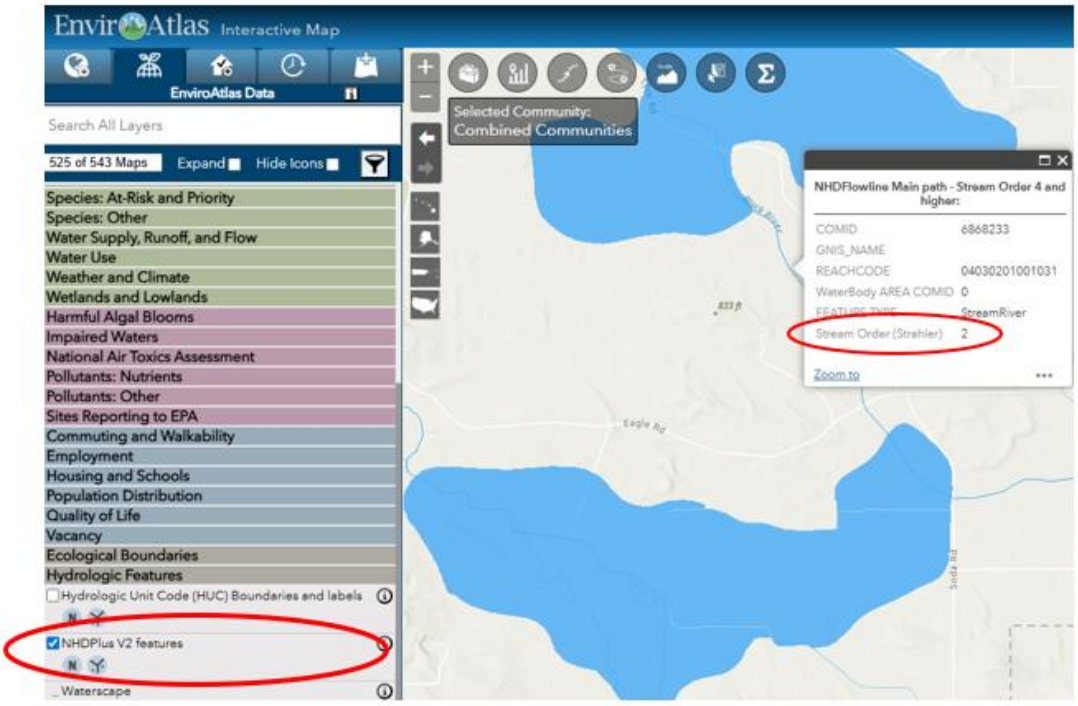
    - **Surface water outlet is highly restricted** – The outlet is well above the normal surface water level of the AA and/or is pinched or artificially narrowed such that surface water is held in the AA and released relatively slowly over time. The outlet is overtopped only during extreme flow events. Marks of inundation several feet above the outlet elevation are often visible due to significant surface water

storage following flow events. Examples include perched and/or undersized culverts as well as narrowed channels and weirs.

- **Surface water outlet is moderately restricted** – The outlet is near the normal surface water level of the AA and/or is relatively wide such that surface water is retained for short periods but released relatively quickly. The outlet is overtopped during normal to heavy flow events Examples include appropriately sized culverts and channel/swale outlets just above the normal surface water level of the AA.
- **No constriction of outflowing surface water** – The AA is adjacent to or contiguous with receiving waterbodies where water can flow freely between the AA and the water body. Examples include return flow to adjacent streams/lakes, headwater streams, and saturation overland flow to adjacent wetland areas.
- **Surface water leaving the AA is expedited via ditching** – Water flowing within and out of the AA is routed through artificially created ditches or swales. Examples include wetlands with tile and ditch drainage systems in them where surface water is removed relatively quickly after most flow events.

29. **What is the stream order of the receiving waterbody?** This question is only applicable and activated if the AA outlets to a river, stream, or ditch (Q24). In EnviroAtlas activate the *NHDPlus V2* layer under *Hydrologic Features* and click on the stream to see its order (Figure 17). Select the appropriate order from the drop-down menu. If the stream or ditch is not mapped in NHD, consider the feature as a 1st order stream in this assessment.

***Figure 17**. Screenshot of EnviroAtlas showing how to use the NHDPlus features layer to identify stream order.*



30. **For AAs that are contiguous with or that discharge to another waterbody, what percent of the active shoreline (bank) is bare ground?** This question is only applicable and activated if the AA outlets to a river, stream, ditch, or lake (Q24). The active shoreline ("bank") is the less of the following: 1) 75 feet landward of the edge of the water (uphill from the ordinary high water mark) or 2) until the shoreline experiences a topographic break. For example, if the waterway has a berm running parallel to the river, and the top of a berm is 15 feet landward from the water's edge, then the top of the berm is a topographic break and the active shoreline would be 15 feet landward of the edge of the ordinary high water mark.

    Use field observations to estimate the percent of bare ground in the active shoreline zone along the length of the AA where it is contiguous with the adjacent waterbody (Figure 18). Natural rock or rip rap shorelines or placed riprap are less susceptible to erosion and are not considered bare ground for this question. See Figure 19 for a visual guide to estimating percent cover. Select the percent cover category from the drop-down menu.

    ***Figure 18**. Photo example of an active shoreline with <30% bare ground and a moderate slope of 30%. (Photo credit: Sally Jarosz, WDNR).*

***Figure 19**. Visual guide for estimating percent cover.*

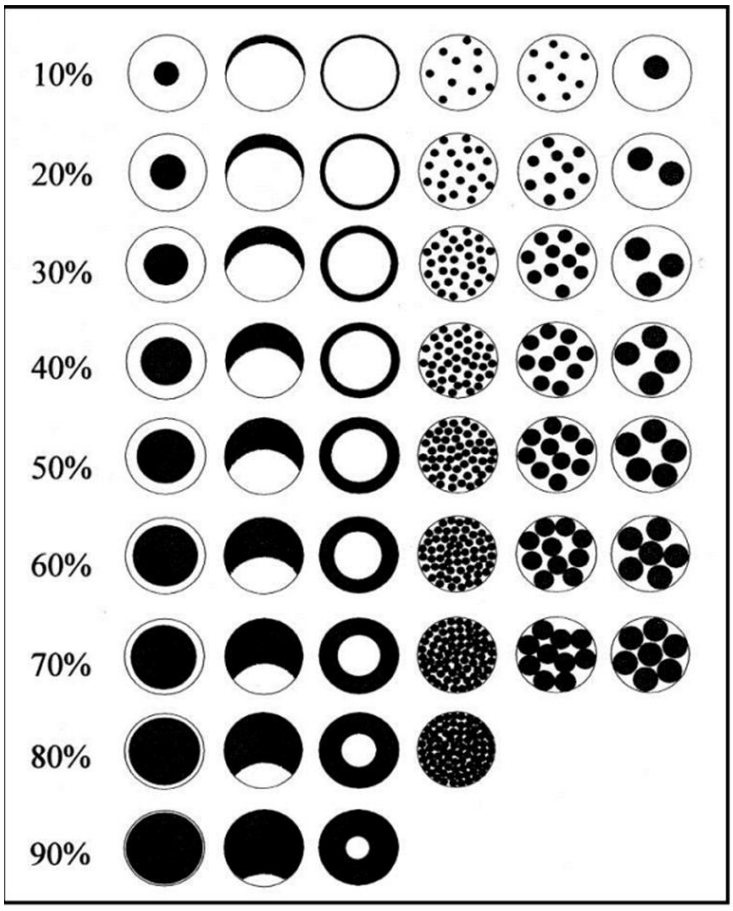
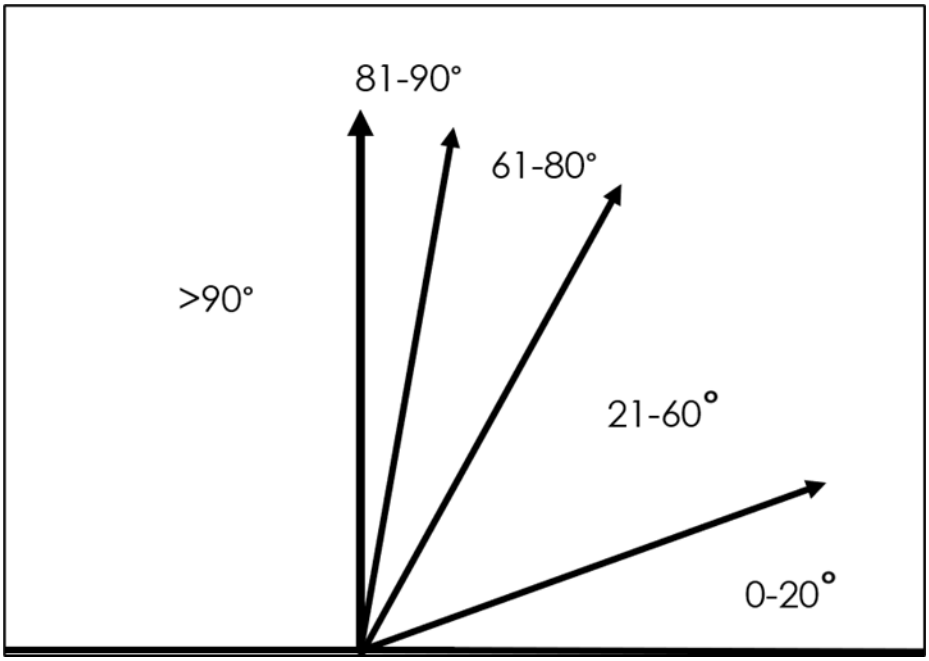


Figure citation: Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (Triturus cristatus). Herpetological Journal 10(4), 143-155.

31. **What is the slope in degrees of the active shoreline as defined in Q30 above?** This question is only applicable and activated if the AA outlets to a river, stream, ditch, or lake (Q24). The percent slope is the change elevation (vertical rise) divided by the horizontal

distance from the top to the bottom of the slope (horizontal run) multiplied by 100. Both the rise and the run must be in the same units (typically feet). The slope can be measured in the field with a clinometer or visually estimated using the visual guide in Figure 20. See example in Figure 18. Choose the percent slope range from the drop-down menu.

***Figure 20**. Visual guide for estimating percent slope.*



32. ***What is the approximate size in acres of the lake or wetland that has a surface water connection to the AA?*** This question is only applicable and activated if the AA outlets to a lake or wetland (Q24). The size of the connected lake or wetland can be determined in EnviroAtlas by drawing a polygon around the boundaries using the *Draw and Measure* mapping tool and selecting *acres* for the area units (Figure 5 and Appendix B).

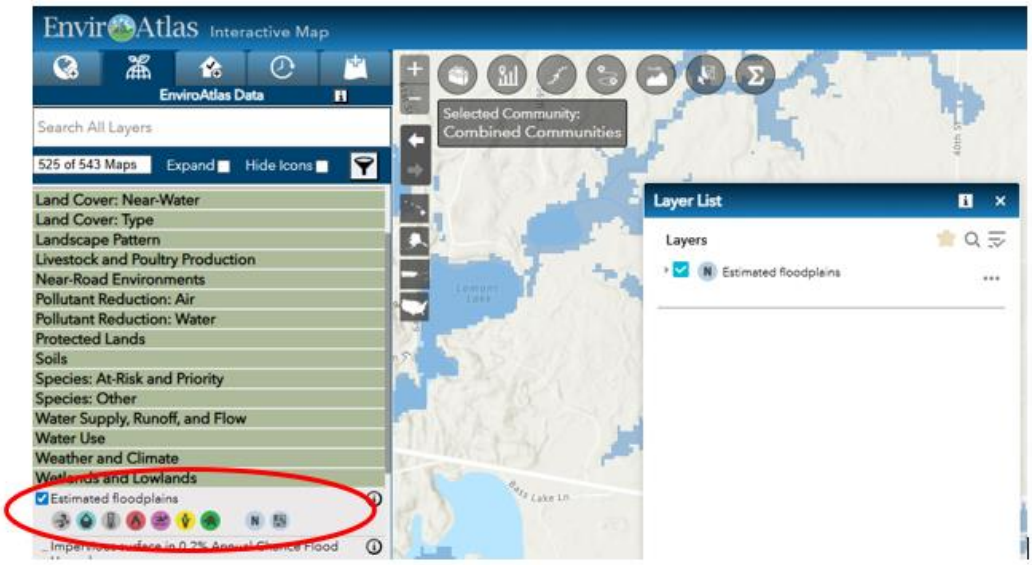
33. **What is the ratio of AA area to the wetland or lake area with a surface water connection?** This question is only applicable and activated if the AA outlets to a lake or

wetland (Q24). Auto-calculated from answers to Q32 and Q12, no input required.

34. **Which best describes the overall composition and structure of floodplain vegetation in the AA?** This question is only applicable and activated if the AA is a Riverine HGM class (Q14). Based on field observations and aerial imagery, determine the dominant life form of the plants that constitute the uppermost layer of vegetation and have an areal coverage of at least 30%. Answer this question as it relates to the AA's ability to intercept high water flows. The greater the number of woody species, the greater the ability of the AA to slow high water flows. Choose from the following drop-down menu options.
    - **Emergent** – dominated by rooted, herbaceous plants that emerge from the surface of the water or soil. Choose emergent If the AA is predominantly open water or dominated by submergent plants.
    - **Tall shrub** – dominated by woody plants less than 20 feet tall.
    - **Spaced trees, open understory, large woody debris** – dominated by woody plants at least 20 feet tall with large woody debris present and with an open understory relatively devoid of shrubs.
    - **Mature trees, shrub understory, large woody debris** – dominated by woody plants at least 20 feet tall with large woody debris present and with an understory of shrubs.

35. **Is any portion of the AA located in a mapped floodplain?** This question is only applicable and activated if the AA is a Riverine HGM class (Q14). In EnviroAtlas activate the *Estimated floodplains* map layer under the *Wetlands and Lowlands* menu (Figure 21) to determine if the AA is in a floodplain.

***Figure 21**. Screenshot of EnviroAtlas showing how to activate Estimated floodplains map layer.*



36. **Use the NRCS Web Soil Survey to determine the average organic matter (OM) content of the upper soils surface within the AA. Do not enter any mapped soil units less than 1% of the AOI.**

    In the Web Soil Survey define the AA using the *Area of Interest* polygon tool (Figure 22) and then access the *Organic Matter* rating in the *Soil Data Explorer* within *Soil Properties and Qualities/Soil Physical Properties* (Figure 23). See Appendix G for illustrations and detailed instructions. Screenshots required.

***Figure 22**. Screenshot of Web Soil Survey location of Area of Interest (AOI) tools for defining the AA to access soils information.*

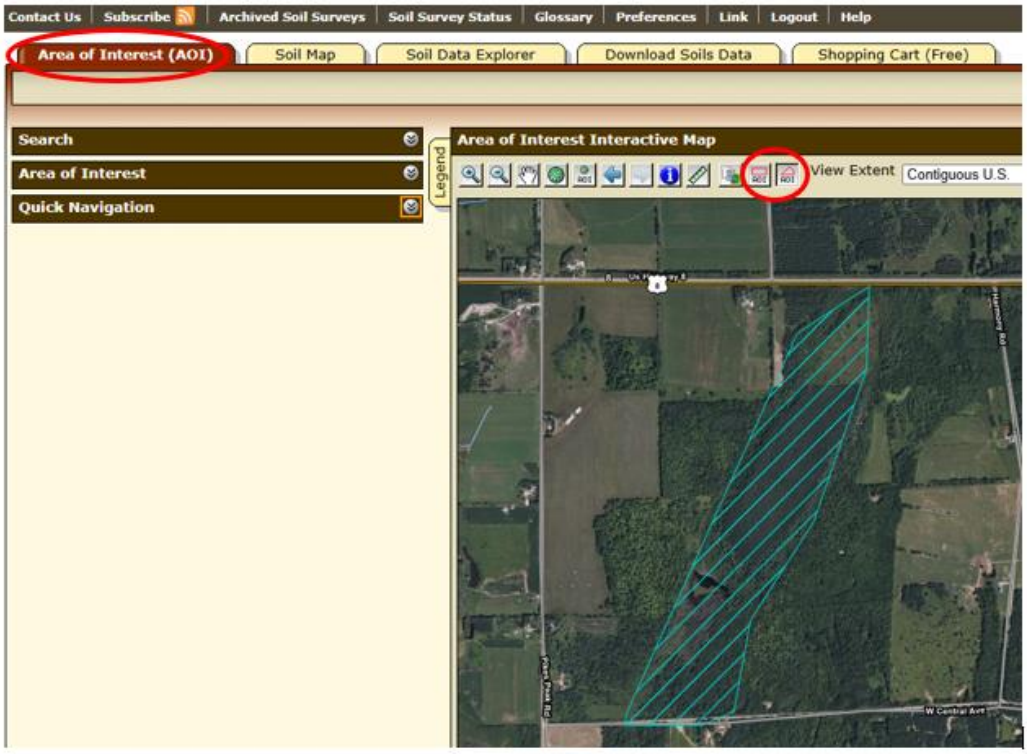
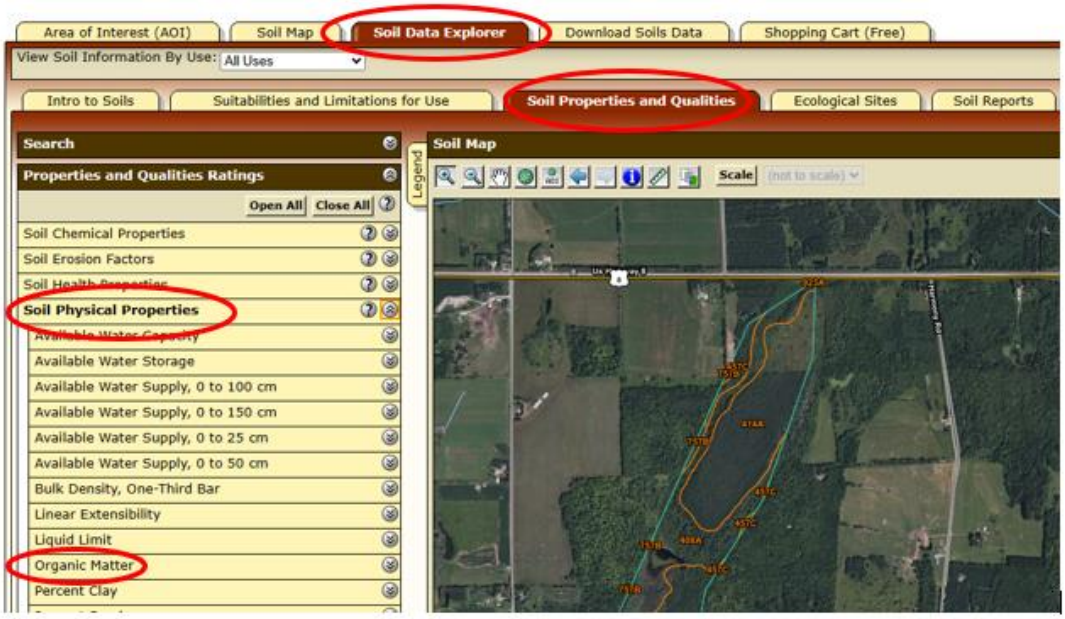


