Ducks Unlimited Canada

Manitoba Prairie Wetland Classification Guide

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PURPOSE

This guide is designed to aid landowners in efficient and informed classification of wetlands when submitting a Water Rights application for legal drainage or other water management activities on their property. This guide provides the means for identifying class 1 and 2 wetlands for conservation programs such as GROW.

POLICY CONTEXT

This guide supports the new Manitoba Water Rights regulation, by guiding landowners to more effectively classify wetlands for registering or licensing of wetland drainage projects. It also supports the recent announcement by the Manitoba government on the GROW trust.

REFERENCE DOCUMENTS

Extensis. 2018. GeoViewer 9. Accessed 14 December 2018 from https://www.extensis.com/support/geoviewer-9.

National Wetlands Working Group. 1997. The Canadian Wetland Classification System, 2nd Edition. Warner, B.G. and C.D.A. Rubec (eds.), Wetlands Research Centre, University of Waterloo, Waterloo, ON, Canada. 68 p.

Stewart, R.E. and Kantrud, H.A., 1971. Classification of Natural Ponds and Lakes in the Glaciated Prairie Region (No. 92). U.S. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife.

AUTHORS, CONTRIBUTORS

- Native Plant Solutions

CITATION

Ducks Unlimited Canada. 2019. The Manitoba Wetland Classification Guide. Native Plant Solutions. Winnipeg, MB.

INTRODUCTION

The Province of Manitoba recently proclaimed the Sustainable Watersheds Act which includes updates to the water management and licensing processes. The two main goals for the regulation stemming from this legislation include streamlining approvals for low risk projects and a commitment to no-net-loss of wetland benefits. The new regulation will allow drainage projects that meet defined criteria to be registered in an on-line process. Land drainage works 12 inches or less in depth below *prairie level* will be eligible for registration as long as they do not result in drainage or alteration of Class 3, 4 or 5 wetlands. Proposed drainage projects affecting Class 1 and 2 wetlands will be eligible for the registrable projects category.

The ability to correctly classify wetlands to meet the regulatory rules is key to meeting no net loss and determining project eligibility for rapid registration. Landowners will be required to make the initial classification of all wetlands involved in their drainage project. Misclassification of wetlands can lead to serious *habitat* and regulatory implications. It is in the interest of landowners to correctly classify wetlands to meet the regulation and streamline the registration process as well as to access provincial conservation programs.

HOW THIS GUIDE CAN HELP YOU

This guide is designed to aid landowners in efficient and informed classification of wetlands when submitting a Water Rights application for legal drainage or other water management activities on their property. Better classification will lead to a more streamlined registration and approval process as well as access to conservation programs by eliminating discrepancies relating to the wetland classes reported. It is important that classification is done accurately for both legal and conservation reasons. Correct classification limits contributions to ongoing loss of important wetland habitats, which can result in increased flooding and loss of drought resiliency. Legally, incorrect classification leading to the drainage of a protected wetland can result in enforcement and fines as governed under the Water Rights Act. This manual is designed to assist in an informed classification and allow regulatory efficiency and certainty while protecting wetland habitat and function.

USING THIS GUIDE

This guide is designed for ease of use and understanding, leading to informed classification of wetlands on your property. As a landowner, this guide will help direct you in gathering information, including available imagery of the wetland, plants, soil and land use. This information can then be interpreted using the decision key provided in this document to identify the class of wetland in question. A glossary of *terms* used in this guide is provided at the back. This information can be used when applying for a license or registration for drainage or water control works on your property.

This guide applies to wetlands within prairie Manitoba. If your project involves wetlands in the boreal landscape, please contact your local Water Resource Officer for specific instructions.

WHAT IS A WETLAND?

A wetland is defined as land that is *saturated* with water long enough to promote wetland or aquatic processes as indicated by *poorly drained soils*, vegetation and other biological activity adapted to a wet environment (National Wetlands Working Group 1997). The degree of water permanence (the depth and duration of water present) in a wetland will result in the formation of wetland soil characteristics and growth of specific plant communities adapted to growing in wet conditions.

Plant communities in wetlands can be grouped into vegetation zones that are important in wetland classification. These zones represent areas within the wetland where various plant species grow together in similar soil and wet conditions. Different vegetation zones establish in specific locations depending on the amount of soil moisture or standing water present in the wetland (**Figure 1**). For example, some plants are better adapted to growing in shallower water and therefore, will not survive in deeper flooded areas of a wetland.

