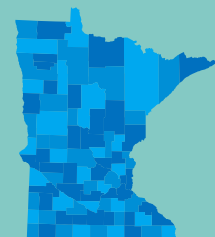


December 2019

Wetland monitoring standard operating procedures

Procedure for evaluating wetland biological monitoring sample sites



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1. Purpose and scope

To describe the methods used by the Minnesota Pollution Control Agency (MPCA) Biological Monitoring Program to evaluate and establish wetland biological monitoring Sample Sites.

This procedure applies to all potential wetland biological monitoring Sample Sites except for Minnesota Wetland Condition Assessment (MWCA) Sample Sites (see the MWCA site evaluation procedure).

There are two primary site evaluation components: desktop evaluation consisting of basic information gathering done prior to making a field visit, and field evaluation which applies to all initial Sample Site visits. Both desktop and field evaluation procedures must be implemented prior to conducting any wetland sampling.

2. General information

The Sample Site is the wetland area that is being represented by any MPCA field sampling. Sample Site boundaries need to be defined for all MPCA wetland monitoring.

Wetland Sample Sites may be selected for monitoring for a number of purposes including:

- Randomly selected Sample Sites as part of ongoing wetland quality status and trends surveys
- Supporting information for MPCA Intensive Watershed Monitoring and stressor identification of streams and lakes
- Sample Sites selected for the development and calibration of wetland monitoring approaches and assessment criteria
- Long-term monitoring at designated Sample Sites
- Effectiveness monitoring of permitted activities

In addition, different types of monitoring may occur at a Sample Site including:

- Vegetation
- Macroinvertebrates at depressional wetlands
- Water chemistry
- Hydrology

The level and amount of information required for site evaluation will depend on both the reason and type of monitoring planned for the Sample Site.

3. Requirements and responsibilities

3.1 General qualifications

All personnel conducting MPCA wetland site evaluation must have the ability to perform rigorous physical activity in an outdoor setting. It is often necessary to hike long distances through rugged terrain to reach a Sample Site. Walking and wading through wetlands for prolonged periods is required to perform field evaluation and ultimately any wetland monitoring.

3.2 Field crew leader

The field crew leader must be a professional biologist with a strong working knowledge of Minnesota's wetlands and a minimum of a Bachelor of Science degree. Field crew leaders should also possess excellent map reading and orienteering skills and a demonstrated proficiency with both compass and Global Positioning System (GPS). The field crew leader is responsible for implementing the action steps of the procedure and ensuring that the data generated meets the standards and objectives of the MPCA.

3.3 Field technicians/student workers

Field technicians/student workers must have at least one year of college education and coursework in environmental, natural resource, and/or biological science and an interest in becoming a natural resource professional. Field technicians/student workers are responsible for implementing the action steps of the procedure — including data recording and the maintenance, stocking, and storage of sampling equipment.

4. Training

All inexperienced personnel will receive instruction from a trainer designated by the unit supervisor. Major revisions of this procedure require that all personnel that apply this procedure be re-trained by experienced personnel. The field crew leader will provide additional instruction to the field technicians/student workers and will be responsible for assessing their performance throughout the field season.

5. Desktop evaluation

The primary purpose of desktop evaluation is to gather or derive as much required basic information as possible prior to making a field visit.

All information generated during desktop evaluation is recorded in designated database site tracking tables and GIS geospatial coverages.

5.1 Determine the monitoring project

The first step is to determine the primary monitoring project (i.e., purpose) that a candidate Sample Site is intended to meet. Different levels of site evaluation may be required depending on the project.

Choose a monitoring project from the following list of routine MPCA wetland monitoring activities:

- Minnesota Wetland Condition Assessment (see the MWCA site evaluation procedure)
- Depressional Wetland Quality Assessment (DWQA)
- Watershed support monitoring
- Program development
- Long term trend sample sites
- Regulatory effectiveness monitoring
- Other (if purpose is a non-routine monitoring activity)

5.2 Establish preliminary Sample Site boundaries

The Sample Site is the wetland area that is being represented by any MPCA field sampling. Sample Site boundaries need to be defined for all MPCA wetland monitoring. The approach used to establish wetland Sample Sites depends on the monitoring project and is flexible to allow for monitoring the wide variety of wetlands that occur in Minnesota. MPCA wetland monitoring Sample Sites can vary in size and shape according to the needs of the project and the physical characteristics of the wetland that is to be monitored.

The boundaries for all Sample Sites targeted for an upcoming field sampling season need to be established during desktop evaluation in the designated GIS geospatial coverages. This ultimately defines where field sampling is going to occur for a given year and will be needed to derive any Sample Site GPS coordinates and maps that will be necessary to conduct field evaluation and sampling.