***Figure 23**. Screenshot of Web Soil Survey showing location of Soil Data Explorer, Soil Properties and Qualities, Soil Physical Properties, and Organic Matter tabs.*

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi



For AAs that lack complete organic matter soil information in the Web Soil Survey or where the soil survey is outdated or otherwise inaccurate, estimate the organic matter content based on representative soil test holes as follows:

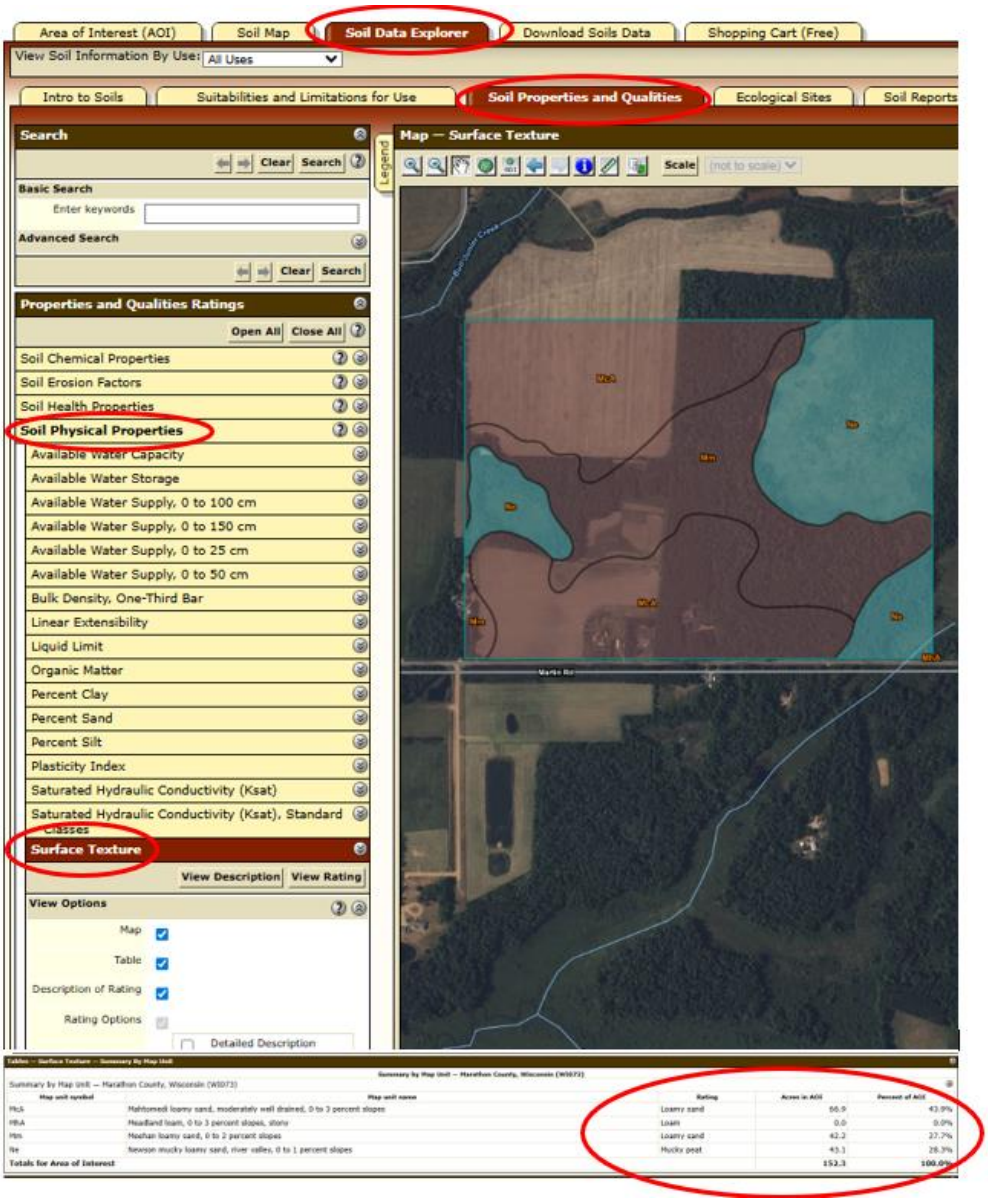
- List each water regime in the AA as a map unit in the spreadsheet table for the question.
- Excavate/auger a test hole 18 inches deep in a representative area of each identified water regime in the AA.
- Determine the cumulative thickness in inches of any organic (i.e., Peat, Mucky Peat, Muck) or mucky modified (Mucky-Loamy, Mucky-Sandy) soil layers within the top 18" of soil for each unit.
- Enter one of the following Organic Matter Ratings into the tool for each map unit (along with the associated *Percent AOI*) based on the following cumulative organic/mucky modified thickness:
    - Rating = 5 if cumulative thickness of organic and mucky modified layers in the upper 18 inches is < 6 inches.
    - Rating = 20 if cumulative thickness of organic and mucky modified layers in the upper 18 inches is 6 – 12 inches.
    - Rating = 50 if cumulative thickness of organic and mucky modified layers in the upper 18 inches is >12 inches.

37. **Use the NRCS Web Soil Survey to determine the predominate surface soil texture (0-18 inches) within the AA. Select the general texture class corresponding to the Web Soil Survey texture class per the crosswalk in the User Notes to the right. Enter the corresponding percent of AOI for each Map Unit.**

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

In the Web Soil Survey define the AA using the *Area of Interest* polygon tool (Figure 22) and then access the *Surface Texture* rating in the *Soil Data Explorer* within *Soil Properties and Qualities/Soil Physical Properties* (Figure 24). See Appendix H for illustrations and detailed instructions. Select *View Rating* and enter the *Percent AOI* from the rating table and the general texture class for each soil unit. Use the crosswalk provided in the *Information for User* associated with the question in the RAM spreadsheet to place the rating in the soil survey into one of the 6 general texture classes in the drop-down menu. Do not enter any mapped soil units that occupy less than 1% of the AOI. Screenshots required.

***Figure 24**. Screenshot of Web Soil Survey showing location of Soil Data Explorer, Soil Properties and Qualities, Soil Physical Properties, and Surface Texture tabs.*



For AAs that lack complete surface soil texture information in the Web Soil Survey or where the soil survey is outdated or otherwise inaccurate, estimate the determine the dominant surface soil texture based on representative soil test holes as follows:

- List each water regime in the AA as a map unit in the spreadsheet table for the question.
- Excavate/auger a test hole 18 inches deep in a representative area of each identified water regime in the AA.
- Determine the dominant soil texture in the upper 18 inches using standard field texturing methods. cumulative thickness in inches of any organic (i.e., Peat,

Mucky Peat, Muck) or mucky modified (Mucky-Loamy, Mucky-Sandy) soil layers within the top 18" of soil for each unit.

- Select the general texture class for each map unit and the associated *Percent AOI*.

Vegetation

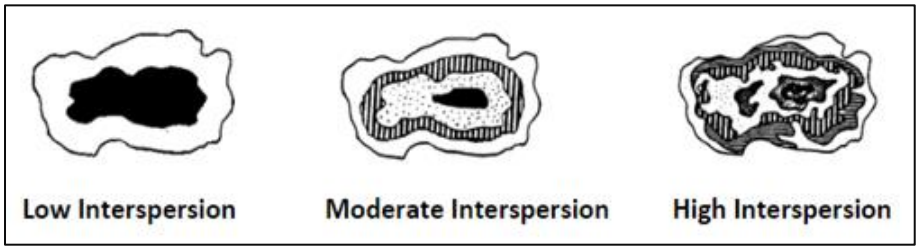
The questions in this section evaluate the quality, distribution, and structure of vegetation in the AA as it relates to various functional metrics.

38. **Use field reconnaissance and aerial imagery to map and estimate the percent of the AA occupied by each vegetation structural type.** Map the areal extent of each vegetation structural type in the AA and estimate the percent of the AA occupied by each type. Refer to Figure 19 as a visual guide for estimating percent cover. Vegetation structural types are defined in the *Information for User* associated with the question in the tool spreadsheet. The sum of percentages for all types must equal 100%.

39. **What is the floristic quality condition category of the AA? Assess the wetland using the Rapid FQA methodology (Minnesota or Wisconsin as applicable).** Assess the wetland using the rapid FQA methodology for Minnesota or Wisconsin (Minnesota Rapid FQA, WI Rapid FQA User Guide, WI Rapid FQA field form) as applicable. Choose the rapid FQA category from the drop-down menu. Category names are from the Minnesota Rapid FQA. Use the crosswalk provided in the *Information for User* associated with the question in the tool spreadsheet to convert Wisconsin Rapid FQA categories to those in the drop-down menu.

40. **What is the average level of interspersion of wetland vegetation structural types in the AA**? Based on the vegetation structural types identified in Q38, estimate the level of interspersion of types within the AA (Figure 25) using a combination of field observations and aerial imagery. Choose the level of interspersion from the drop-down menu.

***Figure 25**. Visual guide for estimating interspersion.*



41. **What is the areal coverage of standing and downed dead trees in the AA?** Estimate the percentage of the AA with standing dead and/or downed trees based on field observations and aerial imagery as applicable. This question is intended to assess the extent of large woody cover that can provide habitat niches. Estimate the physical areal coverage of the standing or downed trees collectively within the AA. Choose the applicable percent range from the drop-down menu.

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

42. **What is the percent cover of sphagnum moss (Sphagnum spp.) in the AA?** Estimate the percent cover within the AA based on field observations. Choose the applicable percent range from the drop-down menu.

Fish Habitat

The questions in this section evaluate important habitat features for fish species. Questions 44–46 are only applicable if the AA has a surface water connection to a lake or stream (Q43).

43. **Does the AA have a permanent, semi-permanent, or seasonal surface water connection to a lake or perennial stream reach?** Use a combination of field observations and aerial imagery to determine if there is a surface water connection.

44. **For all areas of the AA with permanently, semi-permanently, and seasonally-flooded water regimes, what percent of those areas are unvegetated (i.e., open water lacking emergent/submergent vegetation)?** This question is only applicable and activated if Q43 answer is yes. Use field observations and aerial imagery to estimate the percent of these areas that are unvegetated under normal environmental conditions. Choose the appropriate percent range from the drop-down menu.

45. **For all areas of the AA with permanently, semi-permanently, and seasonally-flooded water regimes, what percent of those areas have woody debris?** This question is only applicable and activated if Q43 answer is yes. Use field observations to estimate the percent of these areas that have woody debris. Woody debris is defined as any dead woody plant material including logs, branches, standing dead trees, and root wads. Choose the appropriate percent range from the drop-down menu

46. **Estimate the level of aquatic barriers to fish movement:** Based on field observations, choose the level of aquatic barriers to fish movement in and out of the wetland (Table 5).

Table 5. *Types of aquatic barriers to fish movement (Adapted from The Wildlife Migration Initiative).*

Type of Barrier	Description
Velocity Barriers	Undersized culverts that constrict water flow and create velocities that are too high, making it difficult for fish to move upstream.
Low Flow Barriers	Area where water becomes too shallow and spread out, making passage harmful or impassible to fish.
High Culvert Barriers	Culvert pipes perched above water connection point preventing fish from going upstream.
Exhaustion Barriers	Very long and/or steep culverts that inhibit fish passage due to lack of resting areas

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

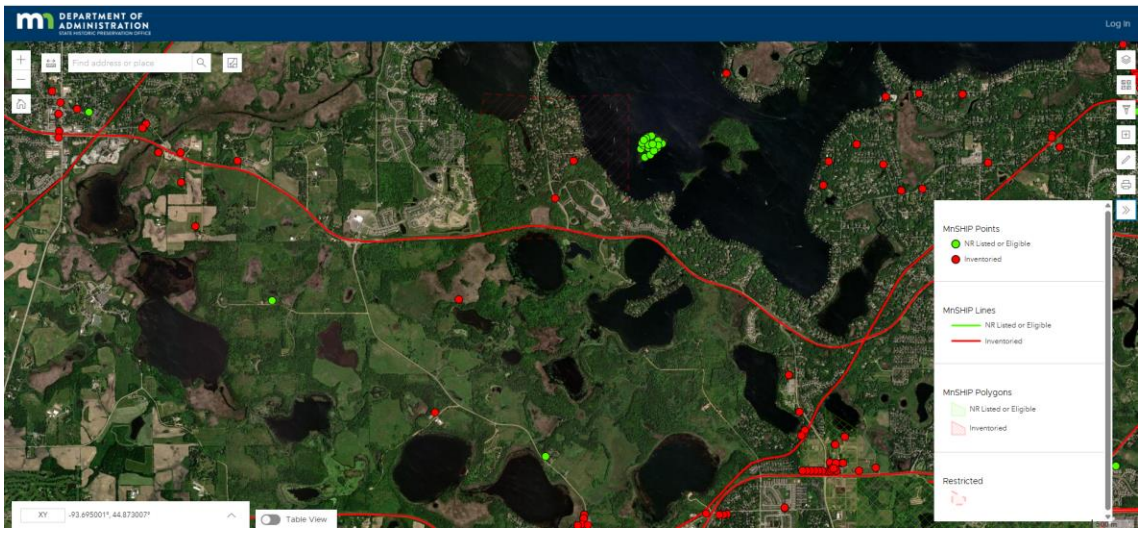
	needed to traverse long distances when traveling upstream.
Dams	Obvious barrier to fish passage.
Vertical Barriers	Waterfalls and other vertical structures that impede upstream fish movement.
Constructed Fish Barriers	Man made fish barriers that prevent the movement of native fishes.

Cultural, Historic, Commercial, Recreational Values

The questions in this section evaluate anthropogenic functions and values. All questions are yes-no answers from drop-down menus.

47. **Is any portion of the AA part of an identified historic, archaeological, or culturally important resource or property?** Use the best available information to answer this question. In Minnesota, go to the Minnesota's Statewide Historic Inventory Portal (MnSHIP) to access information on these resources (Figure 26).

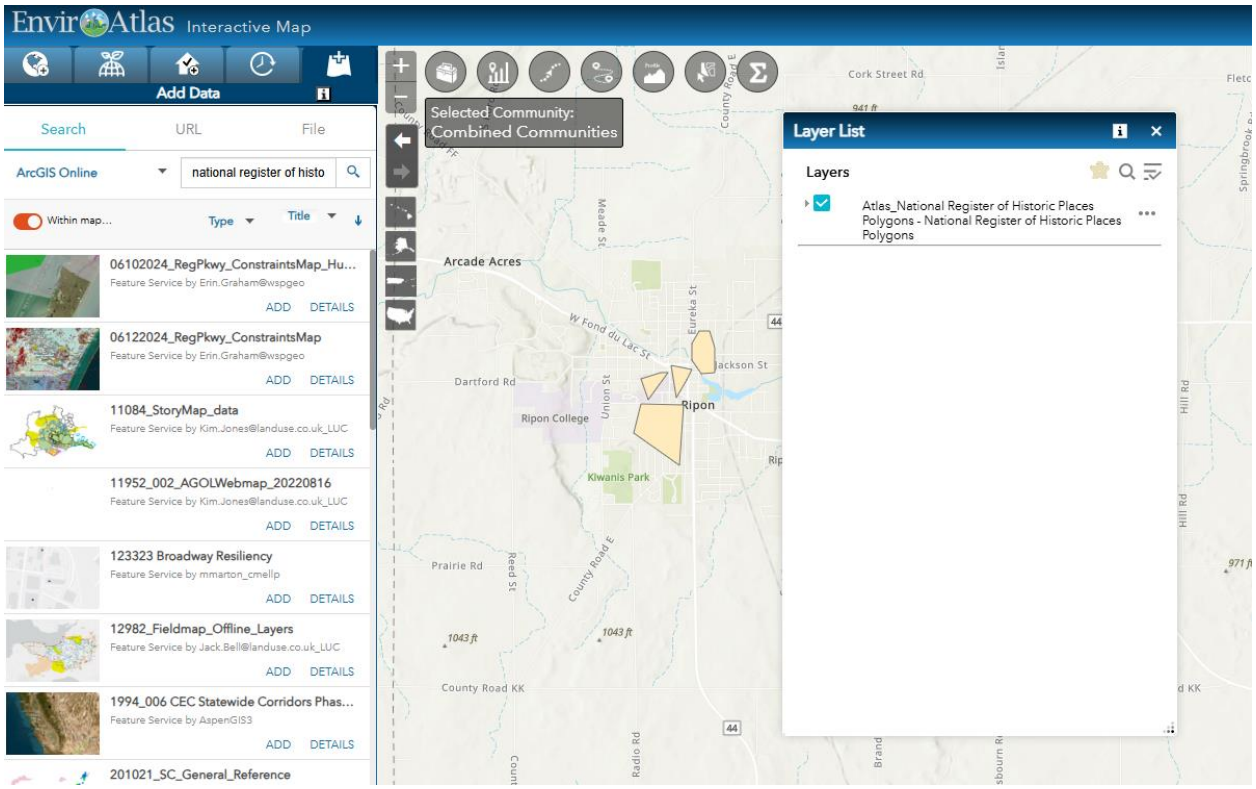
***Figure 26**. Screenshot of Minnesota's Statewide Historic Inventory Portal (MnSHIP).*



In Wisconsin, details on how to access to the Wisconsin Historic Preservation Database (WHPD) can be found here.

Access to various data layers of historic sites can be in EnviroAtlas by searching *ArcGIS Online* using the search term "national register of historic sites" (Figure 27).

***Figure 26**. Screenshot of EnviroAtlas showing search for data layers associated with National Register of Historic Sites.*



48. **Is any portion of the AA part of an identified educational or scientific research property (e.g., school property, college campus, nature center, research station, scientific natural area, etc.)?** Designated for education means that infrastructure is present that allows users reasonable access e.g., safe access points, ADA compatible trails, interpretive signage, etc.) for educational purposes (e.g. outdoor classrooms, nature walks, etc.). Designated for scientific use means that infrastructure is present that indicates the assessment area is currently being used for scientific purposes (e.g., signage, monitoring wells, etc.).