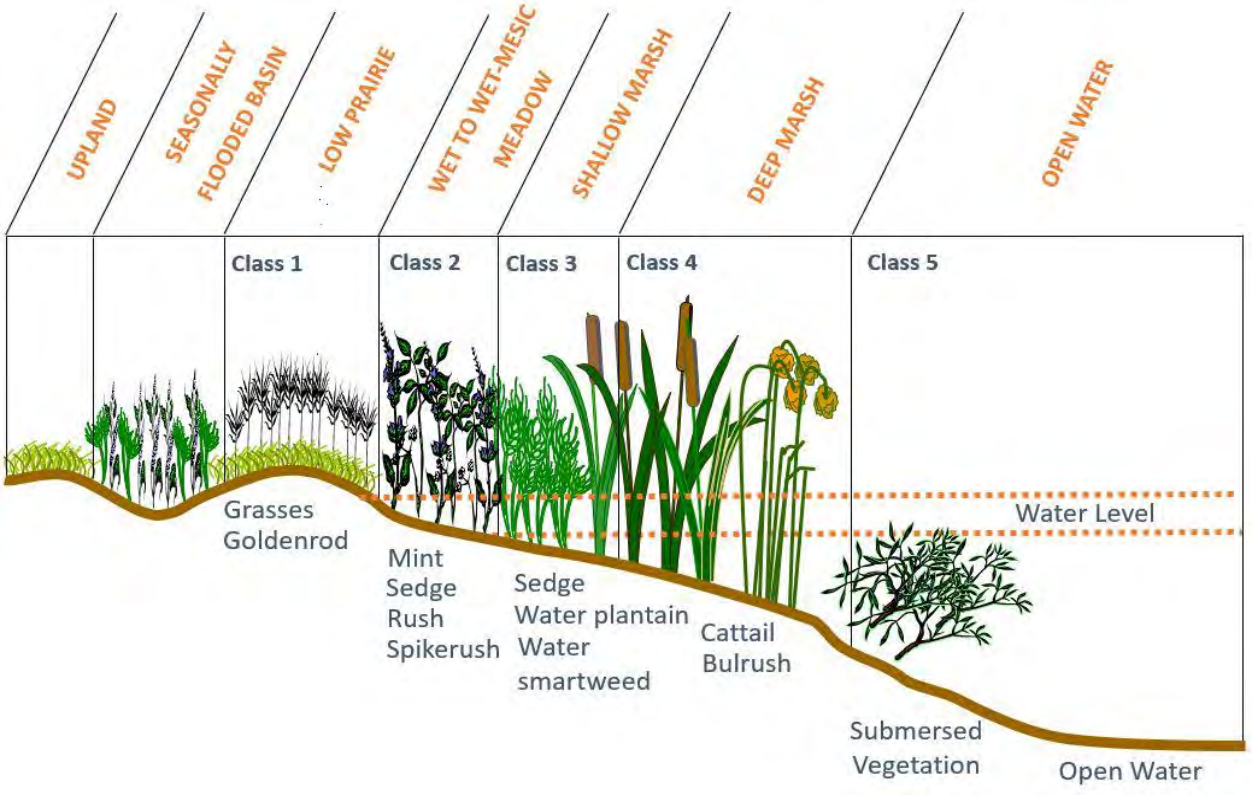


Figure 1. Side profile of vegetation positioning in prairie wetlands with the water level line approximating where water would sit during a normal growing season after spring snow melt. (courtesy of Native Plant Solutions)**.**

The deeper a wetland is flooded the more vegetation zones present (**Figure 1**). In wetlands with multiple zones, one zone will usually occupy the central area of the wetland, while others occur as concentric bands based on water depth or soil moisture (**Figure 2**). The central area of the wetland often represents the area with the deepest water present, or if water is absent at the time of your visit, the lowest area or elevation in the wetland.