Use the guidelines in the following subsections (organized by project) to establish preliminary Sample Site boundaries in the designated GIS geospatial coverages:

5.2.1 Minnesota Wetland Condition Assessment

The primary goal of the [Minnesota Wetland Condition Assessment \(MWCA\)](#) is to monitor wetland vegetation condition statewide and by major ecoregions over time using a probabilistic (i.e., random) sampling design. The MWCA target population is defined as: all wetlands with < 1 m depth of surface water that are not actively being cultivated. This includes virtually all wetlands in Minnesota, representing the wetlands that can be effectively sampled on foot that are not currently plowed.

The MWCA relies on a very specific procedure to establish Sample Sites during desktop evaluation. Please refer to the MWCA site evaluation procedure.

5.2.2 Depressional Wetland Quality Assessment

The MPCA also monitors the status and trends of depressional wetland condition using a probabilistic survey design known as the Depressional Wetland Quality Assessment (DWQA). The DWQA target population is defined as: wetland basins that occur in a topographical landscape depression that have a semi-permanent to permanent flooding regime (i.e., areas of open water throughout most years) and at least some marsh vegetation around the margin (Figure 1A).

The DWQA focuses on the individual wetland as the primary reporting unit. The DWQA relies on DNR status and trends wetland GIS data as the sample frame (i.e., the wetland map to randomly draw monitoring sites). In this case, individual depressional wetland basins have been aggregated from the wetland mapping data. The U.S. Environmental Protection Agency (EPA) provides the DWQA random draw of depressional wetlands. To maintain the integrity of the survey design, depressional wetlands must be evaluated in design order.

DWQA Sample Site boundary establishment is typically straightforward (Figure 1A). The DWQA Sample Site polygons have already been defined in the sample frame and the random draw is provided by the EPA.

5.2.3 Watershed support monitoring

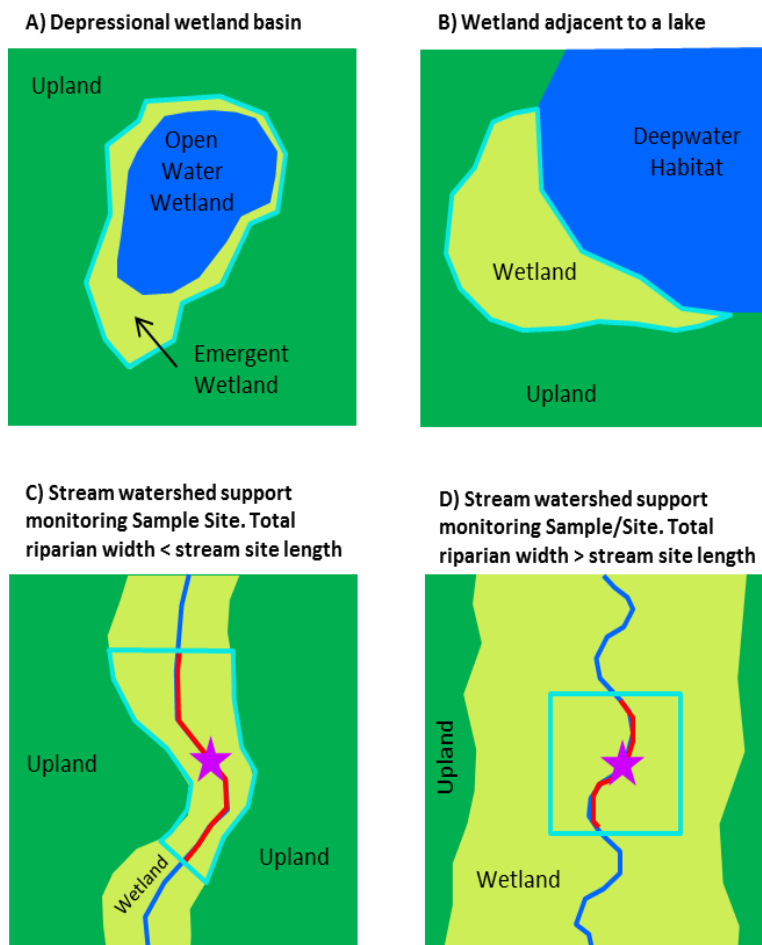
The MPCA employs a [watershed approach](#) to monitor, assess, diagnose impairment, and promote restoration and protection of Minnesota's lakes and streams. These activities are organized by Minnesota's 80 major watersheds over a 10-year cycle and represent a significant increase in the waters that are monitored and assessed. [Lake monitoring by the MPCA](#) and local partners provides information for all lakes > 500 acres and at least 50% of smaller lakes in a given watershed. [MPCA stream intensive watershed monitoring](#) collects biological and water chemistry data from dozens of sites along the network of rivers, streams, and ditches in a watershed. Stream Sample Sites that are assessed as impaired for aquatic life based on biological indicators must go through an additional [stressor identification process](#) to diagnose the potential causes of impairment.