49. **Is any portion of the AA part of an identified public recreational/use area (e.g., park, wildlife management area, public access land, state forest land, etc.)?** Public recreation is where the general public can access and use the wetland for wetland dependent recreation opportunities such as hunting, trapping, fishing, bird watching, boating, or general wildlife/nature viewing without permission of a landowner. Wetlands under private ownership are not considered as accessible for general public recreational uses unless public access has been explicitly provided.

50. **Does any portion of the AA contain or is a part of an area that contains public recreation-oriented infrastructure such as designated parking lot/area, signage (interpretative, trail map, etc.), constructed trails, boardwalks, or other infrastructure that supports and facilitates public recreation use?** Self-explanatory.

Size of the catchment area draining into the AA (in acres): The catchment area is the land area contributing surface water runoff directly to the AA. Topographic data and the Raindrop Tool in EnviroAtlas can be used to define the catchment area and determi

51. **Is a significant portion of the AA viewable by the public from a public road, trail, stream, lake, etc.?** Self-explanatory.

52. **Is the public viewable portion of the AA free of structures, trash, debris, and other materials that detract from the natural character of the wetland?** Select “no” from the drop-down menu if the answer to Q51 is “no”.

53. **Are there viewing platforms, benches, and/or other infrastructure accessible to the public that promotes viewing some or all of the AA?** Self-explanatory.

54. **Is any portion of the AA used for a wetland-dependent commercial activity?** A wetland-dependent commercial activity is one that is almost exclusively conducted within wetlands (e.g. peat mining, cranberry production, sod farming). Wetland dependent commercial uses do not include uses that require the conversion of wetlands to non-wetland or uses that can and are preferably conducted in non-wetlands (e.g., row crop corn and soybean production).

55. **Is the AA within two miles of a wetland-dependent commercial activity?** Self-explanatory.

56. **Is any portion of the AA owned by an entity that operates a wetland-dependent commercial activity in the area?** Self-explanatory.

57. **Does the AA have similar characteristics (landscape setting, hydrology, vegetative structure, soils, etc.) as other wetlands being used for wetland-dependent commercial activities in the immediate area?** Self-explanatory.

Appendix A

Wetland Hydrogeomorphic (HGM) Classes and Key

Wetland hydrogeomorphic (HGM) classification incorporates geomorphic setting, predominant water source, and hydrodynamics into a single system to provide a framework to assess wetland functions.

The following dichotomous key can be used to determine the appropriate HGM class for an AA. The key was adapted from the original HGM class definitions (Smith et al. 1995) and the US EPA NWCA key (2021) with refinements from MN wetland hydrology classes (Novitzki 1998). It incorporates the following wetland features that were not specifically addressed in previous keys:

- Floating mat wetlands
- Wetlands within depressional basins where vertical peat accumulation is a predominant process (i.e., Organic Soil Flat)
- Topographically flat wetlands where groundwater is the predominant source (i.e., Slope – Groundwater)
- Topographically sloped wetlands where surface water is the predominant source (i.e., Slope – Surface Water)
- Saturated soil wetland that is contiguous with streams or lakes that are not floating and are largely above bi-directional flow influence from the stream or lake (i.e., flat or slope)

The HGM classes (all capitals) and sub-classes recognized here are as follows:

- RIVERINE – Upper Perennial
- RIVERINE – Lower Perennial
- LACUSTRINE FRINGE
- DEPRESSIONAL
- DEPRESSIONAL – Floodplain
- ORGANIC SOIL FLAT
- MINERAL SOIL FLAT
- SLOPE – Groundwater
- SLOPE – Surface Water

Key to the Hydrogeomorphic (HGM) Classes *(water regimes defined below)*

1. Wetland is associated with a perennially flowing stream, floodplain, OR fringing a lake or reservoir. **2**

    2. Wetland is associated with a perennially flowing stream or floodplain..... **3**

        3. Stream is designated 1st or 2nd order in the National Hydrography Dataset (NHD).. **4**

            4. Regular overbank flooding occurs (e.g., there is an apparent change in water regime or vegetation close to the channel compared to broader contiguous wetland).....**RIVERINE – Upper Perennial**

            4. Regular overbank flooding typically *does not* occur (e.g., no apparent change in water regime or vegetation in broader contiguous wetland). **7**

        3. Stream is designated 3rd order or higher in NHD and regular overbank flooding occurs. **5**

            5. Wetland lacks a closed topographic contour to retain water following overbank flooding conditions (i.e., the wetland is the floodplain) ..... **RIVERINE – Lower Perennial**

            5. Wetland has a closed topographic contour such that floodwater is retained relative to the adjacent floodplain wetland following overbank flooding conditions (i.e., a depression within a broader floodplain) ..**DEPRESSIONAL – Floodplain**

    2. Wetland is fringing a lake or reservoir (e.g., named lake in Public Water Inventory, has Limnetic NWI subsystem polygons in the continuous basin) **..... 6**

        6. Lake water elevation maintains wetland hydrology – surface water flows bi-directionally between the wetland and lake (wetlands with A, C, or F water regimes[1]) AND/OR the wetland consists of a floating mat (with a C or D water regime). ..... **LACUSTRINE FRINGE**

        6. Wetland elevation above typical high water lake elevation and not consisting of a floating mat (typically wetlands with a D water regime that are not floating) **..... 7**

1. Wetland is not associated with a perennially flowing stream channel, floodplain, or fringing a designated lake. **7**

    7. Wetland is within a closed elevation contour that allows for water accumulation (i.e., a depressional basin, includes beaver and manmade impoundments and excavations) **. 8**

        8. Wetland has a predominantly D water regime, is not floating, AND vertical accretion of peat has produced a flat surface. .....**ORGANIC SOIL FLAT**

        8. Wetland has any other predominant water regime or has a D water regime, consists of a floating mat, and does not have significant vertical accretion of peat. ..... **DEPRESSIONAL**

    7. Wetland is not within a closed elevation contour. **9**

        9. Wetland is on a topographic slope (e.g., > 1% percent slope)..... **10**

            10. Groundwater is the primary water source (e.g., histic epipedon/histosol, groundwater indicator species). ..... **SLOPE – Groundwater**

10. Precipitation is the primary water source (e.g., groundwater indicator species not prevalent)..... **SLOPE – Surface Water**

9. Wetland is topographically flat (e.g., < 1% slope).....**11**

11. Wetland has predominantly mineral soil (if organic surface layer present, < 20 cm in depth)..... **MINERAL SOIL FLAT**

11. Wetland has predominantly organic soil (an organic surface layer ≥ 20 cm present[2]). **12**

12. Precipitation is the primary water source. .....**ORGANIC SOIL FLAT**

12. Groundwater is the primary water source (e.g., groundwater indicator spp. present)..... **SLOPE – Groundwater**

Water Regime Types:

- Temporarily flooded – Inundated for brief periods, water table typically well below surface.
- Seasonally saturated - Saturated to the surface for much of growing season but unsaturated by the end.
- Seasonally flooded - Inundated for extended periods, absent by end of season with variable saturation depth.
- Continuously saturated - Substrate saturated throughout most of the year with rare inundation.
- Seasonally saturated - flooded - Inundated for extended periods, absent by end of season with near surface saturation.
- Semi-permanently flooded – Inundated throughout the growing season, high water table when inundation absent.
- Intermittently exposed - Inundation throughout the year excluding extreme drought.
- Permanently flooded - Inundation throughout the year in all years.

HGM type examples:

The following are examples of how to interpret wetland mapping, vegetation, and water regimes to determine wetland HGM types and how it is applied to establish an Assessment Area (AA) based on an Area of Interest (AOI). The figures illustrate simplified NWI mapping of larger HGM type units often from multiple NWI polygons. Figure captions describe important considerations for how an HGM type for given wetland area can be interpreted using the key.

FIGURE A-1. Example of Riverine-Upper Perennial with adjacent Organic Soil Flat.

The wetland immediately adjacent to the 2nd order stream consists of scrub-shrub, emergent, and forested vegetation structural classes with a continuously saturated water regime. The scrub-shrub and emergent classes immediately adjacent to the stream are dominated by a mix of willows, alder, sedges, and Canada bluejoint grass while the forested class is a mix of black ash and black spruce farther out from the stream channel. Both areas have deep organic soils. The difference in vegetation indicates occasional overbank flooding in the scrub-shrub and emergent areas, whereas the forested area is likely outside the zone of regular overbank flooding from the stream and more precipitation-driven. Given the change in water source the scrub-shrub and emergent areas would be Riverine-Upper Perennial HGM class whereas the forested area would be Organic Soil Flat HGM class. In this example, if an Area of Interest (AOI) occurs in only one of these two HGM types then the AA should be limited to that HGM polygon. If an AOI occurs across the two HGM types then two separate AA's should be established according to the HGM boundary.

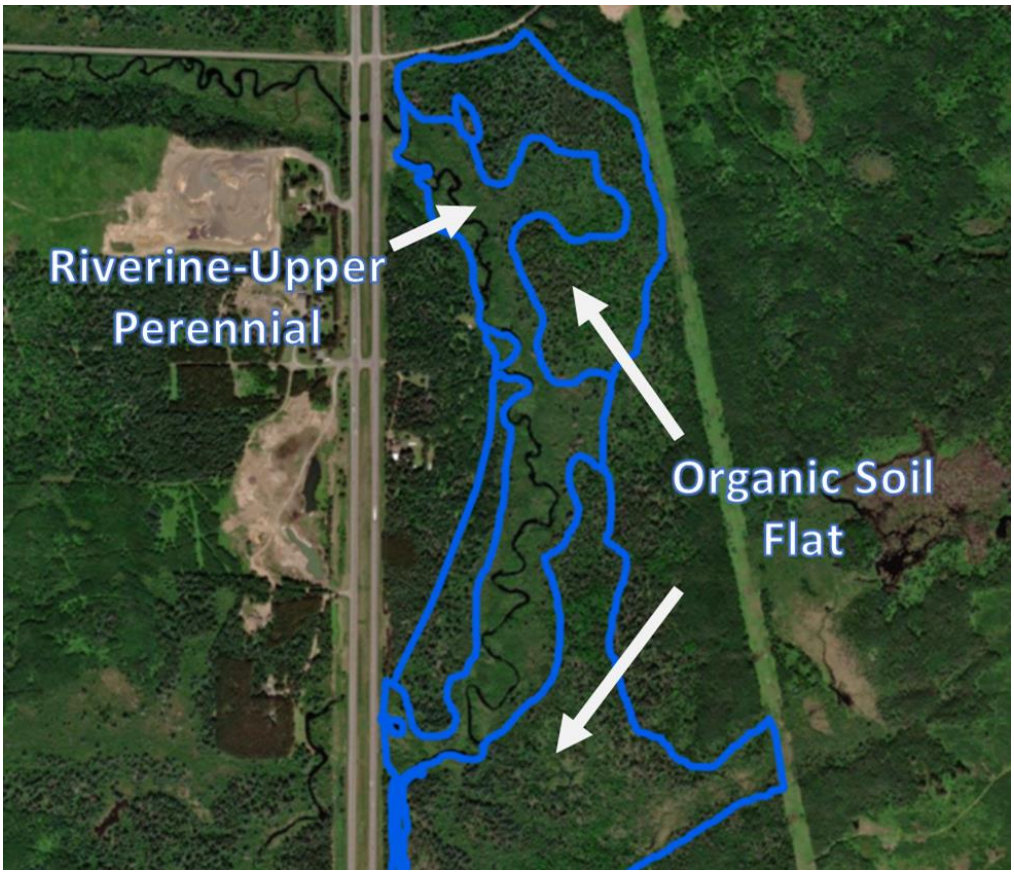


Figure A-2. Example of Riverine-Lower Perennial.

The wetland adjacent to this 4th order stream is a forested vegetation structural class dominated by silver maple and elm with a temporarily flooded water regime and mineral soils. The primary water source for the wetland is overbank flooding from the stream/river. The wetland would is a Riverine-Lower Perennial HGM class. The wetland stretches many miles up and downstream from the image. If an Area of Interest (AOI) were located at this location, AA boundaries should be established such that the AA does not exceed the 250-acre maximum size.

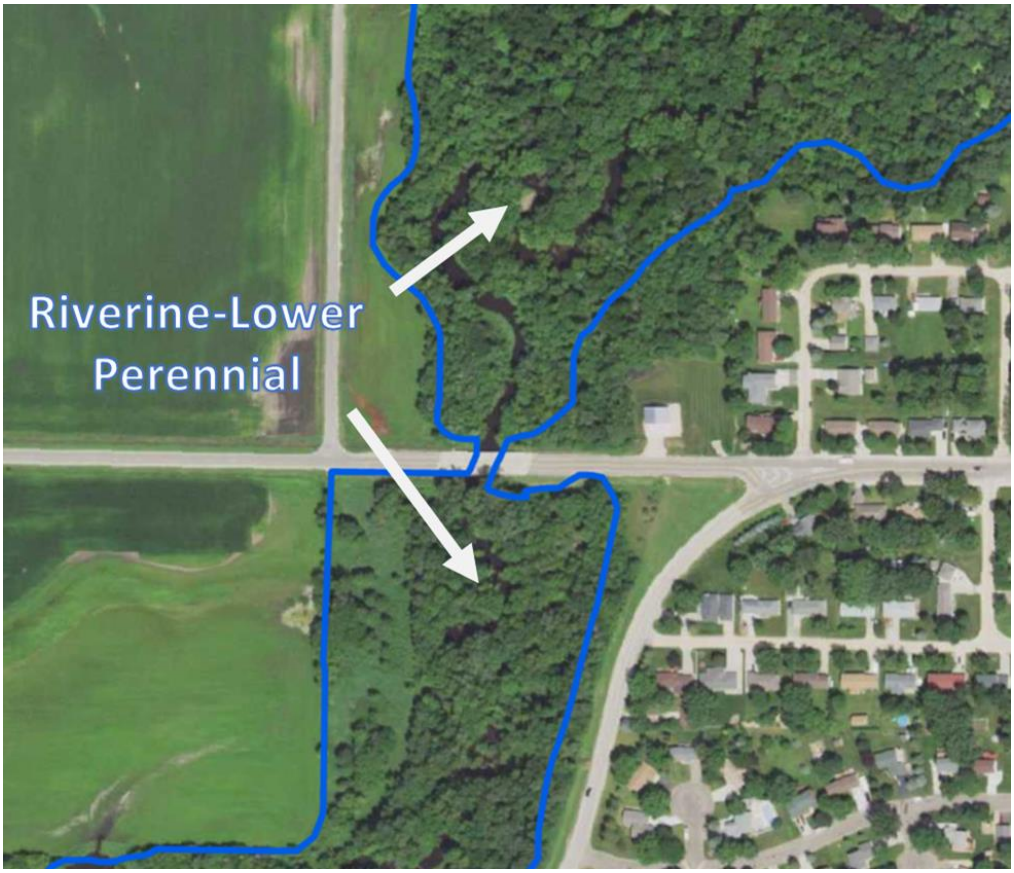


FIGURE A-3. Example of Riverine-Lower Perennial with a Depressional-Floodplain basin.

The wetland occurs on a large river floodplain as a mix of forested and emergent vegetation structural classes dominated by silver maple and reed canary grass. The water regime is temporarily flooded except for a semi-permanently flooded 23-acre depression of cattails. The depression receives overbank flooding but also holds surface water much longer than the surrounding forested and emergent areas. The 23-acre basin is Depressional-Floodplain HGM class as opposed to the surrounding Riverine-Lower Perennial HGM class. In this example, if an Area of Interest (AOI) is only within the Riverine-Lower Perennial HGM class area, the AA should exclude the Depressional-Floodplain HGM class portion. Conversely, if an AOI is only within the Depressional-Floodplain basin, the AA would exclude the Depressional-Floodplain HGM class area. If an AOI included both HGM types, two separate AA's should be established.

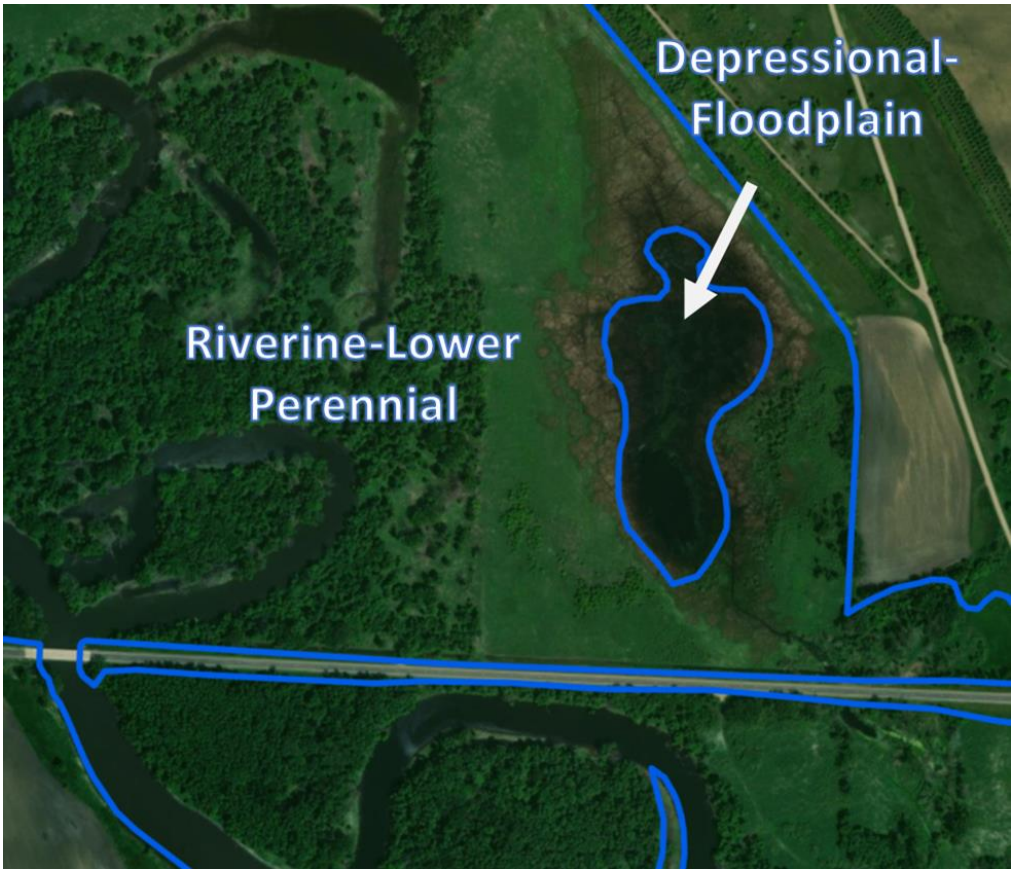


FIGURE A-4. Example of Lacustrine Fringe.