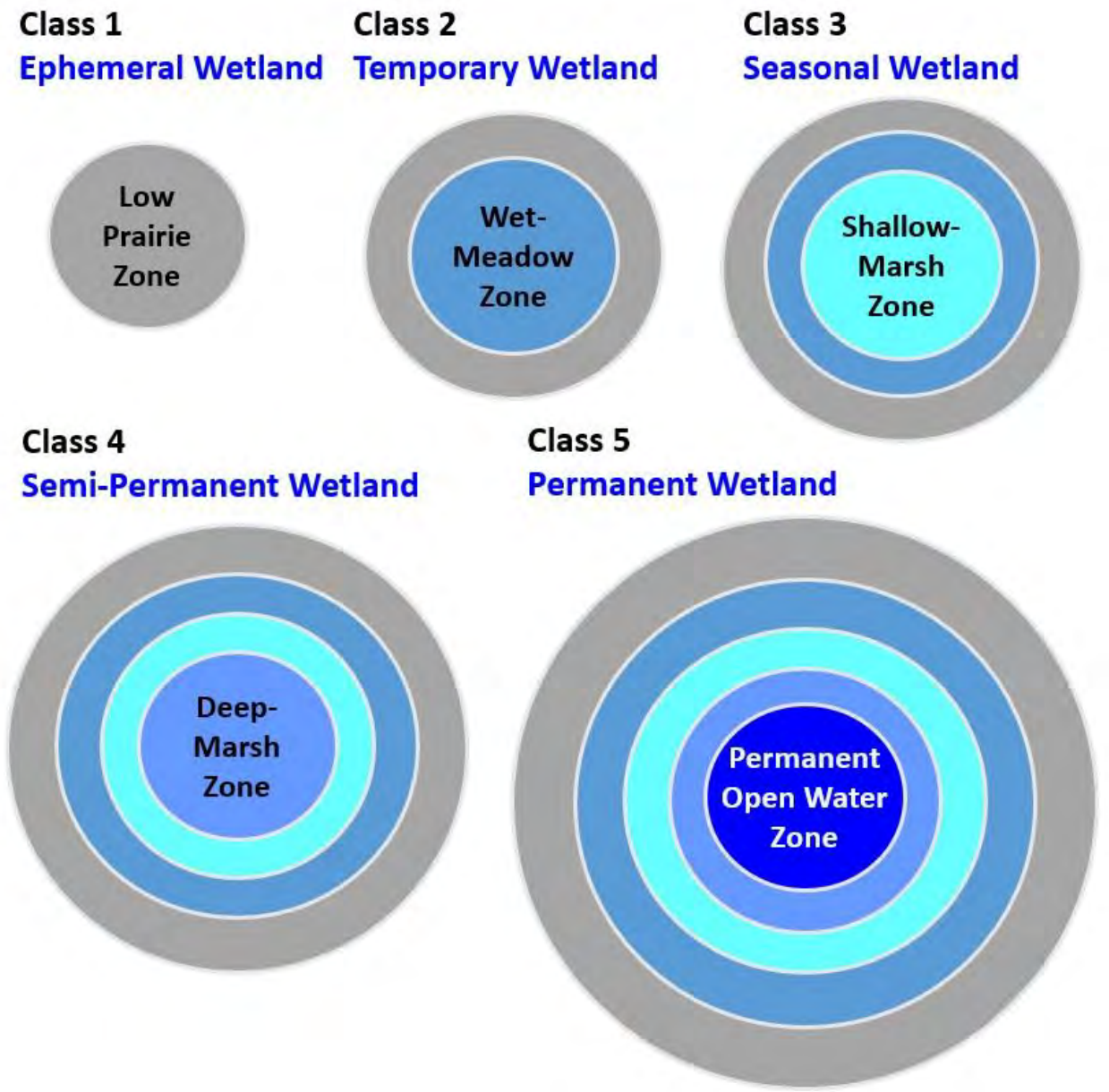


Figure 2. Vegetation zones in prairie wetlands assuming water has drawn down and basins are dry (with exception of Class 5; courtesy of Native Plant Solutions)**.**

Identification of these zones is one tool you can use in distinguishing the major classes of wetlands. The vegetation zone that dominates the central portion of the wetland, as defined above, along with water presence and soil indicators, is used to determine wetland class. Note that in basins that are cultivated, either entirely or partially, these zones may not always be present or easily distinguishable. The species found in cultivated basins tend to be weedy, while undisturbed basins are dominated by native plant species.

WETLAND CLASSES

Wetland classification used by the Water Rights Regulation is based on the system established by Stewart and Kantrud (1971; Figure 2). Prairie wetland classes range from 1 through 5, with Class 1 wetlands being temporarily flooded in the spring to Class 5 wetlands holding water in almost all years. **Appendix A** provides photo examples of the five wetland classes.

An increase in wetland class and water permanence often results in an increase in the types of plant species present and a general change in the height and structure of plants. In the *low prairie zone* native plants tend to be small and fine (e.g., grasses, flowers), while in the *deep marsh zone* plants have evolved to survive growing in deeper water and are therefore taller and more robust (e.g., cattail). Plant species allow wetlands to provide food and shelter for wildlife during breeding, migration and over-wintering seasons. Higher class wetlands (e.g., Class 3, 4 and 5) have a greater capacity for flood and drought prevention because of their increased ability to store water. For these reasons it is important to classify each wetland properly to ensure habitat and functions provided by wetlands are maintained.