These watershed monitoring and assessment activities can lead to wetland monitoring needs. Shallow lakes may have characteristics that raise the question of whether they should be managed as a shallow lake or a wetland. Similarly, low gradient streams often have wetland characteristics in the channel or may be heavily influenced by adjacent wetlands, which may affect stream quality indicators and the stressor identification process.

As part of the watershed approach, wetland monitoring staff are routinely asked to provide supporting information at locations where wetlands are an issue. Wetland monitoring staff can provide information to support the following monitoring objectives:

- In-channel stream vs. wetland determinations based on wetland delineation criteria
- In-channel aquatic vegetation condition assessment (when adequate aquatic vegetation is present)
- Hydrogeomorphic classification of adjacent riparian wetlands based on landscape setting, soil, and vegetation patterns to indicate stream/wetland interaction patterns
- Vegetation condition assessments of adjacent riparian wetlands
- Shallow lake vs. wetland determinations
- Shallow lake vegetation condition assessments

Figure 1. Example wetland monitoring Sample Sites (A-D). Sample Site boundary = light blue, wetland = light green, open water = blue, upland = dark green, stream biological monitoring Sample Site = red, stream station location = purple star



Watershed support monitoring is initiated by water monitoring and stressor identification staff. They typically specify the monitoring locations. Wetland Sample Sites for support monitoring typically are established in close correspondence with lake or stream monitoring Sample Sites as the typical goal of the monitoring is to provide information at the same location.

Watershed support monitoring associated with shallow lakes typically considers the entire basin of the lake/wetland as the Sample Site boundary for small to moderate sized basins—similar to depressional wetlands (Figure 1A). For basins exceeding 100 ha in size, portions of the basin (Figure 1B) or multiple wetland monitoring Sample Sites should be employed, as few MPCA vegetation sampling trials have been conducted on Sample Sites larger than this.

Watershed support monitoring is most often associated with stream biological monitoring. Stream biological monitoring Sample Sites consist of a length of stream equal to 35 times the mean stream width (min = 150 m, max = 500 m). The midpoint (x-site) is first established and then the upstream and downstream endpoints based on the x-site location and total site length. Wetland Sample Sites associated with stream biological monitoring Sample Sites should have the x-site as the approximate center and be bounded by the upstream and downstream endpoints (Figure 1C-D). For cases where the adjacent total riparian wetland width is < the total stream site length, the sides of the Sample Site should be the upland boundary (Figure 1C). Where the adjacent total riparian wetland width is > the total stream Sample Site length, the distance between Sample Site sides should not exceed the total stream Sample Site length (Figure 1D). In other words, the wetland Sample Site width should not exceed the length. This is done to avoid wetland Sample Sites representing wetland areas that are far away from the stream.

5.2.4 Program development, trend sites, and regulatory effectiveness monitoring

Desktop evaluation requirements for program development, trend sites, regulatory effectiveness, or wetland monitoring for any other purpose are somewhat unique and generally less prescriptive compared to the previous monitoring projects.

Program development efforts are typically unique to the issue of scientific interest. Sample Site boundary establishment requirements will be developed to meet the specific needs of a project.

Long term monitoring at designated trend Sample Sites typically have little desktop evaluation needs. Trend Sample Sites have often been visited multiple times and the boundaries and access information are well established.

Regulatory effectiveness monitoring is typically triggered by monitoring requirements specified in National Pollutant Discharge Elimination System permits and Section 401 water quality certifications that were developed in consultation with wetland monitoring staff. The Sample Site boundary needs will be dictated according to the monitoring specifications and should be done in consultation with regulatory staff. Likewise, if monitoring is requested for any other purpose consultation with requesting staff will be required.

5.3 Determine land ownership and obtain permission from landowners

Under no circumstances should field personnel knowingly trespass on private property to access or sample a wetland monitoring Sample Site. In addition, some types of public land require research

permits to access and conduct scientific work (e.g., state parks, scientific natural areas, national wildlife refuges, etc.). Therefore, it is imperative that the landowner information for all candidate monitoring Sample Sites and likely access routes are determined during desktop evaluation and that an effort to obtain access permission is made prior to making a field visit.