A small/shallow lake has four contiguous wetlands of littoral aquatic bed vegetation structural class. The wetlands have a combination of permanently, semipermanently, seasonally, and temporarily flooded water regimes. Surface water flows both to and from the lake to the contiguous wetlands (bi-directional flow). The wetlands are Lacustrine HGM class. In this example, if an Area of Interest (AOI) is located within one of these wetlands, the AA should be limited to the that wetland area and not include the other wetlands represented by the polygons below even though they are connected via the lake. If all wetlands below were connected to each other in a continuous ring around the lake, then the AA should be limited to the maximum 250-acre size limit.

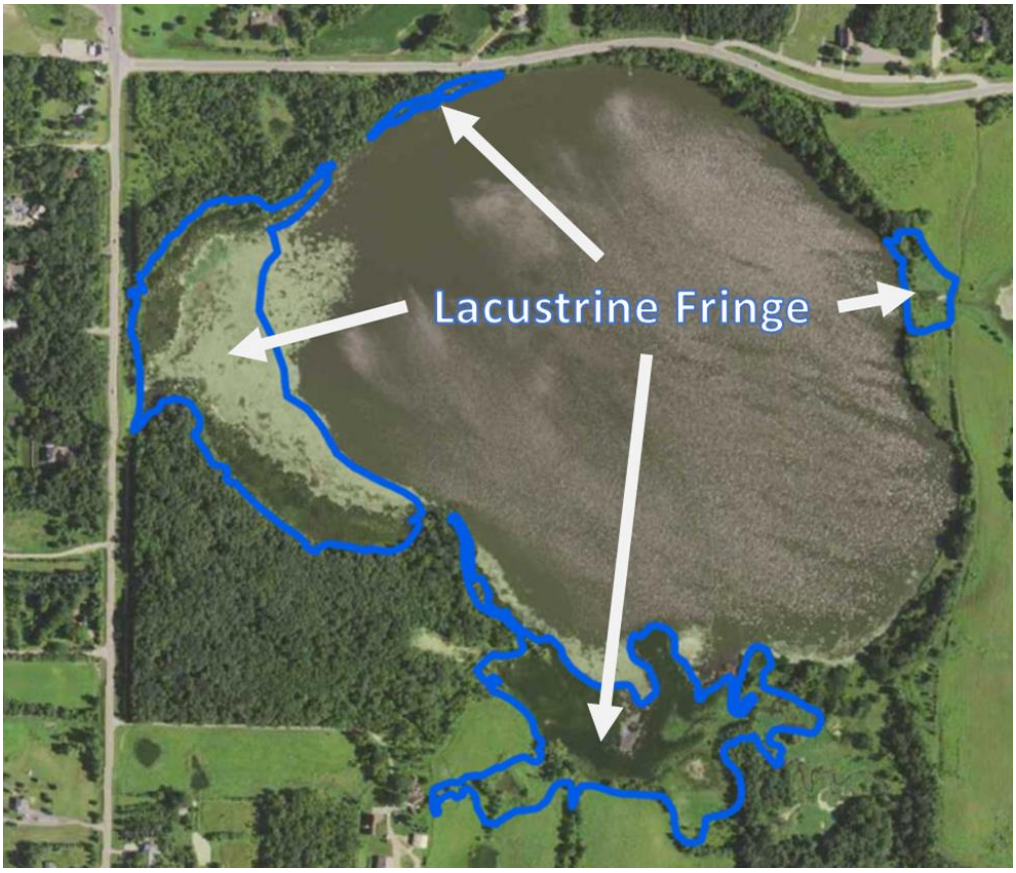
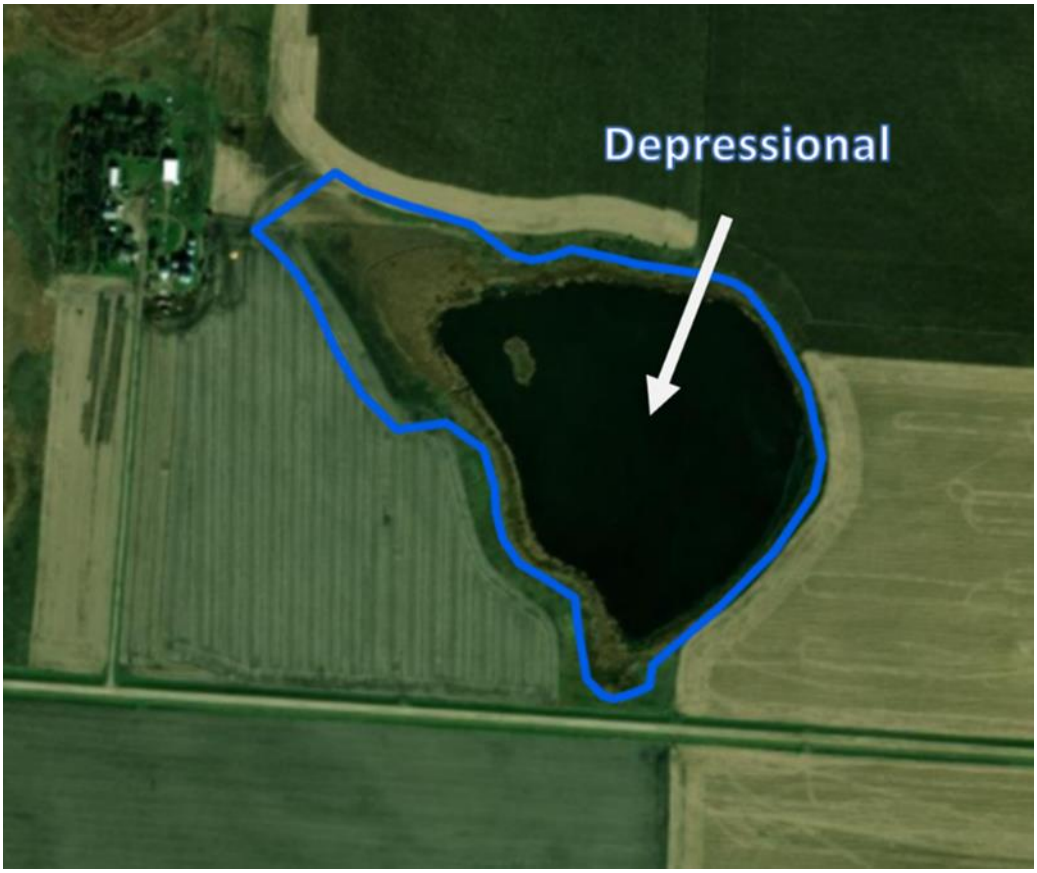
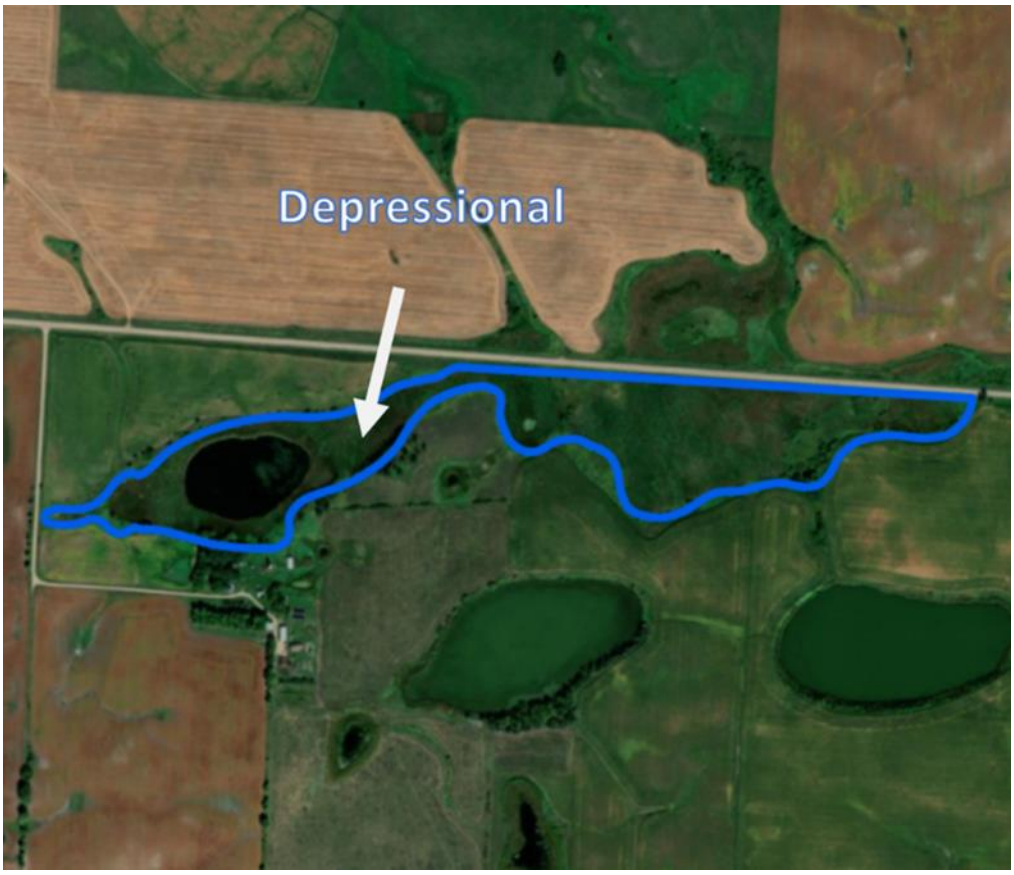


FIGURE A-5. Examples of Depressional.

A) The wetland occurs in a depressional basin and has been restored by construction of a berm with an outlet in the northwest corner where surface water exits intermittently. The wetland has permanently flooded and seasonally flooded water regimes. Even though the wetland continues to the northwest, the constriction created by the berm and outlet is a reasonable break point for defining the AA.



B) The wetland occurs in a depressional basin where a road completes the elevation contour. The emergent wetland dominated by cattail has a seasonally flooded water regime but also includes a small permanently flooded area of unconsolidated bottom. Surface water discharges north via a culvert. As it is surrounded by upland, this entire basin would be the AA.



C) This depressional wetland has been modified by beaver activity. Surface water enters the wetland from from the southeast, and a beaver dam forms the western boundary. The bright green and dark signatures on the image are the open pond areas (i.e., aquatic bed vegetation structural class and permanently flooded water regime). The rest of the wetland has a seasonally flooded water regime with a floating mat of wiregrass sedge. Directly adjacent is an area of mixed emergent and scrub-shrub wetland that is not floating and has a continuously saturated water regime. Given the stark change in vegetation and water regime, this adjacent area should be considered as an Organic Soil Flat HGM class separate from the Depressional HGM class that has been modified by beaver activity.

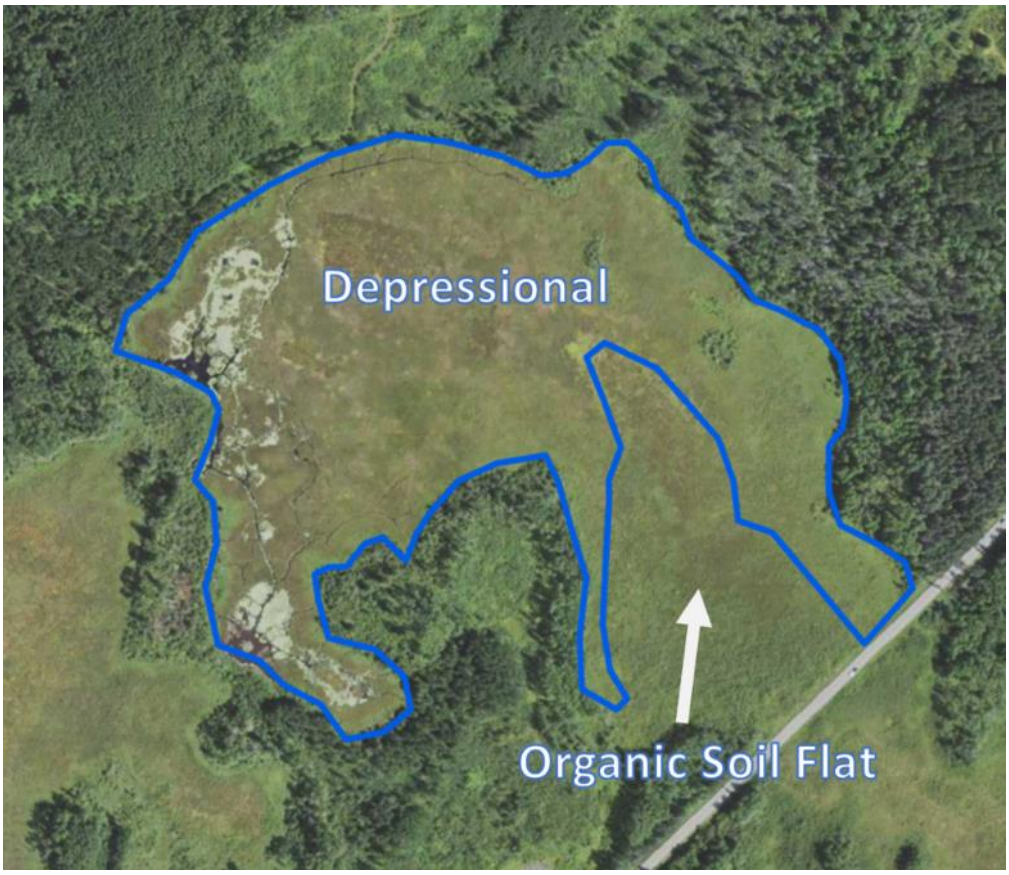
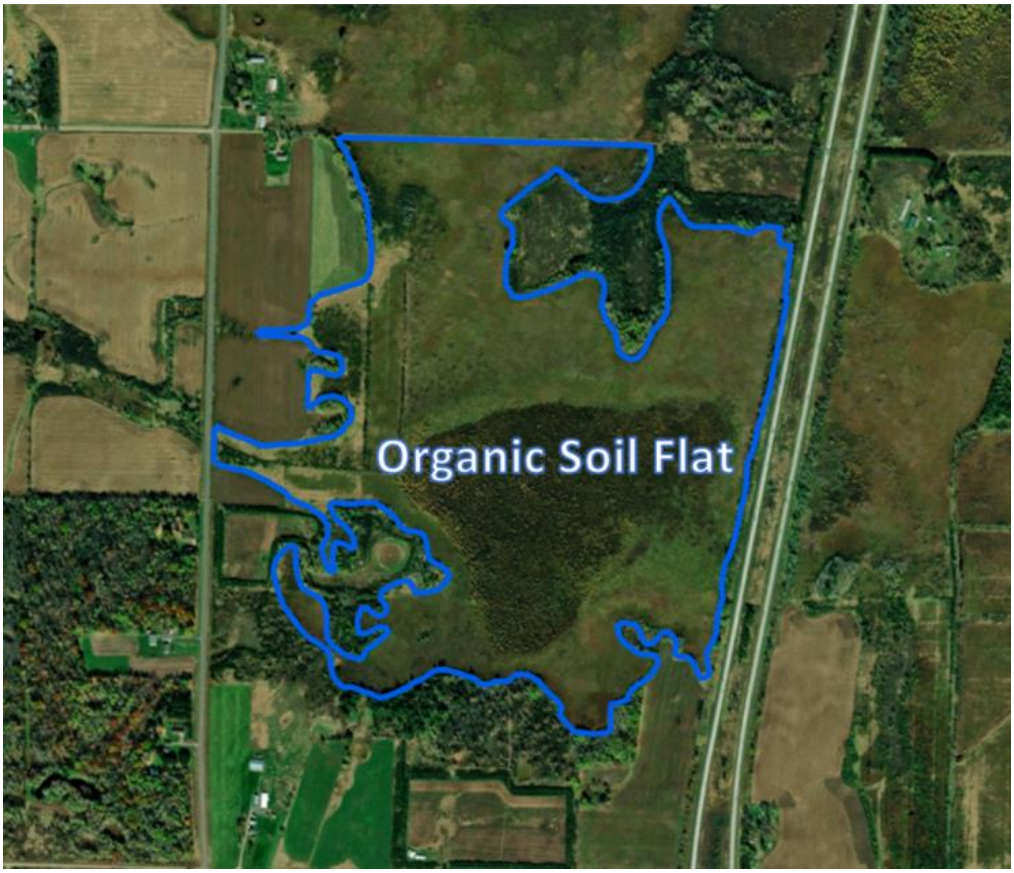


FIGURE A-6. Examples of Organic Soil Flat.

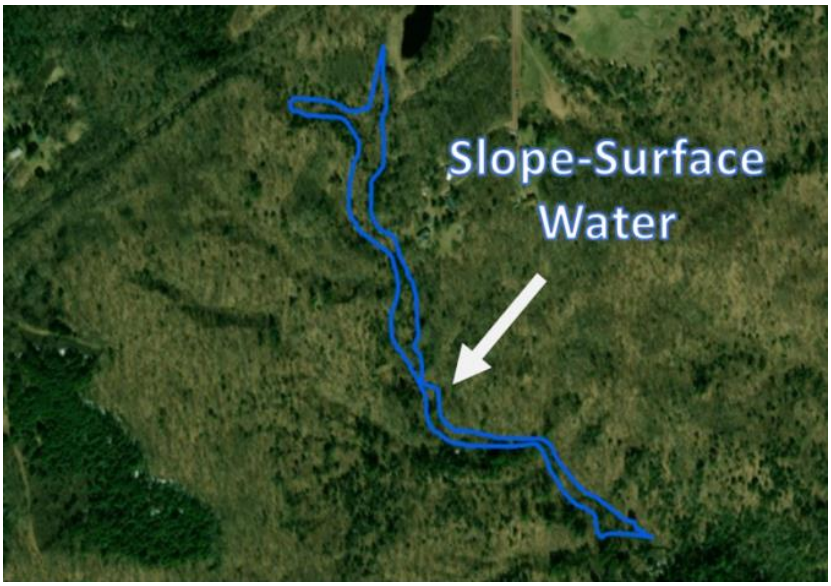
A) The wetland is part of an extensive organic soil flat consisting of forested (tamarack/black spruce), scrub-shrub (leather leaf and willow/alder), emergent (sedges) vegetation structure classes, all of which have a continuously flooded water regime. An abandoned minimum maintenance road bisects the wetland on the north in this image, making it a an appropriate boundary to form the northern boundary of an AA.



B) The wetland is a scrub-shrub vegetative structural class dominated by sphagnum moss and leatherleaf with a continuously saturated water regime and deep organic soils. Although this wetland occurs in an isolated depression, the presence of the peat-forming sphagnum moss and organic soils indicates that peat is accreting consistent with Organic Soil Flat HGM class.