CLASS I EPHEMERAL WETLAND

WETLAND CLASS FACT SHEET

INDICATORS

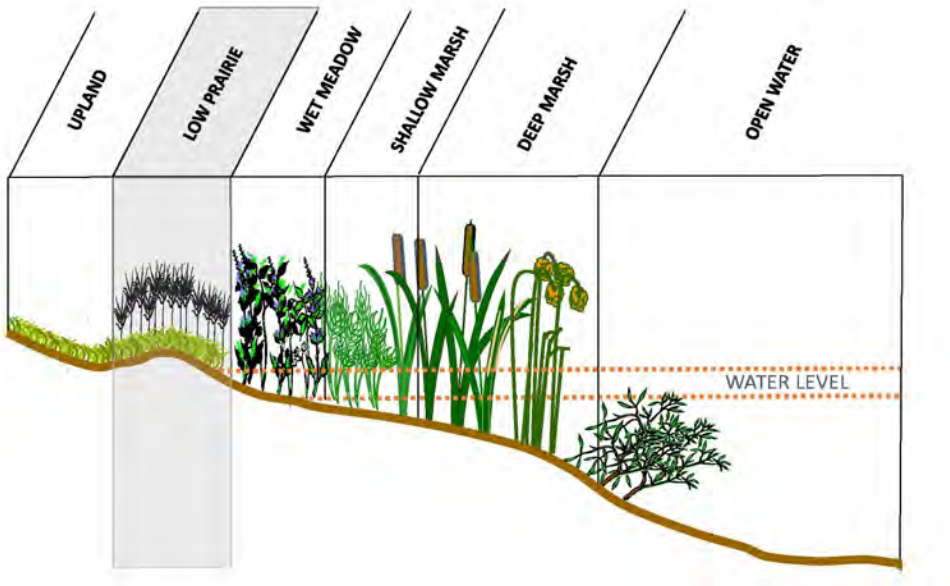
- The porous soils (i.e., silt and sand) in these wetlands allow water to drain quickly. As a result, surface water is present for 1-3 weeks in the early spring (April through early-May) depending on the amount of snow. These wetlands go dry once the ice seal in the soil has melted, allowing for quick drainage of water into the soil.
- The vegetation community at the greatest water depth, or lowest elevation of this class is the low prairie zone.
- These wetlands are often cultivated and seeded in springs with dry and normal moisture years.
- These soils possess no hydric indicators indicating the presence of prolonged soil moisture

Concentric ring of wet zone vegetation associated with Class 1 wetlands.

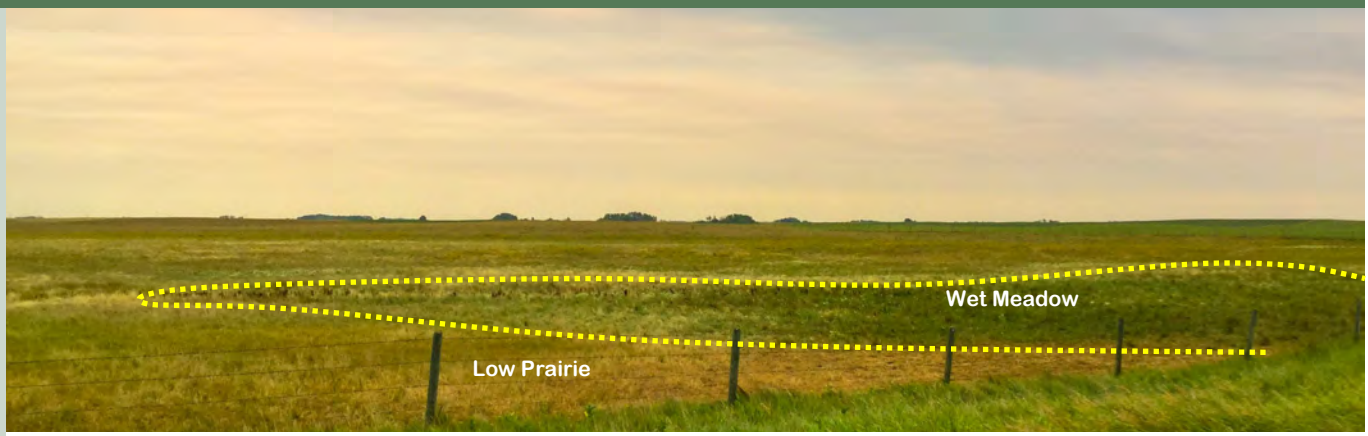
LOW PRAIRIE ZONE

- Includes plant communities adapted to growing in moist soils
- Common species present include Kentucky and fowl blue grass, dandelion, field bindweed, kochia, goldenrod, asters, snowberry and wheat grasses.
- This zone is often cultivated in spring because of drier soil conditions