Landowners should be determined using the following sources (in priority):

- GIS land ownership coverages
- Online county land ownership maps linked through the [Minnesota Geospatial Information Office \(MnGeo\)](#)
- Plat map books
- Contacting county tax assessor's offices

Once landowner information has been obtained, access requests should be made to private landowners and managers of public lands that require permits. The most effective approach for public and organizational/corporate land managers is via email. For private individual landowners, the following sequence has been found to be an effective approach for obtaining access to randomly selected status and trends Sample Sites. This sequence can be adapted as needed. The goal is to get a "yes" or "no" answer, which can happen at any point in the sequence:

- Call during normal business hours. If no answer, leave a message.
- Call during the evening. If no answer, leave a message. Repeat this step if there is no return call after an appropriate length of time (minimum 3 days).
- Visit their home/place of business while conducting field evaluation/sampling other sites in the area.
- Leave at the home/place of business or send a written request with a self-addressed stamped envelope, so that landowners can conveniently respond.
- If no response, the status of the site should be considered as "access permission denied".

Record all of the landowner information determined through desktop evaluation and the final permission status (if resolved) in the designated site tracking tables.

5.4 Create access and site maps

Two maps should be created for all new wetland monitoring Sample Sites: an access map that shows the likely route to the Sample Site from main roads and site map that provides details of the Sample Site itself. For Sample Sites that have been previously monitored, only a new site map is typically required for each planned visit.

Access maps should have the following elements (Figure 2):

- Zoomed to a scale that shows both the Sample Site and the appropriate road(s) that provide the best access to the Sample Site. This provides an appropriate view to show likely parking areas and the access route from the vehicle.
- The background should be recent vintage color aerial photography.
- Include the wetland Sample Site polygon and any associated GPS points which will be used during field evaluation (e.g., centroid).
- The map should be centered on the most likely foot access route between the parking area and the Sample Site.
- Include the most recent landowner parcel coverage (if available) with the labels activated.
- Any useful notes from the individual completing the desktop evaluation such as parking locations or specific information provided by the landowner.
- Access maps should have a scale bar in meters (for small-moderate scale maps) or miles (for larger scale maps) and be clearly labeled with the Sample Site ID, a north arrow, and the MPCA logo (Figure 2).

Figure 2. Example access map for a DWQA site. The view includes roads and is centered on possible foot routes to the site. Coverages include: site boundary (blue), centroid (pink), land parcels (yellow line-work, landowner labels were de-activated for example), roads (green). Appropriate header information is included.



The separate site map provides greater detail of the Sample Site itself. It is primarily needed for wetland plant community mapping during vegetation sampling and noting any other specific aspects of the Sample Site while in the field (e.g., locations of specific impacts, macroinvertebrate and water chemistry sampling locations).

Site maps should have the following elements (Figure 3):

- Zoomed to a scale that shows the wetland Sample Site or for the majority of the view.
- The background should be the most recent summer high resolution imagery available.
- Include Study Site polygons and point layers that correspond to field GPS points.
- The view should be centered on the Study Site polygon.
- Site maps should have a scale bar in meters and be clearly labeled with the Study Site ID, a north arrow, and the MPCA logo (Figure 3).

Both types of maps should be created in ArcMap projects, exported in the PDF file format, and saved in appropriate folders created/designated for the monitoring purpose.