FIGURE A-7. Example of Slope-Surface Water.

The wetland is forested (green and black ash-dominated) with a temporarily flooded water regime. It occurs within a narrow valley forming the headwaters for a 1st order stream. The soil texture is predominately loamy/clayey. The mineral soil, lack of groundwater species, and headwater position indicate the predominate source of wetland hydrology is from precipitation and surface water from the surrounding watershed, as opposed to groundwater discharge or overbank flooding. The wetland also slopes longitudinally, and surface water is not ultimately ponded behind an elevation contour making it a Slope-Surface Water HGM class wetland.



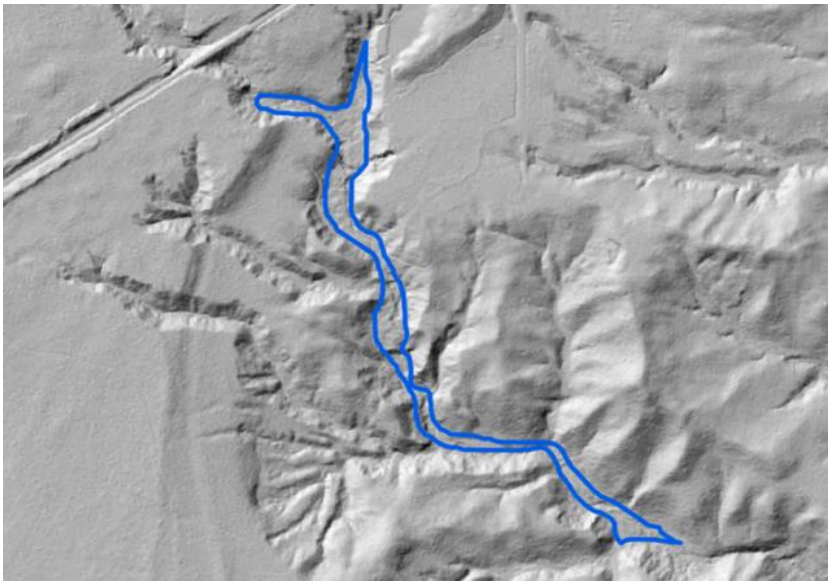
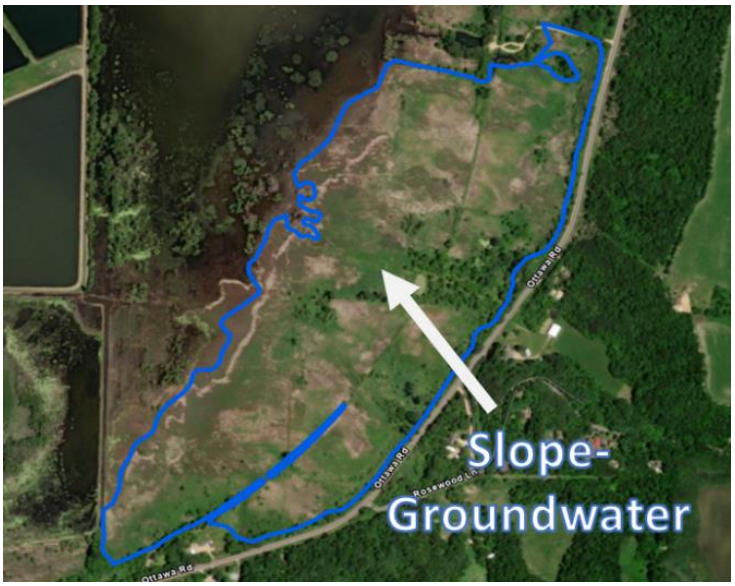


FIGURE A-8. Slope-Groundwater.

The wetland is located at the toe slope of a large river valley and slopes southeast to northwest with a 19-foot elevation drop over 1,000 feet (1.7% slope) before ultimately transitioning into a forested floodplain. The wetland has an emergent vegetative structure class dominated by reed canary grass, sedges and cattails. Surface soils are muck indicating groundwater discharge. The wetland is a Slope-Groundwater HGM class and should be a separate AA from the adjacent forested floodplain.

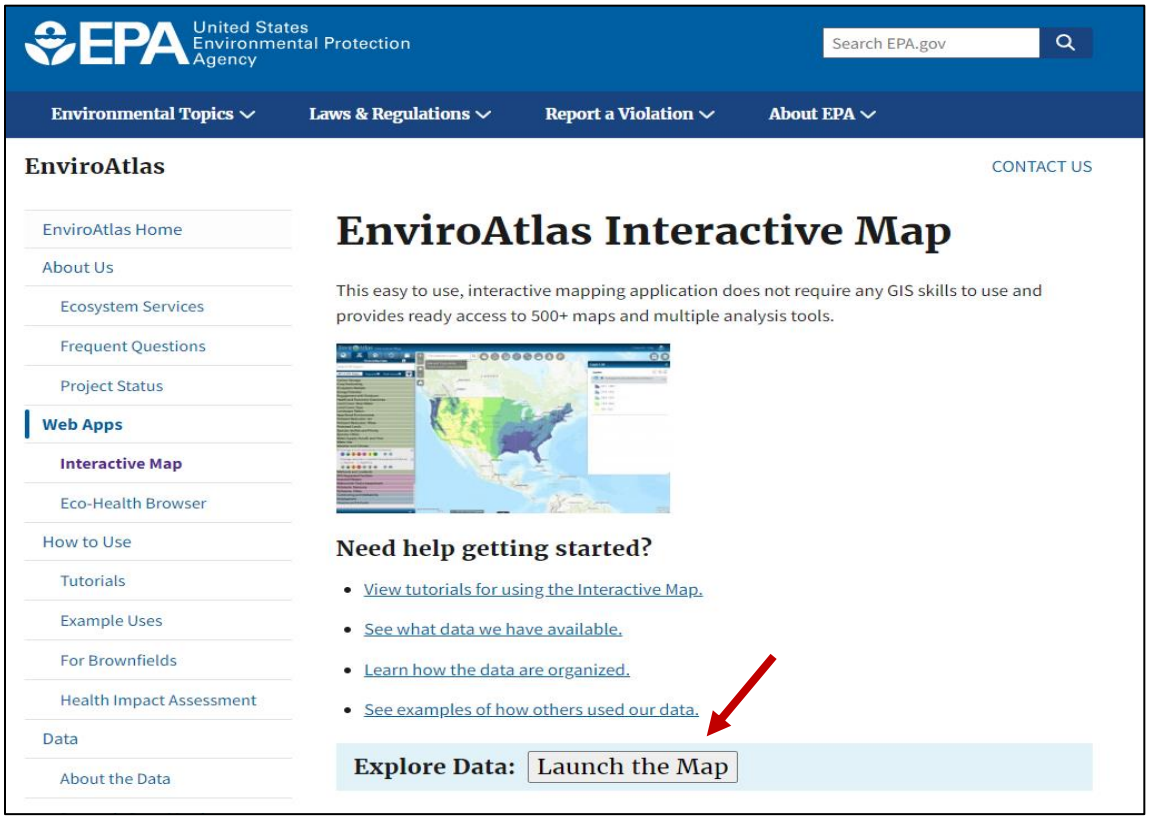


Appendix B

Drawing a polygon and determining the size of an AA in EnviroAtlas

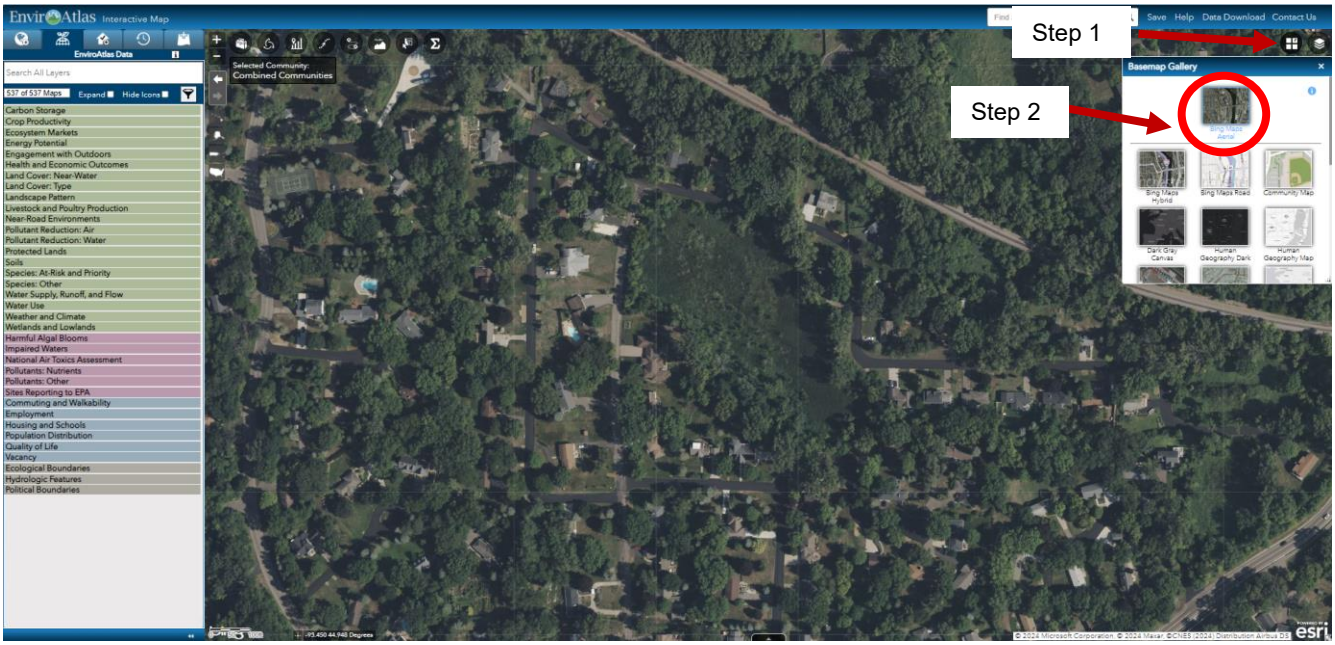
Launch *EnviroAtlas Map*

FIGURE B.1



Zoom to AA, select the *Basemap Gallery* icon (step 1) and then select an appropriate basemap (e.g., aerial imagery).

FIGURE B.2

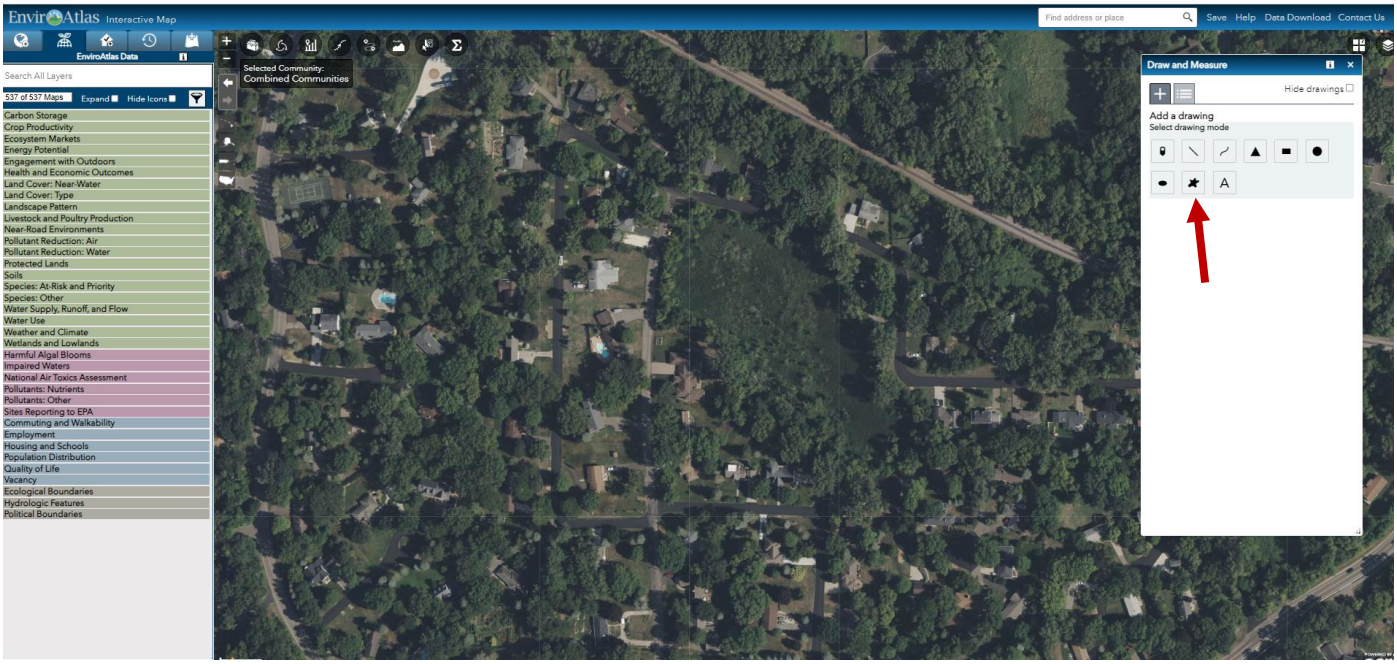


Create polygon around the AA by selecting *Mapping Tools* icon (step 1) and then selecting *Draw and Measure* (step 2).

FIGURE B.3

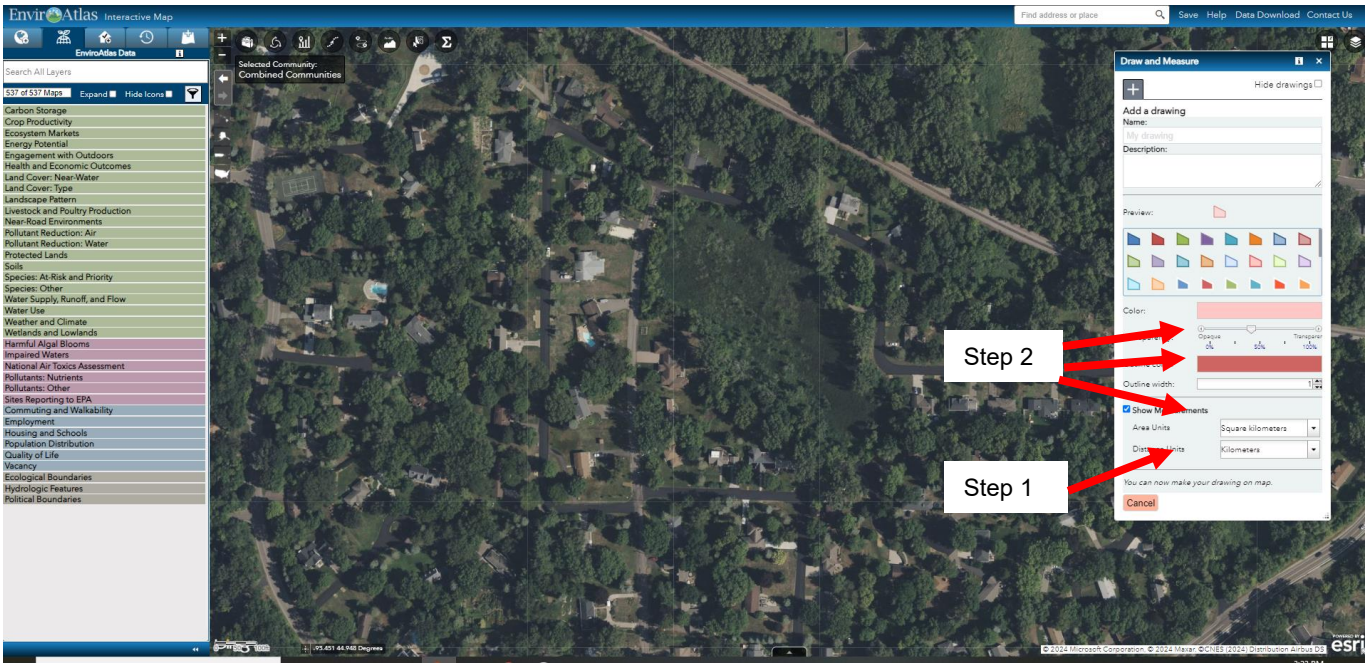
In *Add a drawing* select the *Freehand Polygon* icon.

FIGURE B.4



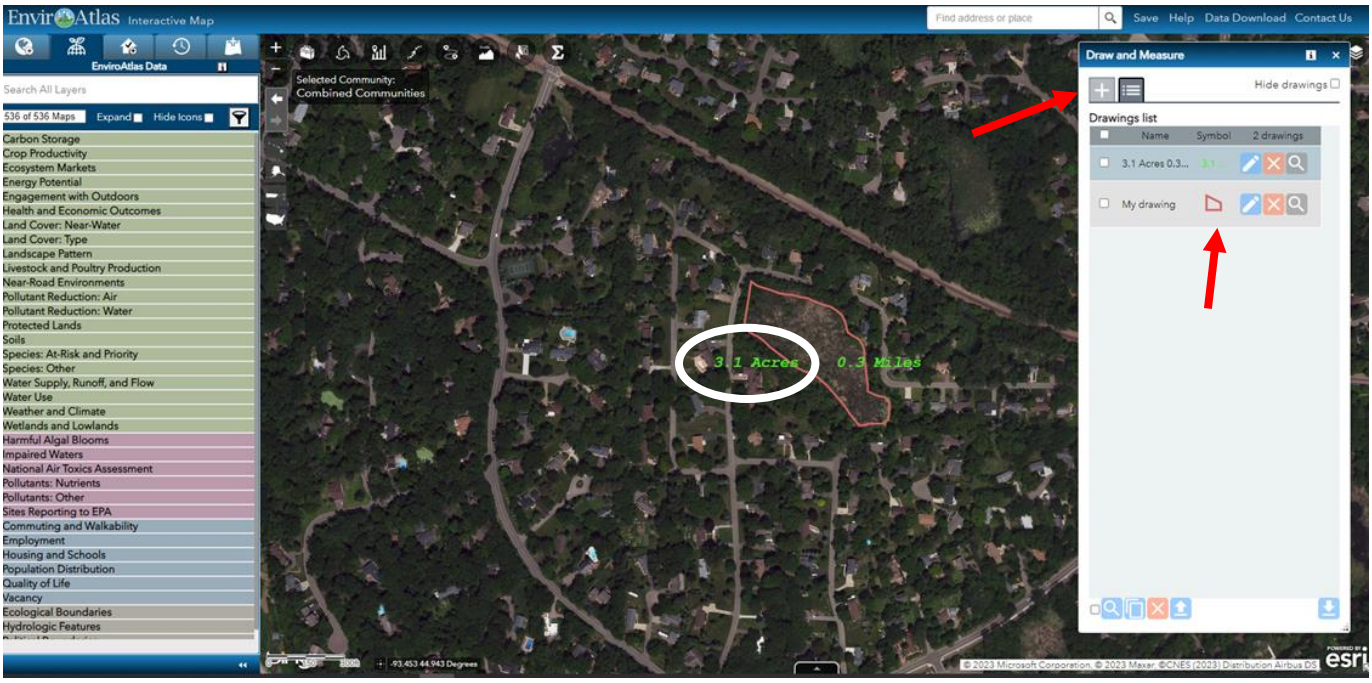
On the popup screen make sure the *Show Measurements* box is checked and select Acres for *Area Units* (step 1). Adjust the *Transparency* bar, *Outline width*, and *Outline color* as necessary (step 2).