Northern wheatgrass (*Elymus trachycaulus)*



CLASS 2 TEMPORARY WETLAND



INDICATORS

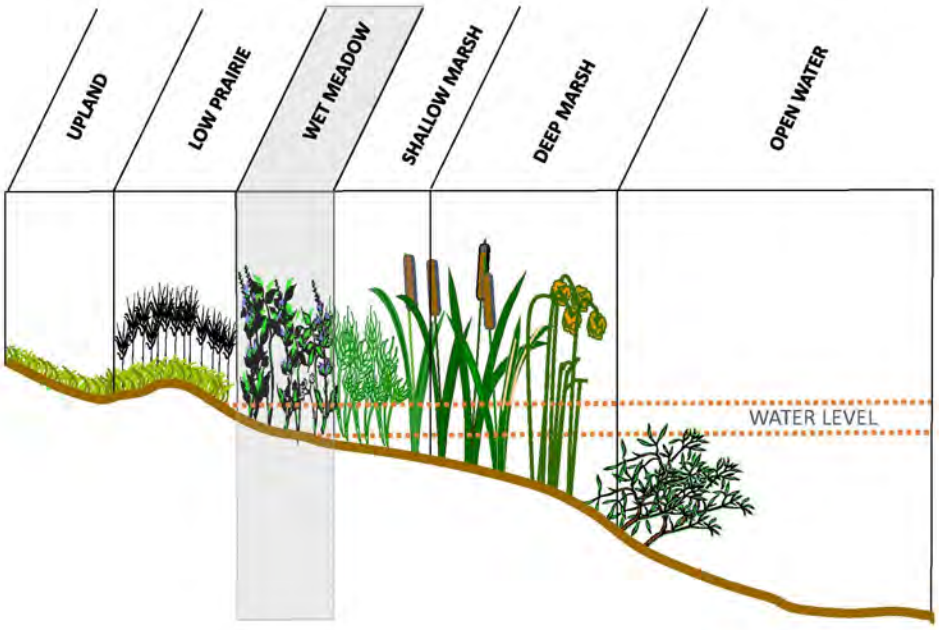
- Class 2 wetlands hold water for a short time in the spring, generally 2 to 6 weeks in normal snowmelt springs (April through mid-June).
- Often holds water for several days after a heavy rainfall event
- Dominated by a wet meadow zone at the greatest water depth, or lowest elevation, in the wetland.
- Are usually cultivated in the spring, supporting crop growth in dry to normal moisture years. In wet years it may be seeded later than the rest of the land.
- These soils show no hydric indicators indicating the presence of prolonged soil moisture.

WET MEADOW ZONE

- Includes plant communities adapted to growing in moist soils, but not prolonged flooded soils
- Species present include sedges, rushes, cordgrass, dock, potentilla and foxtail barley.

Concentric rings of increasingly wet zone vegetation associated with Class 2 wetlands

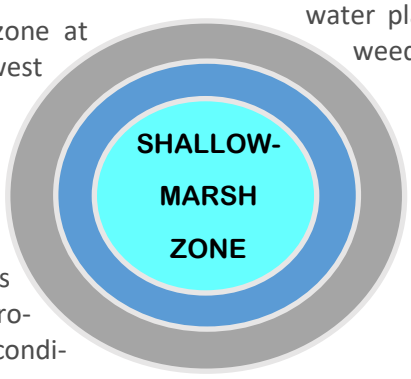
Curled dock (*Rumex crispus*)



CLASS 3 SEASONAL WETLAND

INDICATORS

- Surface water present for an extended period in spring through mid-summer (April through mid/late-July) in normal moisture years.
- In most years this wetland class becomes dry by late summer.
- Dominated by a shallow marsh zone at the greatest water depth, or lowest elevation, in the wetland.
- May be used for hay once soils have dried below the shallow marsh zone.
- These soils show hydric indicators such as mottling, indicating a prolonged presence of flooded soil conditions.

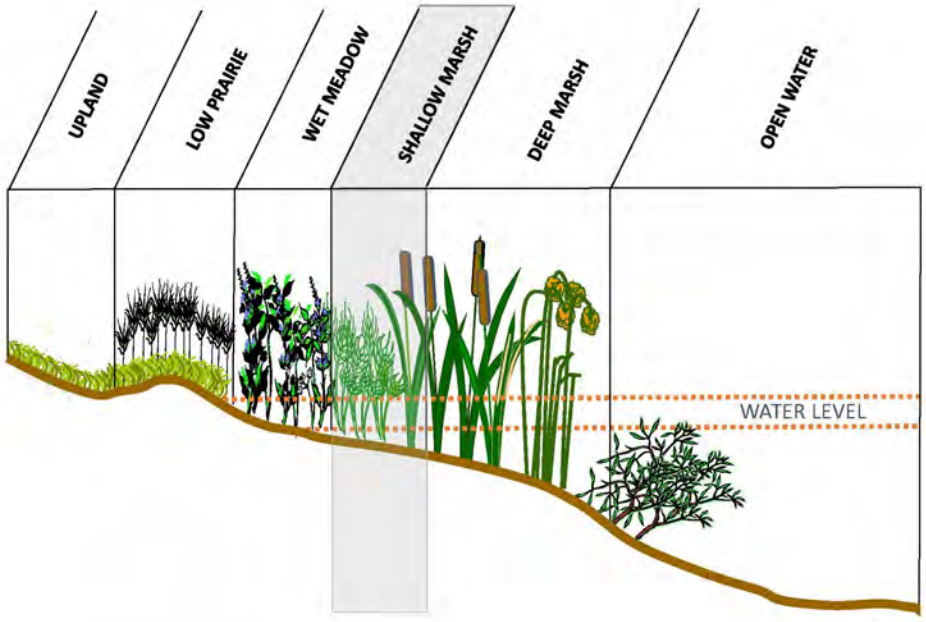


Concentric ring of increasingly wet zone vegetation associated with Class 3 wetlands