5.5 Prep site files, compile, and load GPS points

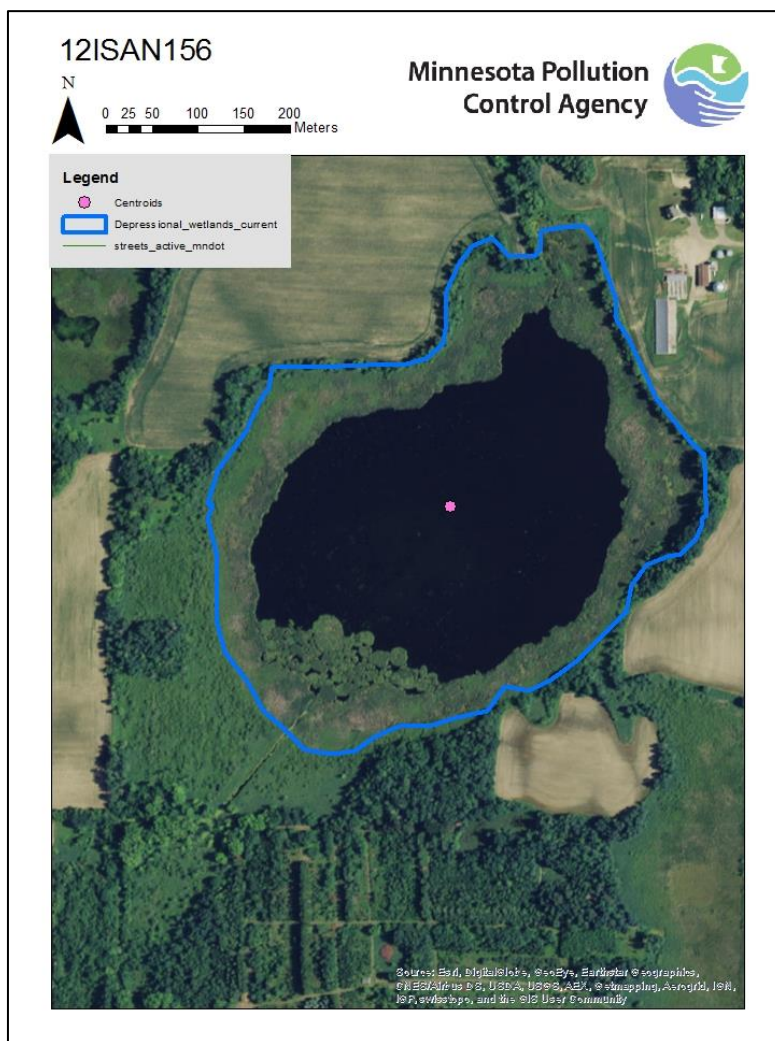
Information derived during desktop evaluation needs to be transcribed onto site evaluation forms prior to engaging in field evaluation. This provides field crews with the information that they need to conduct a field evaluation and/or a sampling visit. Fill out the Site and Access Information sections on the form as completely as possible and add the form to the designated paper site file.

The access and site maps should also be printed in color and added to site files.

Compile (or derive) the necessary GPS points (typically the Study Site centroid) for the list of potential Study Sites that will be included for field evaluation.

Once the appropriate list(s) of points has been compiled, upload GPS points to both the field and navigation GPS units. This can be done using the open source [DNR GPS application](#) or propriety software available with the GPS units.

Figure 3. Example site map for a DWQA site. The background is high resolution ESRI Basemap World Imagery and map is centered on the Study Site. Coverages include: site boundary (blue), centroid (pink). Appropriate labels included in the header.



6. Field evaluation

Prior to conducting field evaluation at any wetland monitoring Study Site, check that all necessary equipment to complete this procedure is present and in proper working condition (Table 1).

For sites that are to be monitored only for vegetation, a separate visit to conduct field evaluation is typically not required. Alternatively, field evaluation is the initial activity undertaken during a sampling visit.

Depressional wetland sites do typically require a separate field evaluation visit. This is typically done in May. The primary purpose is to determine if there are areas within the Sample Site that are semi-permanently or permanently inundated with surface water which is a requirement for applying existing macroinvertebrate indicators and helps define the target population for the DWQA.

Table 1. Equipment list for wetland field evaluation organized by category.

Driving navigation	Field navigation	Personal/safety equipment	Documentation
Navigation GPS (w/points loaded)	Field GPS (w/points loaded)	Cell phone	Site file
		Waders/knee boots	Site map
DeLorme atlas	Access map	Rain gear	Site evaluation form
	Compass	First aid kit	Digital camera
		Drinking water	Clipboard
		Sunscreen/insect repellent	Pencils/markers

6.1 Field evaluation activities common for all monitoring projects

This section outlines the field evaluation activities required for all wetland monitoring sites. For MWCA sites, the separate MWCA site evaluation procedure needs to be followed. Additional project specific site evaluation activities may also be required (see Section 6.2)

6.1.1 Resolve any outstanding access permission

Under no circumstances should field personnel knowingly trespass on private property to access or sample a wetland monitoring Sample Site. If the Sample Site access permission was not resolved during desktop evaluation (see Section 5.3), permission needs to be obtained prior to accessing the site. This typically involves making a visit to the landowner's home or place of business to make an in-person access request. Any new information from the in-person request needs to be documented in the Access Information section of the site evaluation form.

6.1.2 Clearly document site access route information

All Sample Sites should have as complete access route information as possible. This is in the event that if a subsequent visit is required, the field crews know where to park and how to get to the site. It also increases efficiency whereby the same information does not need to be gathered multiple times.

Document the site access route information in the Access Information section of the site evaluation form. This may be done with written notes in the space provided in the form or by annotating the access map (Figure 4) or preferably both. If the access map is being annotated, clearly indicate the date on the map.