FIGURE B.5



Draw the boundary of the AA with your mouse. Note that you may have to make several attempts to get used to using the freeform drawing tool. Simply delete failed attempts by clicking on the X beside the drawing and then clicking the + to start over. Enter the resulting AA acreage in Q12.

FIGURE B.6



Appendix C

Determining catchment of an AA in EnviroAtlas

The scale of the catchment area depends on HGM class and stream order (if associated stream present). For all HGM classes except Riverine (upper and lower perennial) and Depressional-floodplain, the catchment is the drainage area that contributes runoff directly to the AA. Riverine and Depressional-Floodplain HGM wetlands are influenced at larger stream drainage scales and established watersheds are used as a basis for determining the catchment area.

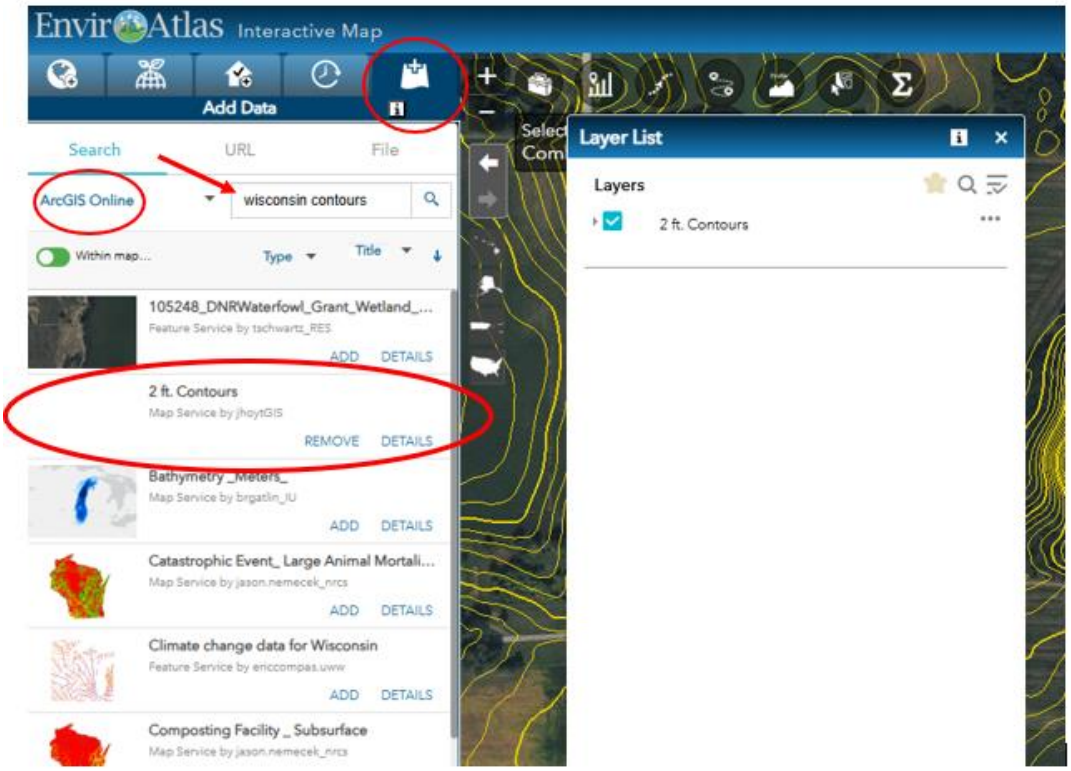
Determining catchment for Depressional, Organic & Mineral Soil Flat, Slope, and Lacustrine Fringe HGM class AAs)

The upper elevation limits of an immediate catchment are the topographic breaks where precipitation can possibly drain towards the AA and the pour points of any upgradient depressional wetlands and lakes. Upgradient depressional wetlands and lakes should be excluded from an immediate catchment. The lower elevation limit of an immediate catchment is the AA boundary.

To delineate an immediate catchment in EnviroAtlas, select an appropriate basemap (e.g., aerial imagery) and zoom to AA.

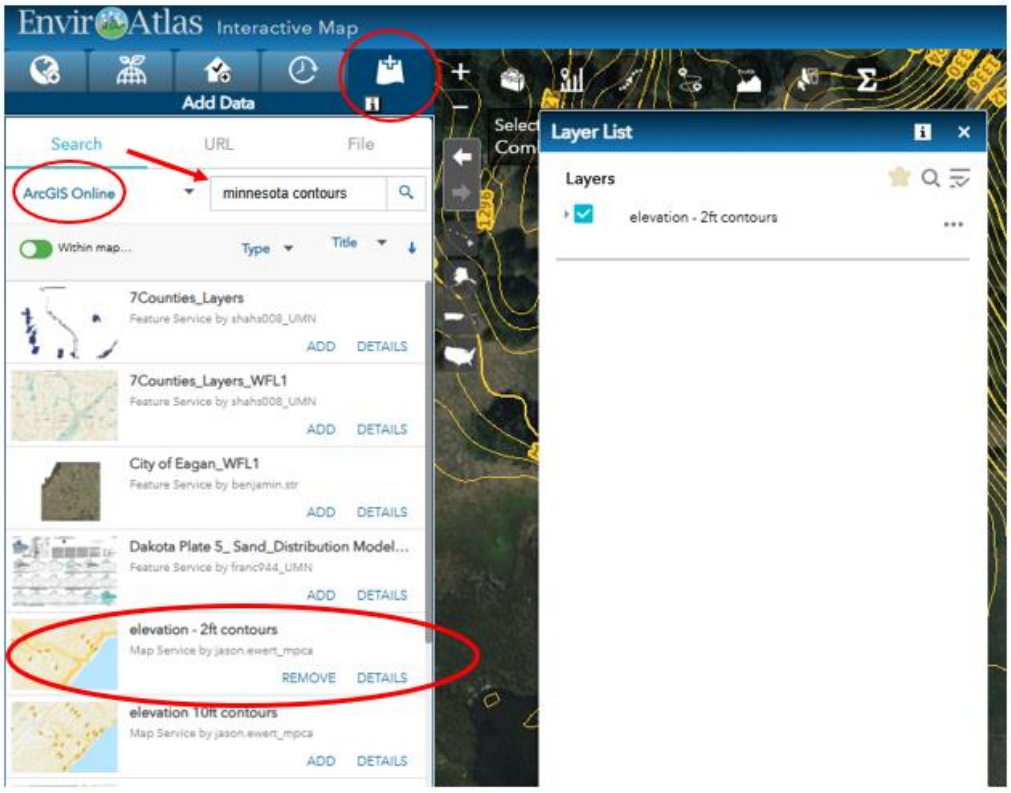
When working in Wisconsin, add a 2-foot contour map to your EnviroAtlas interactive map by selecting *Add Data* and search *ArcGIS Online* using the search term “Wisconsin contours”, and then selecting *Add* for the *2 ft. Contours* layer (Figure C.1).

FIGURE C.1



When working in Minnesota, add a 2-foot contour map to your EnviroAtlas interactive map by selecting *Add Data* and search *ArcGIS Online* using the search term “Minnesota contours”, and then selecting *Add* for the *elevation - 2ft. contours* layer (Figure C.2).

FIGURE C.2

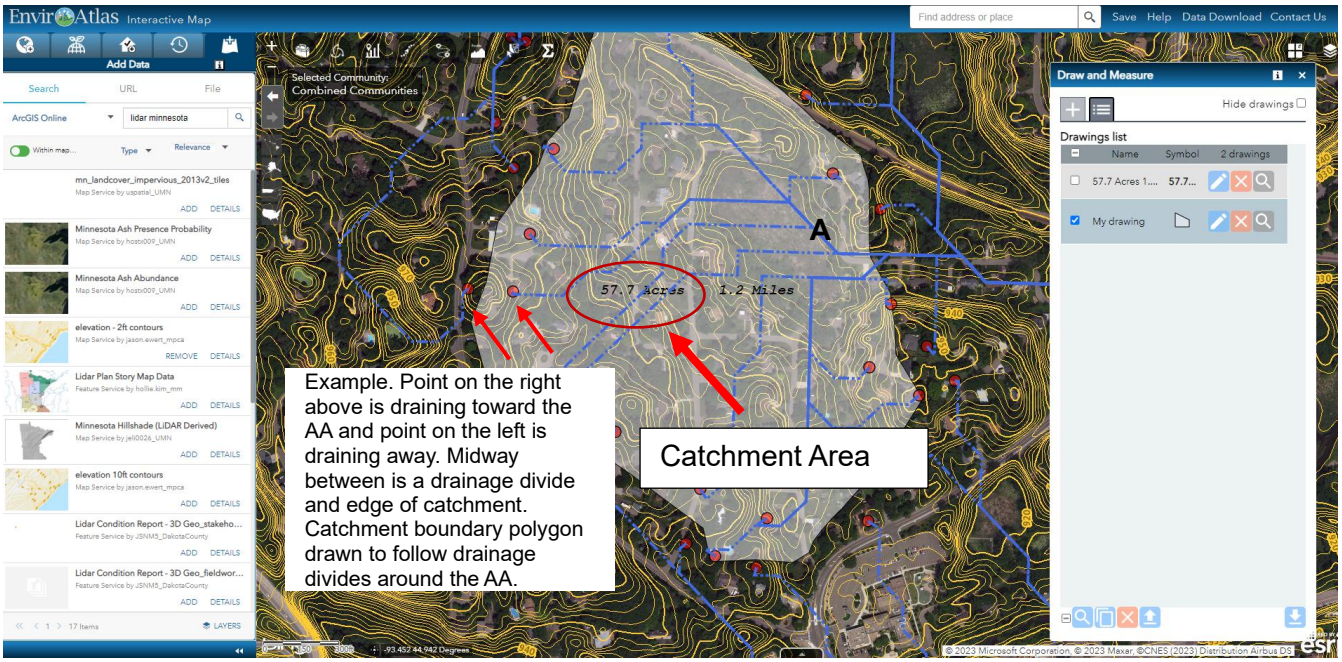


After establishing the basemap with elevation contours select the *Raindrop Tool*. On the pop-up window select *Settings* and increase line thickness to maximum and adjust color for best visibility on basemap. Then select *Activate Tool* (Figure C.3).

FIGURE C.3

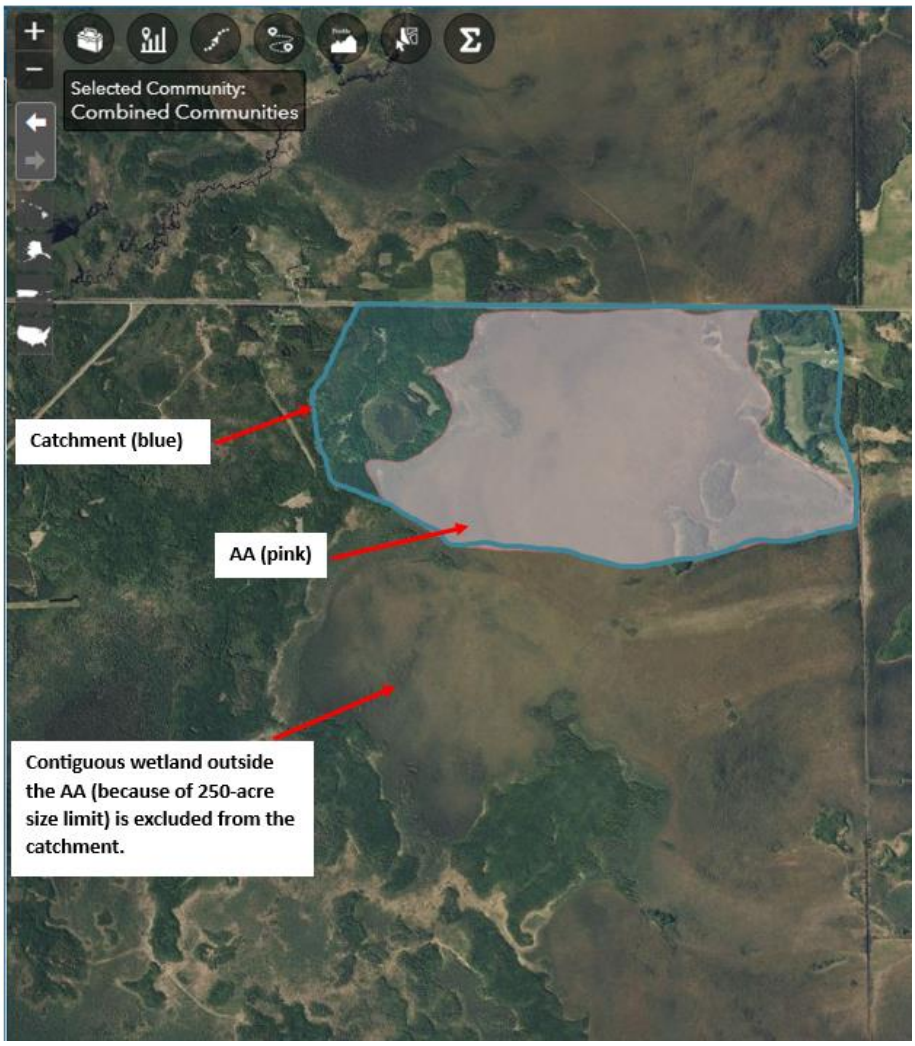
Using elevation contours as a guide, select points of higher elevation around AA to determine which areas drain into or through the AA. Use contours and drainage direction indicators from *Raindrop Tool* to roughly determine catchment area of AA (Figure C.4). Create a polygon around the catchment area of AA using *Draw and Measure* tool as described in Appendix B. When drawing the polygon do not include wetlands or other aquatic resources (lakes, ponds, streams) that drain/overflow into the AA. These waterbodies already store or otherwise intercept surface water flows from the surrounding landscape prior to discharging into the AA and are not considered as being part of the immediate catchment.

FIGURE C.4



If the AA is a portion of a larger contiguous wetland, only include the areas upstream/upgradient of the AA that directly contribute surface water to the AA (Figure C.5).

FIGURE C.5



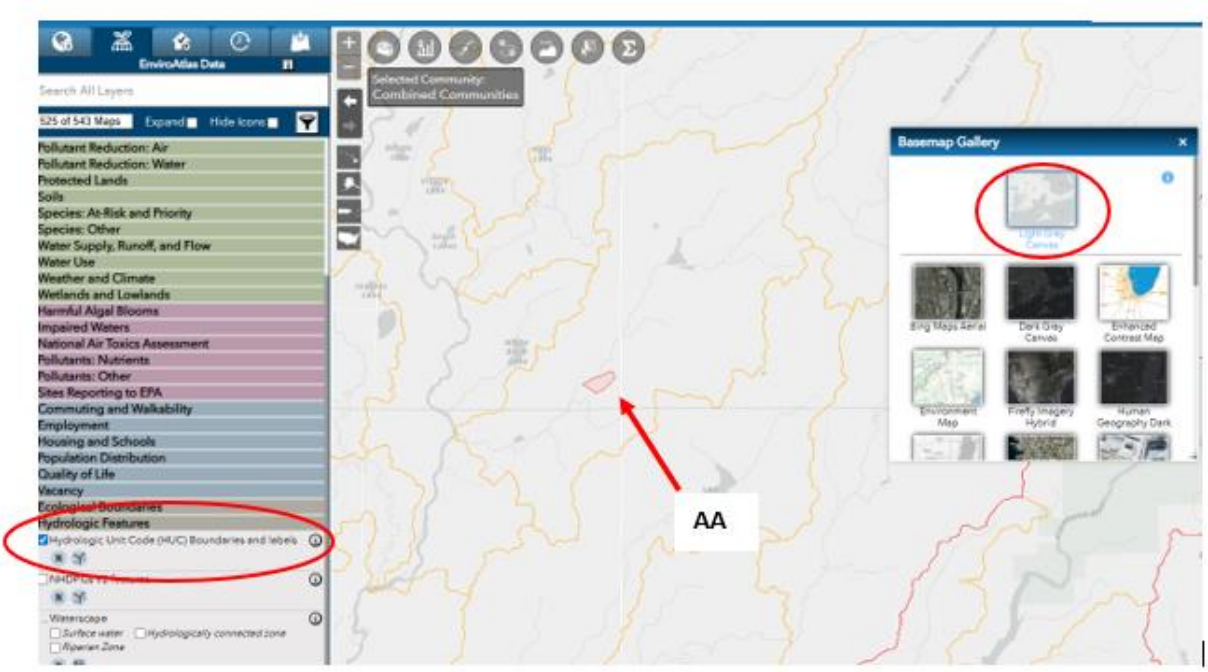
Determining catchment for Riverine and Depressional-floodplain HGM types

The stream catchment represents the watershed that drains towards a Riverine or Depressional-Floodplain HGM class AA and is often much larger than an immediate catchment. Also, hierarchical scaled watersheds for streams/rivers are well established (i.e., Hydrologic Unit Codes or HUCs) such that a stream catchment delineation for this RAM requires much less interpretation.

For Riverine – upper perennial and Depressional-Floodplain class AAs that are associated with 1st or 2nd order streams the HUC 12 (sub-watershed) scale is applied. For Riverine – lower perennial and Depressional-Floodplain class AAs that are associated with 3rd order or greater streams/rivers the HUC 8 (sub-basin) scale is applied.