SHALLOW MARSH ZONE

- Includes plant communities adapted to growing in shallow flooded conditions (10 to 30 cm of water) for prolonged periods of time.
- Species present include softstem bulrush, water plantain, water parsnip, water smart weed, sedge, sloughgrass, giant burreed,

Sedge *(Carex* sp.*)*



CLASS 4 SEMI-PERMANENT WETLAND

INDICATORS

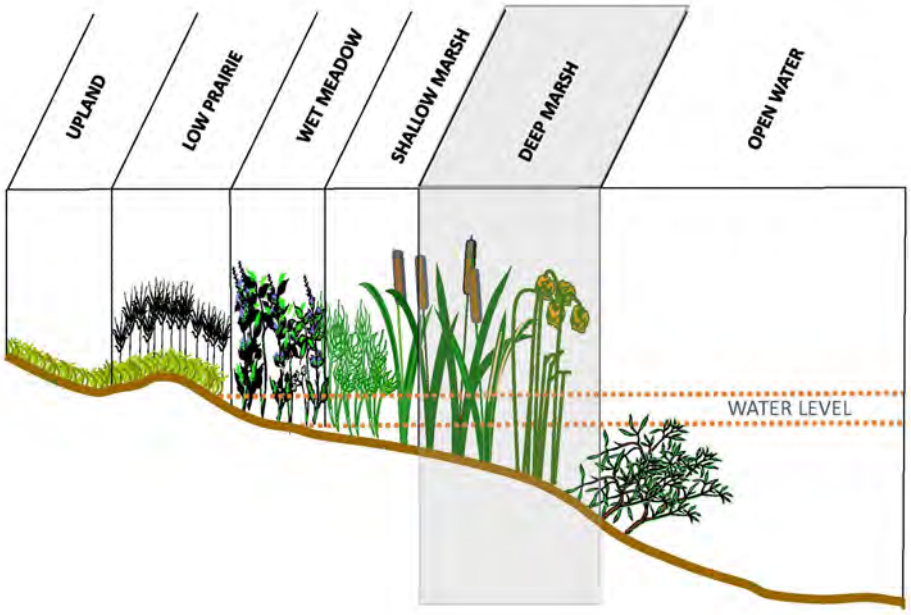
- Maintains surface water from April through September/October in most years (4 out of every 5 years).
- Wetland may or may not become dry by late August or September in normal moisture years.
- Dominated by a deep marsh zone at the greatest water depth, or lowest elevation, in the wetland.
- Soils in the deep, shallow and wet meadow zones show hydric indicators such as mottling and gleying, indicating a prolonged presence of flooded conditions in the soil.

Concentric rings of increasingly wet zone vegetation associated with Class 4 wetlands.

DEEP MARSH ZONE

- Includes plant communities adapted to growing in deeper flooded conditions (30 to 60 cm of water) for prolonged periods of time.
- Species present include hardstem bulrush, river bulrush and broad-leafed cattail.
- Often develops an open water area with plants such as duckweed, bladderwort, and sago pondweed.

Hardstem Bulrush (*Schoenoplectus acutus*)



CLASS 5 PERMANENT WETLAND

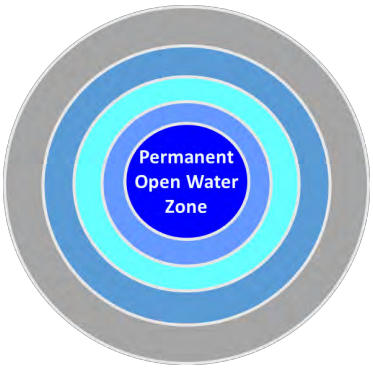
INDICATORS

- Maintains surface water year-round in most years (9 out of every 10 years).
- Dominated by a permanent open water zone at the deepest point, or lowest elevation, in the wetland.
- Soils in the deep, shallow and wet meadow zone show hydric indicators such as mottling and gleying, indicating a prolonged presence of flooded soil conditions.