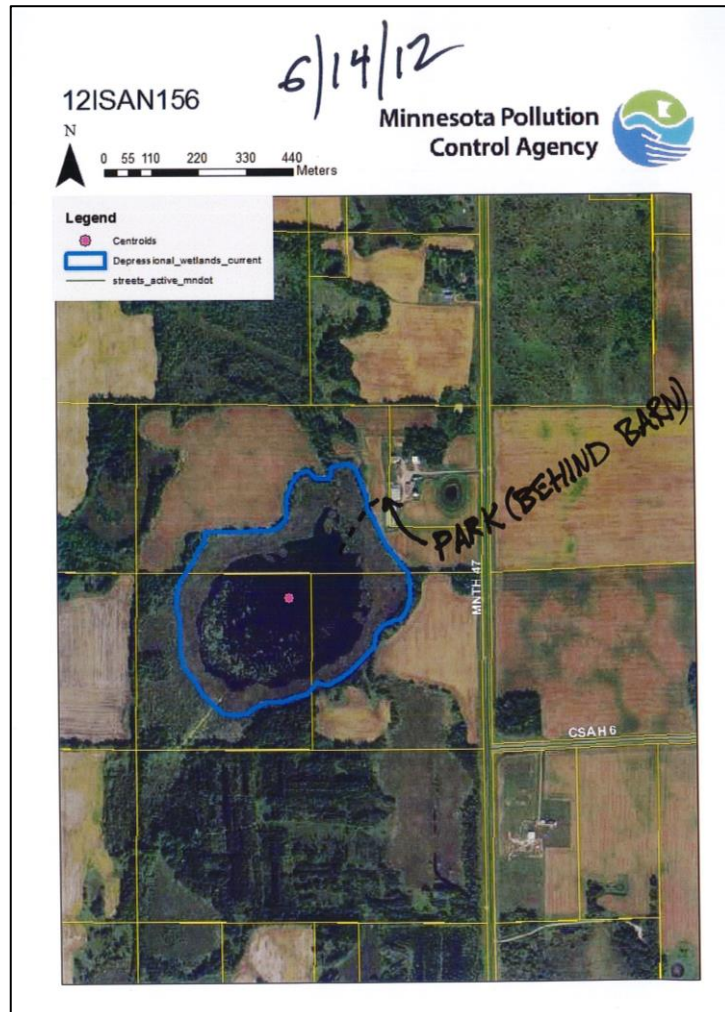
6.1.3 Verify sampleable wetland and correct any Sample Site boundary errors

When first arriving at a Sample Site, effort should be spent making a sampleable site determination and confirmation of the Sample Site boundaries.

In almost all cases, there will be no doubt that a sampleable wetland is present for vegetation sampling. MPCA vegetation sampling can be conducted on virtually all wetland types and a high-level wetland determination has already been made during desktop evaluation. If there is any doubt as to whether the Sample Site occurs on wetland, standard wetland determination approaches should be employed. Consult senior monitoring staff if this occurs. For other types of monitoring, see Section 6.2.

Sample Site boundaries more often require adjustment during field evaluation to correct any errors from desktop evaluation. If any Sample Site boundary adjustments are necessary, after observing conditions in the field, record these changes on the site map (Figure 4). Following field sampling, this information is used to update Sample Site GIS geospatial coverages. Also provide rationale for the boundary changes in the Comments section of the site evaluation form

Figure 4. Example annotated access map. Parking area, route to the site from the vehicle, and the visit date have been recorded.



6.2 Field evaluation activities for specific monitoring projects

This section provides specific additional field evaluation requirements according to the different monitoring projects. For MWCA sites, the separate MWCA site evaluation procedure needs to be followed.

6.2.1 Depressional Wetland Quality Assessment

Field evaluation for DWQA Sample Sites has a number of additional requirements compared to other monitoring projects. Greater emphasis is placed on sampleable requirements specific to how the MPCA treats depressional wetlands.

To make these DWQA sampleable determinations, a separate field evaluation visit is typically required between May-June. DWQA overdraw (i.e., replacements for rejected Sites) Sample Sites must also be evaluated in the random draw order to maintain the integrity of the survey design.

The MPCA defines depressional wetlands for the DWQA as wetlands occurring in a depressional landform with a predominantly emergent marsh plant community and a water regime ranging from semi-permanent to permanently inundated with surface water. Depressional wetlands can either be isolated (no discernable outlets), flow-through (apparent inlet and outlet), or tributary (outlet but no perennial inlet) systems. Patterns of emergent vegetation within target depressional wetlands range from complete coverage to total absence (which can occur in severely degraded wetlands). Waterbodies with artificially maintained water levels such as wastewater treatment ponds, aquaculture impoundments, and cranberry ponds are not considered part of the target population.