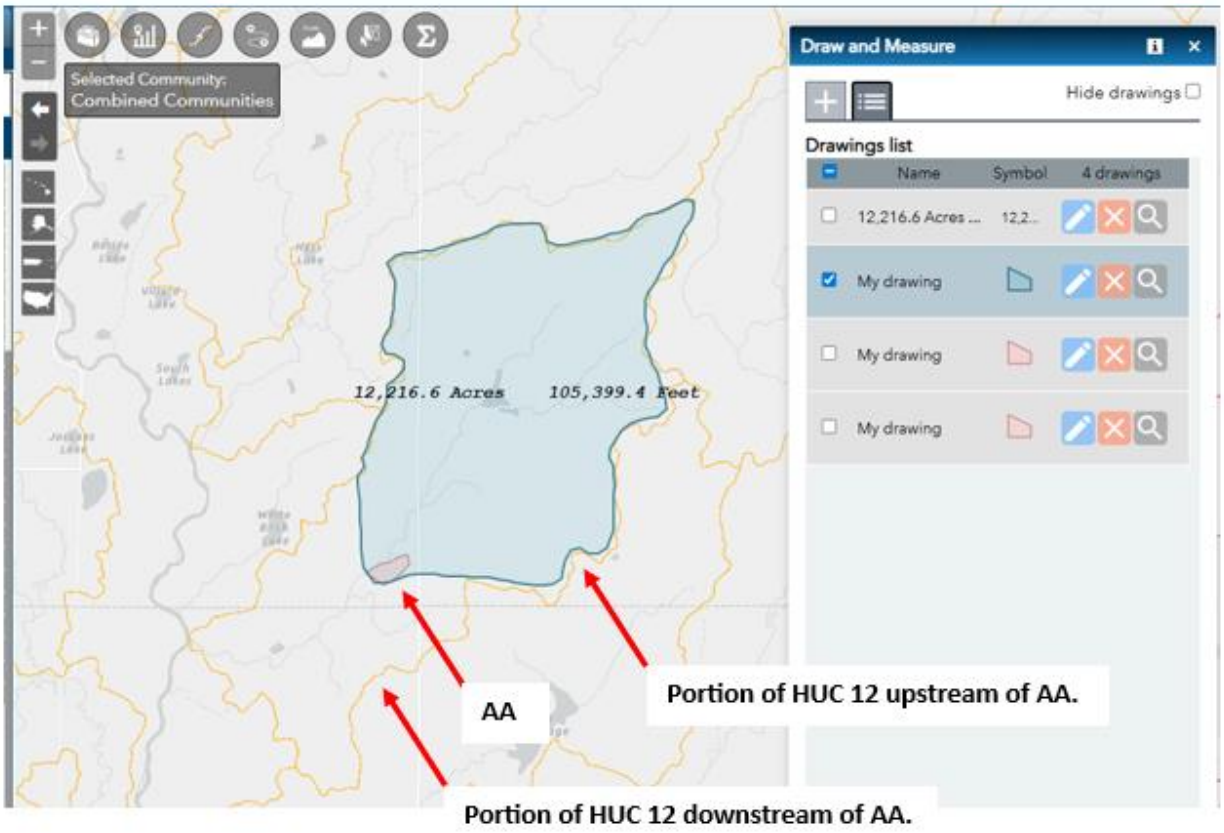
Establish a basemap with the AA (see Appendix B) using the *Light Gray Canvas* as the base (this makes viewing the AA polygon and HUC boundaries easier at larger scales), activate the *Hydrologic Unit Code (HUC) Boundaries and labels* under *Hydrologic Features* (Figure C.5)

FIGURE C.5



Zoom the view to where the upstream HUC 12 or HUC 8 boundary (as applicable according to HGM class as described above) is visible. Use the *Draw and Measure* tool to trace the stream catchment from the downstream end of the AA boundary to the upstream boundary of the appropriate HUC 12/8 boundary (Figure C.6). This only needs to be approximate and any HUC 12/8 area that is clearly downstream of the AA should be excluded. Use the *Raindrop Tool* as needed to confirm flow direction within the applicable HUC.

FIGURE C.6


Selected Community:
Combined Communities
Draw and Measure
Hide drawings
Drawings list
Name
Symbol
4 drawings
12,216.6 Acres ...
My drawing
My drawing
My drawing
12,216.6 Acres
105,399.4 Feet
AA
Portion of HUC 12 upstream of AA.
Portion of HUC 12 downstream of AA.

Appendix D

Determining land cover percentages associated with an AA in EnviroAtlas

To determine the percent land cover within 0.1 miles (0.161 km) of the AA (excluding the AA) proceed as follows:

- Select the *Summarize My Area* tool
- Select *Land Cover* as the indicator
- Select *Draw an area* as the summary unit
- Enter 0.161 as the *Buffer distance (km)*
- Check the *Exclude Inner Feature* box
- Use your mouse to draw the AA boundary
- Select Calculate

See Figures D.1 and D.2 below.

FIGURE D.1

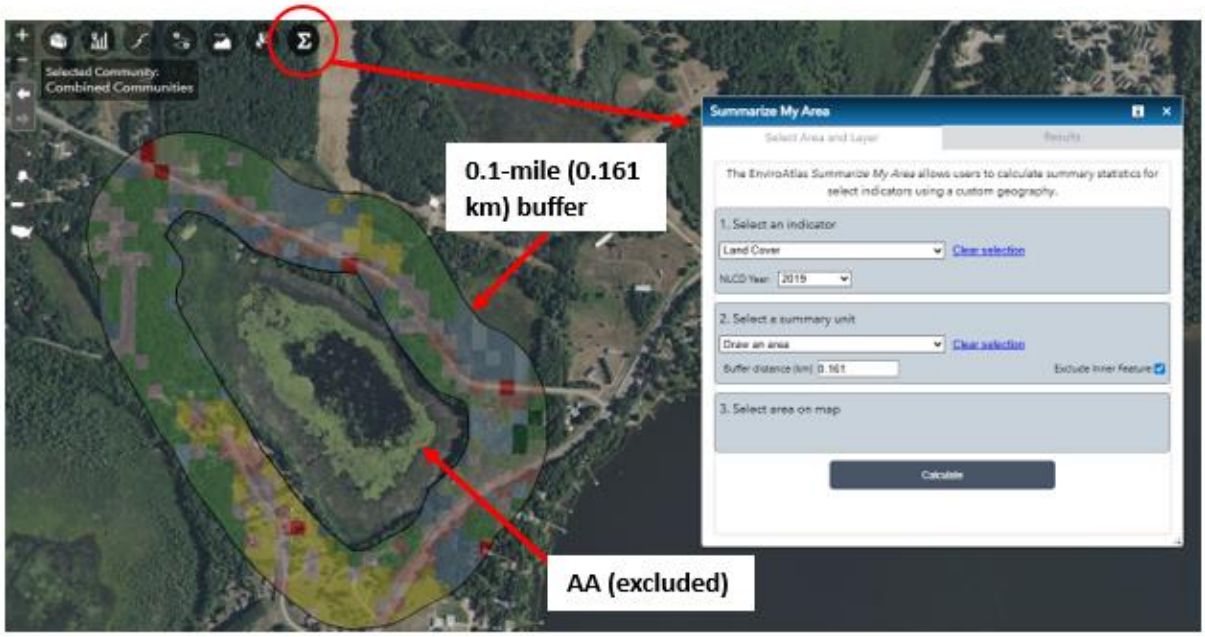
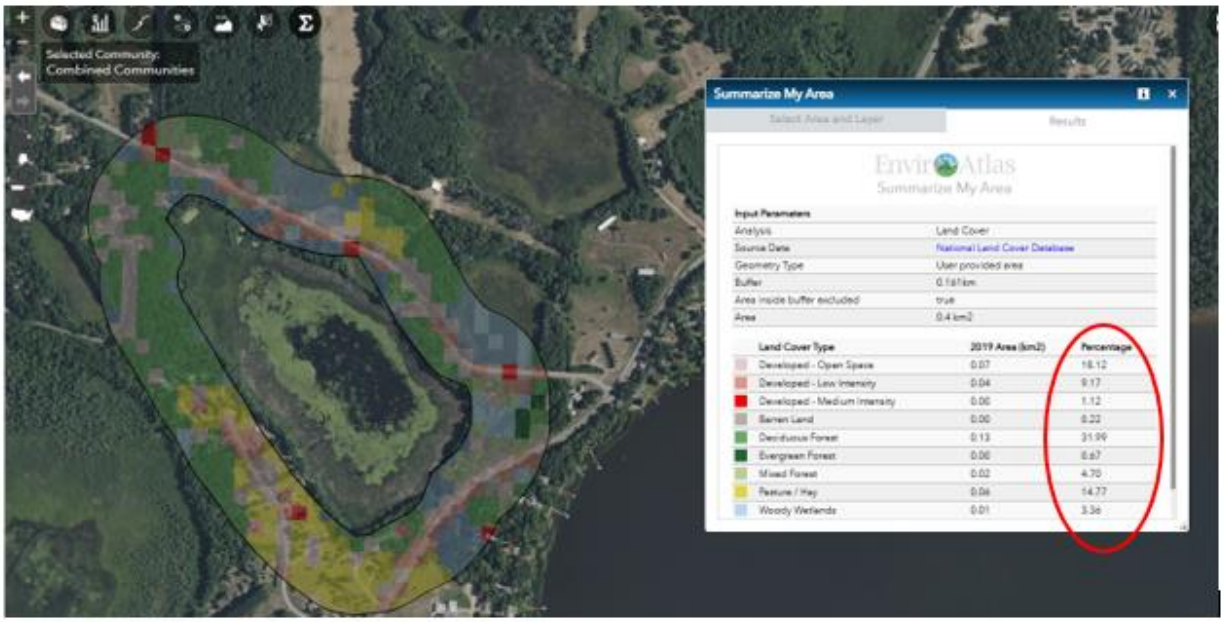


FIGURE D.2



To determine the percent land cover within the AA's catchment (excluding the AA) proceed as follows:

- Use the *Summarize My Area* tool as described above (but without assigning a buffer distance) by drawing the AA boundary with your mouse and selecting *Calculate* to determine the area (km2) of different land cover categories within the AA.
- Repeat the prior step for the catchment area.
- Subtract the AA's land cover areas from the catchment land cover areas and calculate the percent of each land cover type according to the cover category equivalents in Table 4 for Q16.

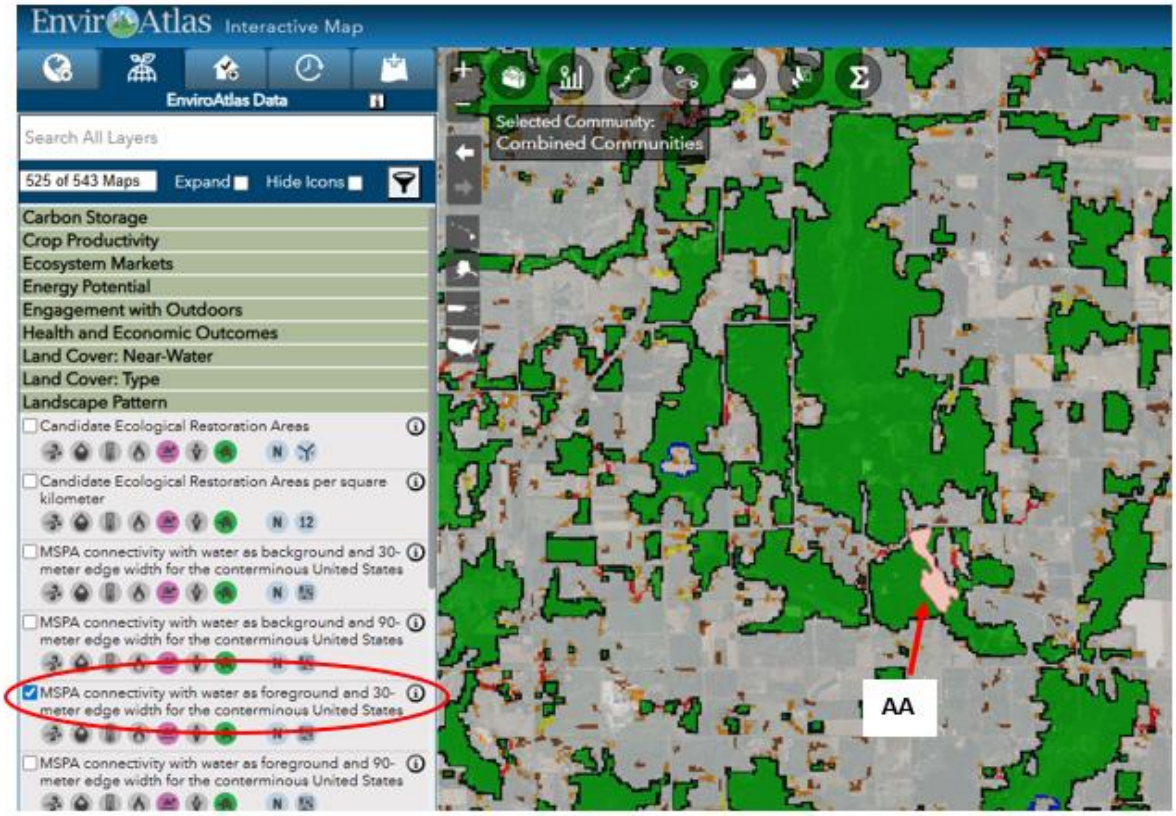
Note: If you observe that the AA is composed of all natural cover categories, then you can run the *Summarize My Area* tool on the catchment, subtract the area of the AA from the natural cover category, and calculate the applicable percentages.

Appendix E

Assessing habitat connectivity of an AA in EnviroAtlas

After establishing and drawing the AA on a basemap select the *MSPA connectivity with water as foreground and 30-meter edge width for the conterminous United States* data layer within the Landscape Pattern menu (Figure E.1). The AA is within a core area if any portion is overlapped by a green polygon.

FIGURE E.1



To estimate the coverage of core area within a 2-mile buffer of the AA boundary (Q18), start by using the Draw and Measure tool to draw 2-mile long lines out from the edge of the AA and then draw a circle polygon centered on the AA that roughly encapsulates the 2-mile lines (Figures E.2 and E.3). Adjust the transparency, width, color, and fill of the lines and circle polygon as needed to observe the core areas (green) within the 2-mile radius and estimate the precent of the area that is core.

FIGURE E.2

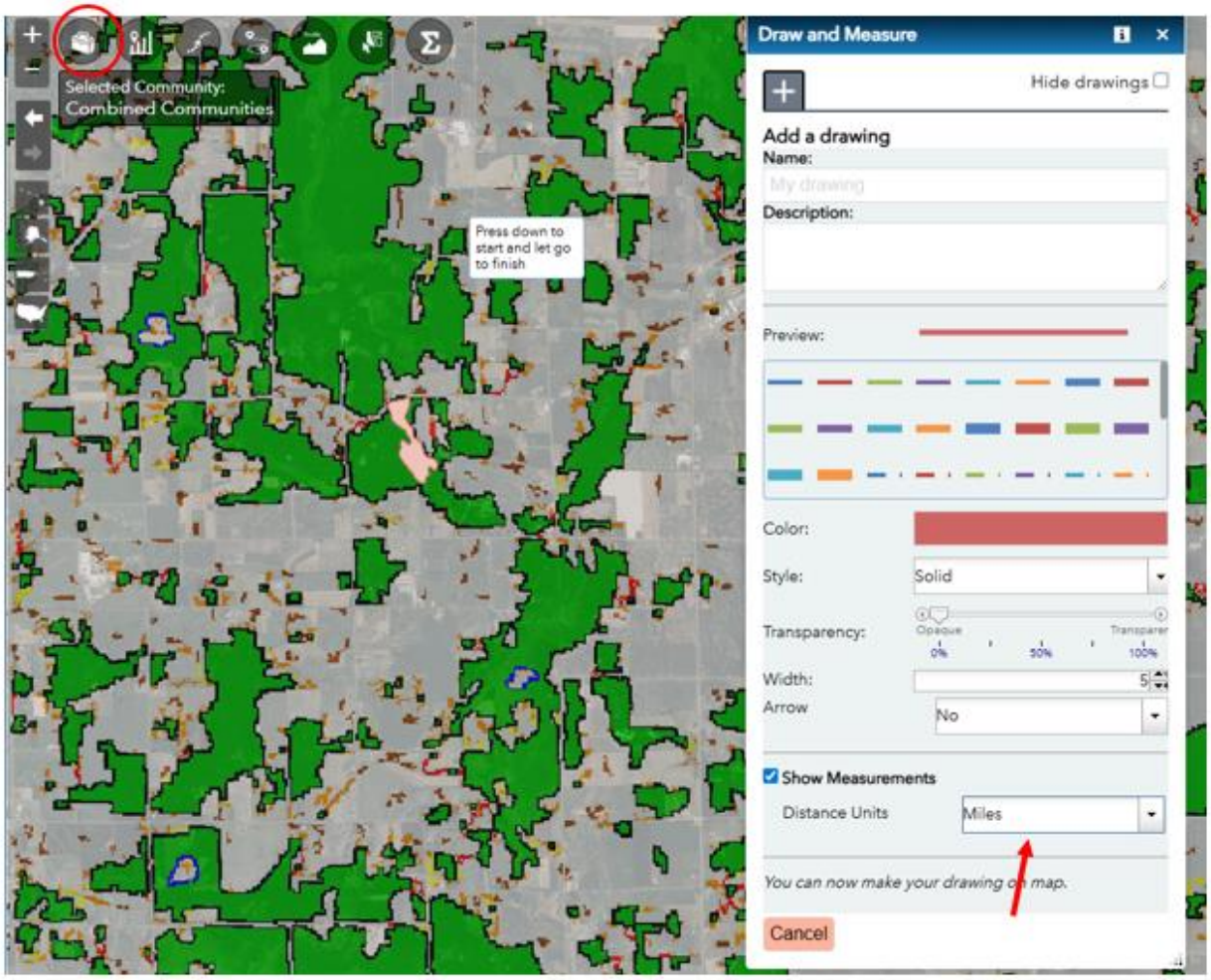
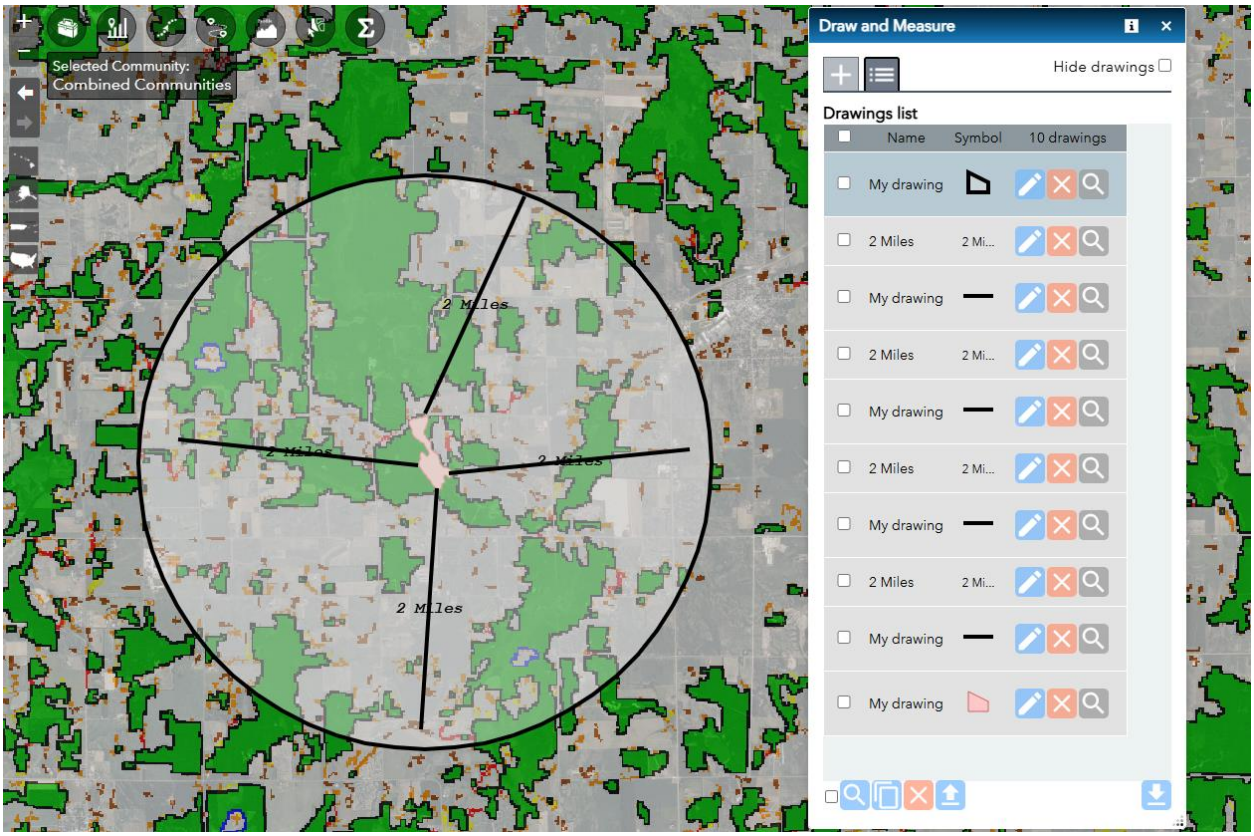