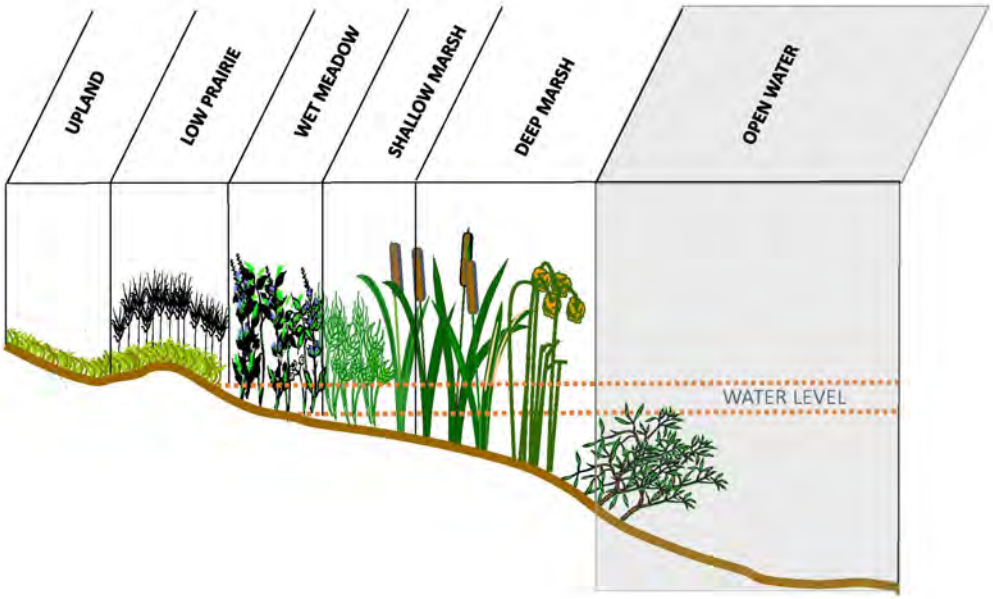
Submerged and floating plants

OPEN WATER ZONE

- Occurs within the deepest flooded area of a wetland, with water depths too deep for plants such as cattail and bulrush to survive.
- Often contains floating or submerged plants such as sago pondweed, hornwort, bladderwort and algal mats.
- Class 5 wetlands may go dry in extreme droughts (1 in 10 years). When this zone is dry a patch of bare ground will be present where the open water zone was (See Appendix A).



Concentric rings of increasingly wet zone vegetation associated with Class 5 wetlands.



WETLAND CLASSIFICATION TOOLS

Hydrology

It is important when assessing a site to consider what type of moisture year it is (dry, normal or wet). This may be done through general observations of precipitation over the previous winter and spring, or through identifying snowfall and rainfall averages for the area through Environment Canada. This information gives perspective on how much and for how long a particular wetland class may hold water in a summer. Determining how long the wetland holds water in any given year provides critical information on the wet/dry cycling of a wetland and the wetland class that results. Investigating a site's *hydrology* involves taking notes on how often the site in question is cultivated or hayed (e.g., 1 in every 5 years, 1 in every 2, or annually). In a normal moisture year Class 1 and 2 wetlands will be dry by June. Therefore, it is important to note if a wetland basin is holding water during the prescribed inspection time (late July to early August). Take note of recent rain events that have taken place up to a week before the inspection. If the wetland has ample standing water with cattail and bulrush present it is likely a Class 4 or 5 wetland. If a wetland shows evidence of saturated soils with possibly small pools of water present in mid-summer then proceed to identify vegetation and soils to further define the wetland as Class 2 or 3.

It is normal for the hydrology of a wetland to fluctuate from one year to the next based on climate patterns (e.g., snowfall, rainfall and timing of events). During a dry moisture year a Class 4 wetland may be dry by late summer rather than fall. During an extremely dry summer a Class 4 wetland may remain dry the entire summer. Likewise, in a very wet winter and spring a Class 2 wetland may hold water into early summer. Determining if it is a wet, dry or a normal moisture year will aid in more accurate wetland classification. During years of extreme drought, with little winter and spring precipitation, a wetland might not hold water. Even Class 5 wetlands may go dry. Classification will then rely on other characteristics such as vegetation and soils.

Vegetation

It is best to collect vegetation information during late July to early August to ensure that most plant species are in flower, allowing for easier plant identification. Take note within the wetland of what species dominate the deepest area or lowest elevations of the wetland (often the center). See Appendix D for photos of common plant species found in the 5 vegetation zones (*low prairie*, *wet meadow, shallow marsh, deep marsh* and *open water*). Several online plant identification guides are also available to aid you in determining what plant species are present at your location (**Table 1**).