Complete the following steps (after the steps in Section 6.1 have been completed) for DWQA field evaluation:

- 1) Gather DWQA information:** It is the intention of the DWQA to measure wetlands that are considered waters of the state, which can briefly be defined here as any wetland not being used as a treatment system operated under permit. Throughout Minnesota there are many manmade waterbodies that can resemble wetlands, but were not created with the intention of providing wetland habitat, as well as highly altered wetlands that have been legally mitigated for. In most cases, such waterbodies are not considered waters of the state. Alternatively, created, restored, and managed wetlands that clearly were manipulated for the purpose providing wetland area (and thus are waters of the state) also occur throughout the state and share many of the same features (e.g., linear shore lines, predominance of shallow open water). Aerial photointerpretation alone cannot reliably distinguish these manmade wetland habitats from other manmade or highly altered waterbodies and thus cannot provide the regulatory status of individual waterbodies. Even when visited during field evaluation, determining whether a particular waterbody is a water of the state can be a difficult task.

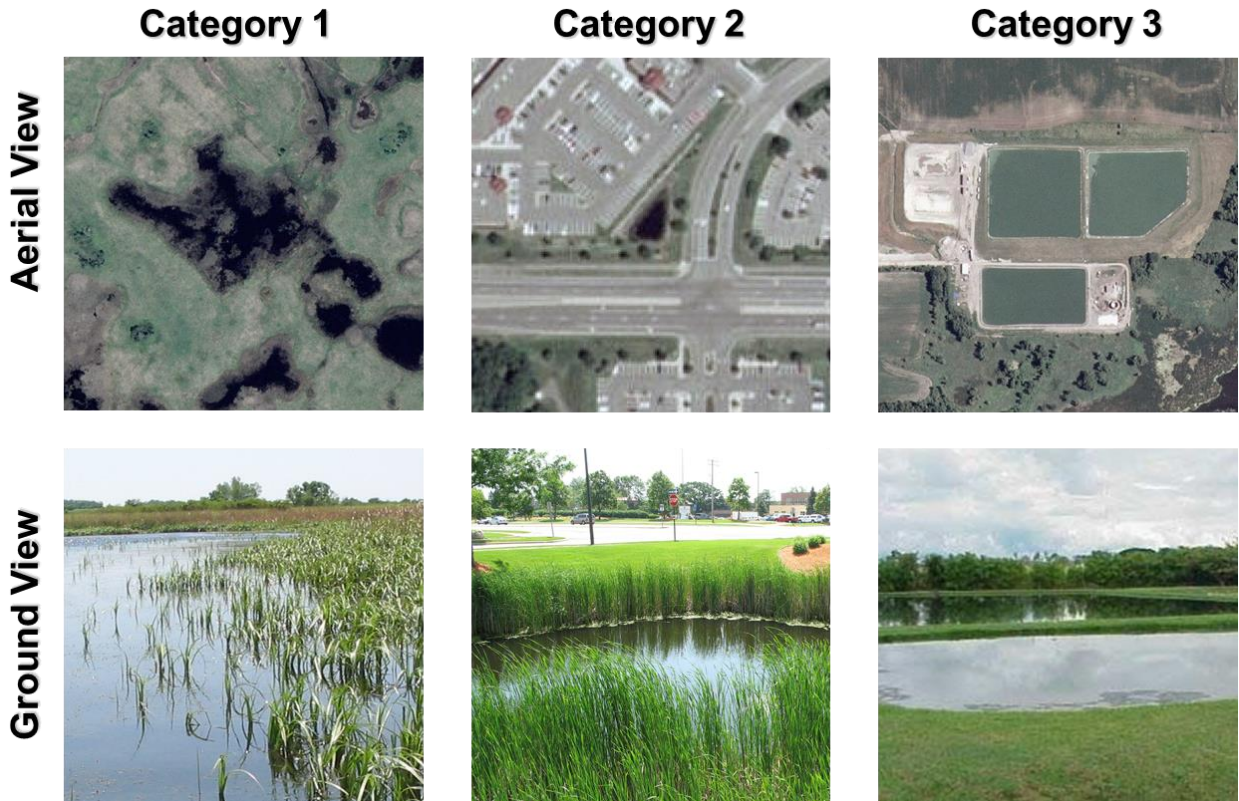
The MPCA has created a simple three level categorization to track wetlands by state waters status for the DWQA. Examples for each category are provided in Figure 5:

- Category 1 includes wetlands that are either natural in origin or have been created for the purpose of increasing and/or replacing wetland habitat (e.g., compensatory mitigation wetlands, waterfowl dugouts). Wetlands in this category are clearly waters of the state.
- Category 2 will be assigned to waterbodies that have either been created or physically altered specifically for treatment, commercial, agricultural, or recreational purposes, but have a natural hydrology and maintain some natural wetland features. Examples include stormwater, livestock (active or abandoned), and recreational ponds. Waterbodies within this category may or may not ultimately be waters of the state. They are questionable waters of the state, and would require further investigation and consultation to make a definitive determination. As they do have some natural wetland features, they are sampled and tracked in the DWQA as a separate category from Category 1 wetlands.