Selected Community:
Combined Communities
Press down to start and let go to finish
Draw and Measure
Hide drawings
Add a drawing
Name:
My drawing
Description:
Preview:
Color:
Style:
Solid
Transparency:
Opaque
Transparent
0%
50%
100%
Width:
5
Arrow
No
Show Measurements
Distance Units
Miles
You can now make your drawing on map.
Cancel

FIGURE E.3


Selected Community:
Combined Communities
2 Miles
2 Miles
2 Miles
2 Miles
Draw and Measure
Hide drawings
Drawings list
Name
Symbol
10 drawings
My drawing
2 Miles
2 Mi...
My drawing
2 Miles
2 Mi...
My drawing
2 Miles
2 Mi...
My drawing
2 Miles
2 Mi...
My drawing
My drawing

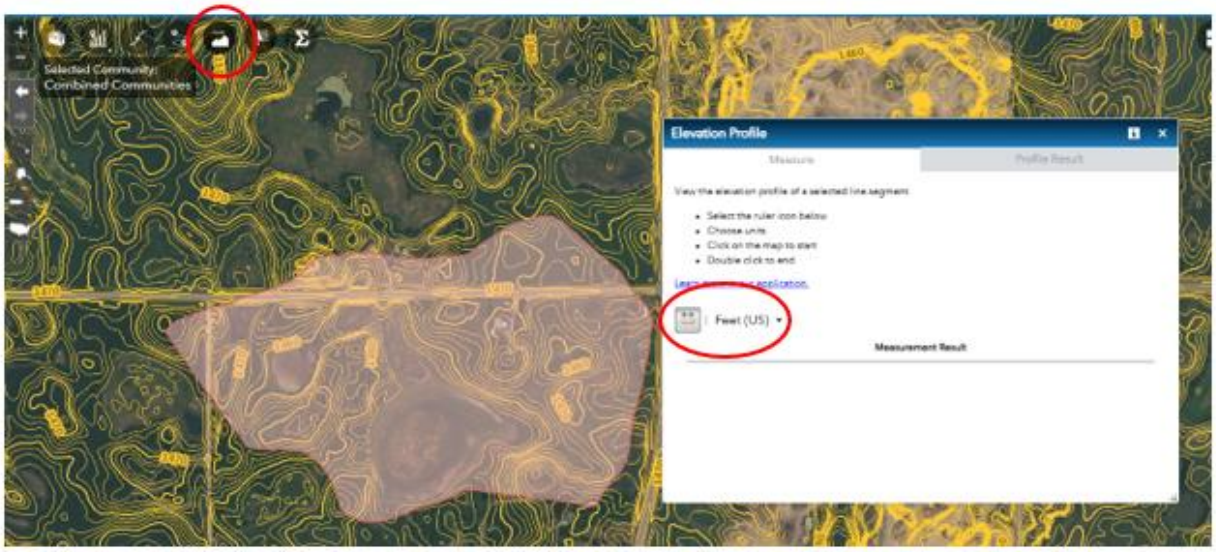
Appendix F

Determining catchment area slope in EnviroAtlas

To determine the slope of the AA's catchment proceed as follows:

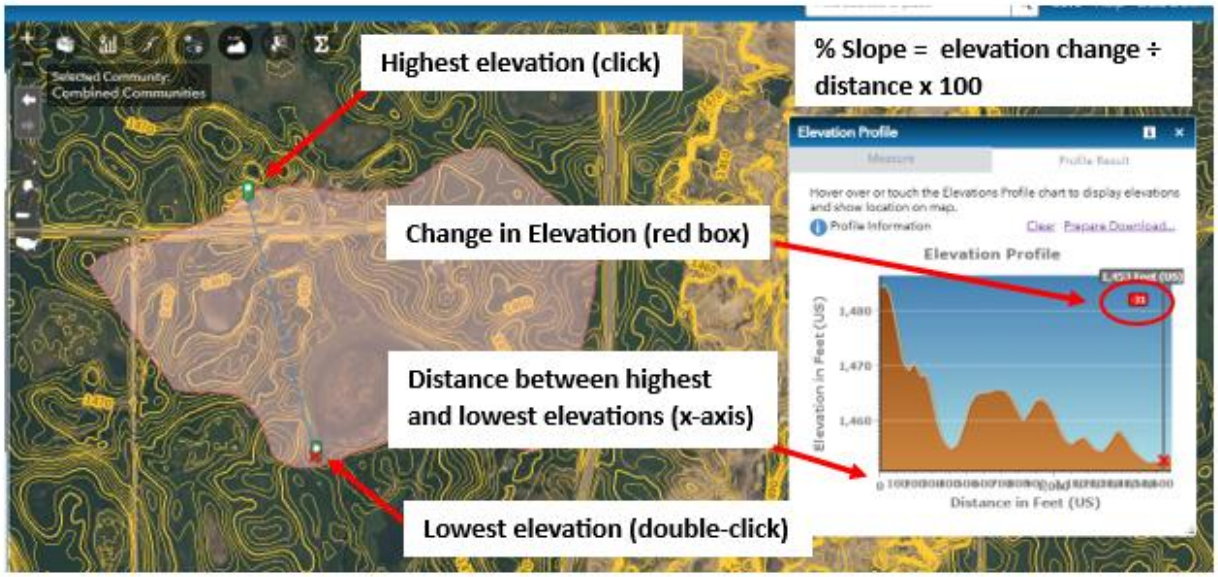
- Establish a basemap with contours (see Appendix B) and zoom to the catchment of the AA..
- Locate the highest and lowest elevation within the catchment.
- Select the *Elevation Profile* tool and select *Feet (US)* under the *Measure tab* (Figure F.1).

FIGURE F.1



- Click on the highest point in the catchment and double-click on the lowest point. You may have zoom in and out to see the contour labels and find the high and low points. The *Profile Result* will appear as shown in Figure F.2. Move your cursor along the x-axis of the profile to the very right hand side and record the distance (in gray) and change in elevation (in red).
- Divide the change in elevation by the distance and multiply by 100 to get the slope of the catchment.

FIGURE F.2


Highest elevation (click)
% Slope = elevation change ÷ distance x 100
Change in Elevation (red box)
Distance between highest and lowest elevations (x-axis)
Lowest elevation (double-click)
Elevation Profile
Hover over or touch the Elevations Profile chart to display elevations and show location on map.
Profile Information
Clear
Prepare Download...
Elevation Profile
Elevation in Feet (US)
1,480
1,470
1,460
Distance in Feet (US)

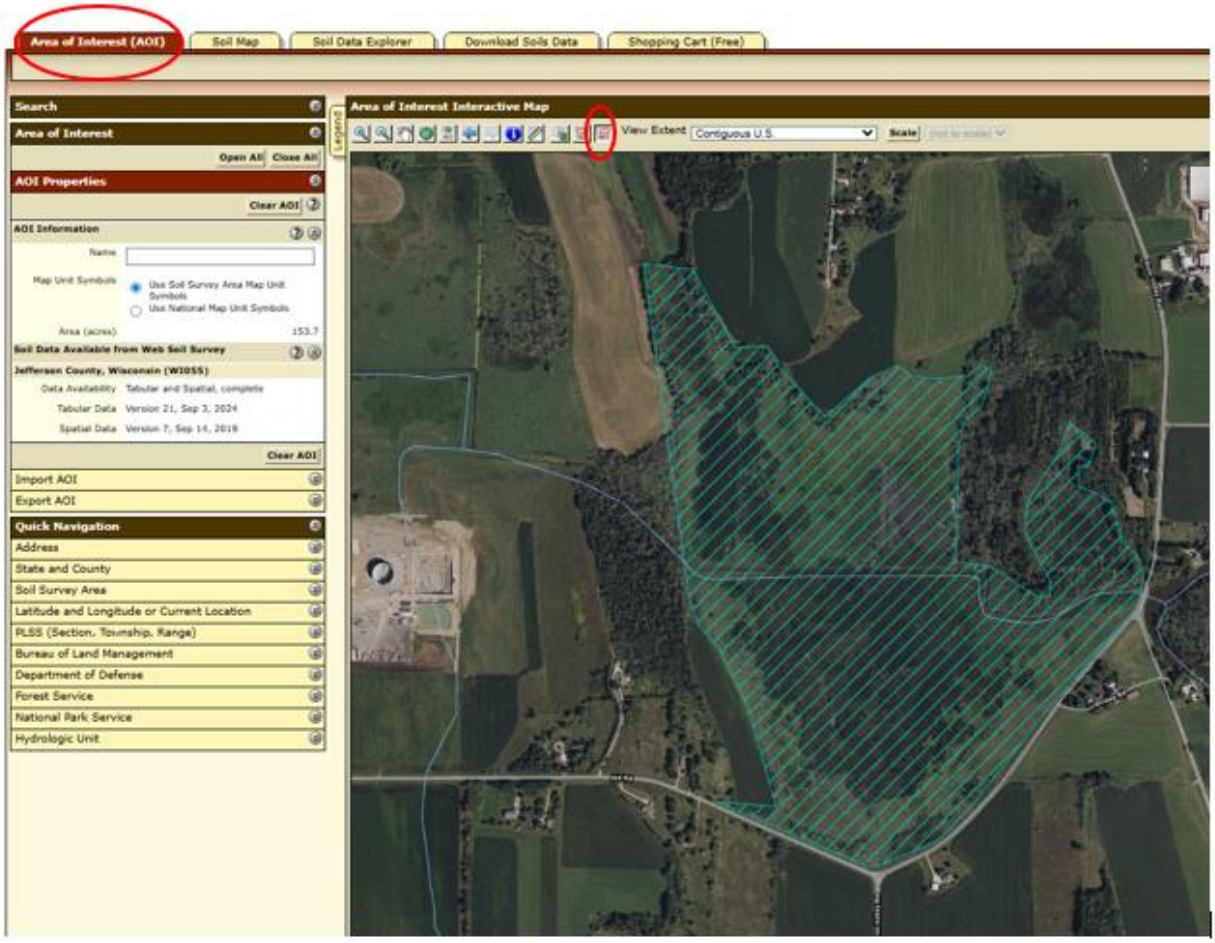
Appendix G

Determining average organic matter content of surface soils in an AA using Web Soil Survey

To determine the average organic matter content of surface soils in the AA proceed as follows:

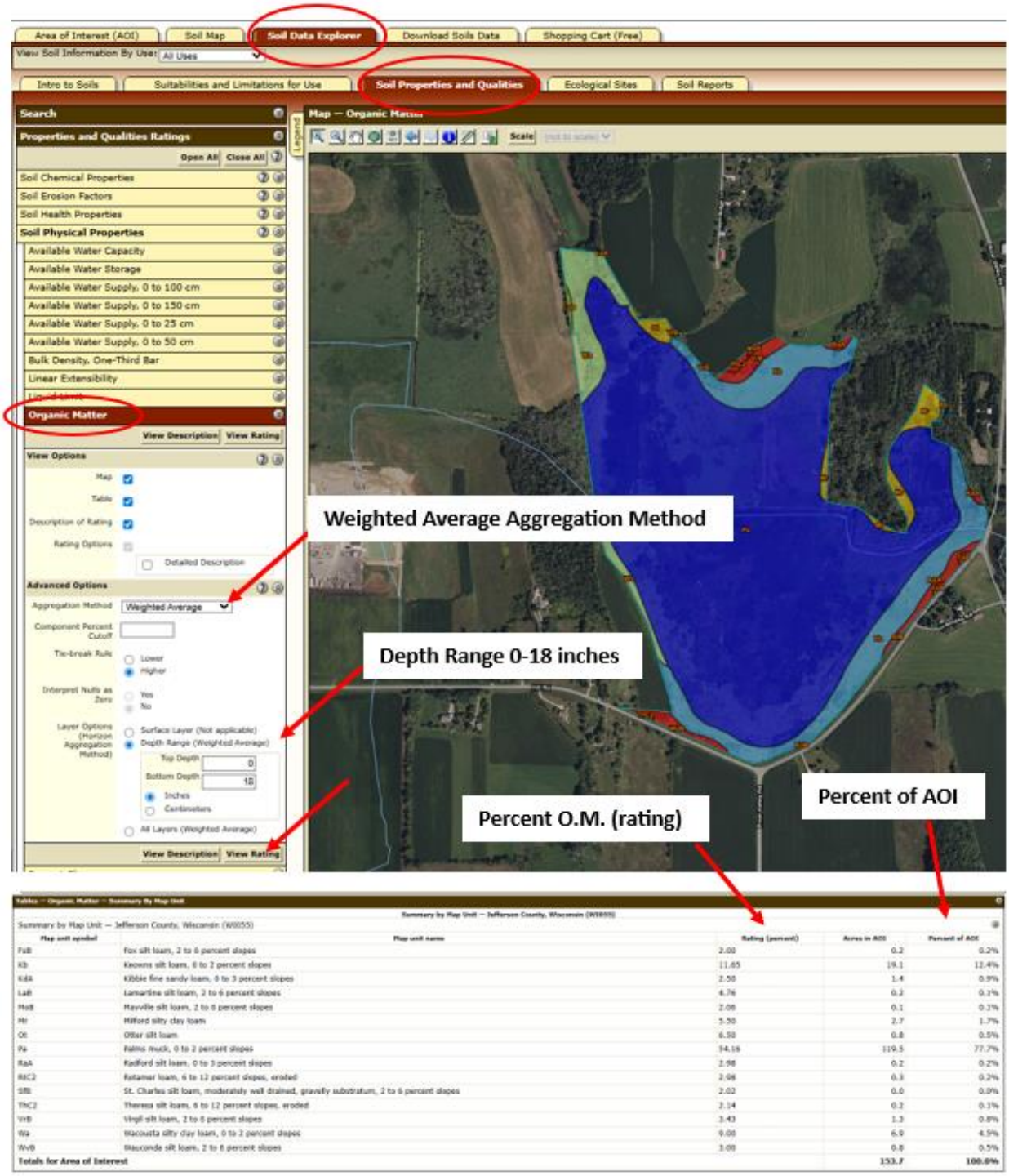
- Outline the AA using the *AOI* tool under the *Area of Interest (AOI)* tab (Figure G.1).

FIGURE G.1



- Select the *Soil Data Explorer* tab and then the *Soil Properties and Qualities* tab.
- In the menu on the left side of the screen select *Organic Matter*.
- Select *Weighted Average* for the *Aggregation Method*, select *Depth Range* for *Layer Options*, and specify a *Top Depth* of 0, *Bottom Depth* of 18, and select *Inches*.
- Select *View Rating* and table of percent organic matter and percent of AOI appears at the bottom of the screen (Figure G.2).

FIGURE G.2



Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
FoB	Fox silt loam, 2 to 6 percent slopes	2.00	0.2	0.2%
Kb	Keowns silt loam, 0 to 2 percent slopes	11.65	19.1	12.4%
KkA	Kibbie fine sandy loam, 0 to 3 percent slopes	2.50	1.4	0.9%
LaB	Lamartine silt loam, 2 to 6 percent slopes	4.76	0.2	0.1%
MaB	Mayville silt loam, 2 to 6 percent slopes	2.08	0.1	0.1%
Mr	Milford silty clay loam	5.50	2.7	1.7%
Ot	Otter silt loam	6.50	0.8	0.5%
Pa	Palms muck, 0 to 2 percent slopes	94.16	119.5	77.7%
RaA	Radford silt loam, 0 to 3 percent slopes	2.98	0.2	0.2%
RkC2	Ritzman loam, 6 to 12 percent slopes, eroded	2.08	0.3	0.2%
StB	St. Charles silt loam, moderately well drained, gravelly substratum, 2 to 6 percent slopes	2.02	0.0	0.0%
ThC2	Theresa silt loam, 6 to 12 percent slopes, eroded	2.14	0.2	0.1%
VrB	Virgil silt loam, 2 to 6 percent slopes	3.43	1.3	0.8%
Wa	Wacousta silty clay loam, 0 to 2 percent slopes	9.00	6.9	4.5%
WvB	Wauconda silt loam, 2 to 6 percent slopes	3.00	0.8	0.5%
Totals for Area of Interest			153.7	100.0%

Appendix H

Determining predominant surface soil texture within an AA using Web Soil Survey

To determine the predominant surface soil texture in the AA proceed as follows:

- Outline the AA using the *AOI* tool under the *Area of Interest (AOI)* tab (See Figure G.1 in Appendix G).
- Select the *Soil Data Explorer* tab and then the *Soil Properties and Qualities* tab.
- In the menu on the left side of the screen select *Surface Texture*.
- Select View Rating and table of surface texture and percent of AOI appears at the bottom of the screen (Figure H.1).

FIGURE H.1