- Category 3 waterbodies are those that are clearly not waters of the state and are thus considered non-target in the DWQA. This category will be assigned to waterbodies that have been created or altered for the purposes listed under Category 2, but also have an artificial hydrology maintained by pumping and/or are lined with geo-textile fabrics, concrete or other such impermeable layers (e.g., livestock manure ponds, wastewater treatment ponds).

Complete the DWQA Category Information section of the site evaluation form. Make specific comments for any marked questions detailing the extent and effect of wetland alteration in the Comments section of the site evaluation form.

Figure 5. DWQA category examples



- 2) **Gather lake characteristics information:** Large depressional wetlands with predominantly open water may be more appropriately treated as shallow lakes and thus be non-target for the DWQA. In this scenario, the depressional wetland vs. shallow lake determination relies on a number of factors including public use and shoreline features.

Complete the Lake Characteristics section of the site evaluation form if any of these features are observed. Make specific comments for any marked questions in the Comments section of the form. A final depressional wetland/shallow lake determination will be made after field evaluation has been concluded.

- 3) **Determine macroinvertebrate sampleability:** For macroinvertebrates, a site meets the minimum sampling requirements if it has: 1) a minimum surface water depth of 15-20 cm during the sample index period of June, and 2) a littoral zone that can be safely and effectively sampled without the use of a boat (e.g., deeper wetlands fringed by floating mat communities often cannot be sampled for macroinvertebrate due to safety considerations). Mark the appropriate boxes in the Invertebrate Sampleability section of the site evaluation form.

- 4) **Take field evaluation photographs:** As field evaluation for the DWQA is typically done during a separate visit, then photographs will be required. Field evaluation photographs should be taken such that they provide an overview of the site and/or the emergent-open water interface where macroinvertebrate and water sampling is located. Record relevant information about any field evaluation photographs (e.g., time of the photograph, description of the view) in the Comments section of the site evaluation form.
- 5) **Determine the DWQA category and site evaluation status:** Based on the observations made during site evaluation and recorded in the previous sections, make final DWQA Category and site evaluation status determinations and record results on the site evaluation form. Further affirm the status of the Sample Site by completing the Site Elimination section of the site evaluation form.

6.2.2 Watershed support monitoring

Field evaluation for watershed support monitoring is not as prescriptive as the DWQA, but does depend on the monitoring objectives which are typically specific for a Sample Site (see Section 5.2.3 for support monitoring objectives). Typically, no further field evaluation is required beyond activities completed in Section 6.1 as most of the focus of watershed support monitoring is vegetation based sampling. However, if macroinvertebrate sampling is an objective, the Invertebrate Sampleability section of the site evaluation form should be completed. Additionally, if the monitoring objectives include wetland determination of stream or lake features and/or hydrogeomorphic wetland functional classification, some additional field evaluation activities may be required. Senior wetland monitoring staff should be consulted for these situations.

6.2.3 Program development, trend sites, and regulatory effectiveness monitoring

Field evaluation requirements for program development, trend, and/or regulatory effectiveness monitoring projects will be variable. Program development efforts are typically unique to the issue of scientific interest. Consult senior monitoring staff for any additional field evaluation requirements. Trend Sample Sites typically do not require field evaluation as they have typically been visited multiple times and the boundaries and access information are well established. Regulatory effectiveness monitoring is targeted at specific wetlands and monitoring objectives are developed in consultation with regulatory staff. Any additional field evaluation activities will be defined according to specific monitoring needs.

7. Data security

The following action steps must be taken after field evaluation has been completed:

- **File completed site evaluation forms:** Remove completed forms from the clipboard, dry them (if necessary) and securely file them in their designated site files. Complete this step on a daily basis during field evaluation.
- **Download data:** Download any and all new coordinate data from the field GPS and all digital photographs. Save them using appropriate file naming conventions in designated file directories. Delete data on field GPS units and cameras to avoid making duplicate copies from downloading the same files multiple times during the field season. Complete this step on a weekly basis.

- **Update site tracking tables and GIS coverages:** Site evaluation results need to be entered on the designated Sample Site tracking database tables and GIS geospatial coverages on a weekly basis.

8. Quality assurance/quality control

Compliance with this procedure will be maintained through annual internal reviews. Technical personnel will conduct periodic self-checks by comparing their results with other trained personnel.