Table 1. Online plant identification guides

Title	Description and Source
Minnesota Wildflowers – A field guide to the flora of Minnesota	Online field guide for identification of common wetland plants of Minnesota. Plants can be searched by common or scientific name and links organized by species lead to factsheets with photos and identification keys
	https://www.minnesotawildflowers.info/page/aquatics?pID=0
Saskatchewan Forage Council Field Guide: Identification of Common Riparian Plants of Saskatchewan	Online field guide for the basic identification of common riparian plants of Saskatchewan.
	http://www.naturesask.ca/rsu_docs/common-riparian-plants-of-sask--sask-forage-council.pdf
Manitoba Agriculture Weed Identification Guide	Web links includes photos and information to help identify the most common *weeds* found in Manitoba. Plants can be searched by common name or family name.
	https://www.gov.mb.ca/agriculture/crops/weeds/index.html
Canadensys Database of Vascular Plants of Canada	Database of Vascular Plants of Canada (VASCAN). It is a comprehensive list of the occurrence and identity of all vascular plants reported in Canada, with data on provincial distribution. Search engine 'Name Search' or 'Images' for taxon (scientific name) that can be that can be viewed online.
	http://data.canadensys.net/vascan/search http://images.canadensys.net/?lang=en
Tropicos Biological Specimen Database	Electronic plant database containing numerous specimen records. Search engine for taxon (scientific, common name) that can be viewed online.
	http://www.tropicos.org/

If a species cannot be identified, take photos of distinguishing features of the plants (e.g., stems, leaves, flowers, fruit) and submit photos to a plant or wetland specialist for identification. If species can be identified compare the species observed on site to the list of species found in each plant zone to determine which zone dominates the deepest area of the wetland. See which wetland class this zone is attributed to. A Class 2 will possess a low prairie and wet meadow zone, a Class 3 wetland will also possess a shallow marsh zone, while Class 4 and 5 wetlands will also possess a deep marsh zone. Keep in mind Class 2-5 wetlands will have multiple vegetation zones present, often forming bands of plant communities around them based on the amount of water present within that location in the wetland (**Figure 2**).

Soil Indicators

Figure 3. Soil pit laid out for observation.

Indicators in the soils of wetlands help to verify the permanence and movement of water within soil or *soil profile*. These indicators can be observed by digging a shallow, 60-cm deep soil pit (**Figures 3 and 6**) and laying the soil profile out on the ground as you dig, looking for different soil colors the deeper you go. Soil pits are good for examining soil layers and displaying *hydric soil* indicators such as mottles (**Figure 4**) and gleying (**Figure 5**) within the soil profile (**Appendix F**).

Soils that experience intermittent wetting and drying, such as soils found in Class 3 wetlands, experience a redistribution of iron in the soil profile. Mobile iron in the soil moves when the soil becomes wet, and then precipitates in the soil as the soil dries out. In Class 3 wetlands this redistribution and precipitation of iron results in the formation of visible orange to reddish colored spots within the soil profile or mottles (**Figure 4**).

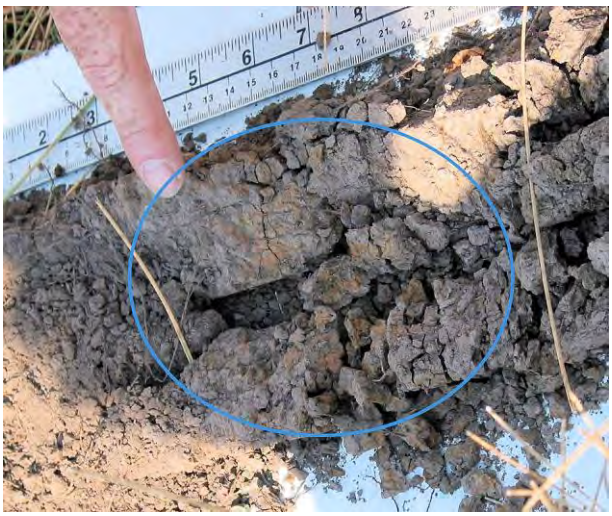


Figure 4. Example of mottles in soil

Poor drainage and persistent low oxygen conditions in soils result in reducing conditions and a color change in the soil, particularly in permanently flooded soils such as those found in Class 4 and 5 wetlands. A permanent lack of oxygen in the soil profile, also known as gleying (**Figure 5**), affects the way the soil handles iron (Fe^{3+} to Fe^{2+}). This causes the soil to take on a green, grey or bluish color compared to the naturally occurring brown and black soils found in upland areas.

In landscapes where surface vegetation has been disturbed or altered due to cultivation or drainage, a soil investigation may be your only tool for determining wetland class. Soil pits are best dug when the wetland has gone dry, or when water has receded inward and away from the outer margins of the wetland (e.g., late July through early October). A minimum of 2 to 3 soil pits are recommended per wetland basin.

Figure 5. Example of gleying in soil

If possible soil pits should be dug in what would have been the deepest flooded portion of the basin. Identifying these locations on available aerial photos of the site can help with this. For wetlands still holding water, soil pits should be dug as close to the water's edge without the pit filling in with water. If this occurs, move further out from the water's edge. Lay out the extracted soil alongside the soil pit in chronological order (e.g., from shallowest to deepest) as it is removed from the pit (**Figure 6**).

Figure 6. Example of how soil from soil pit should be laid out

Examine the extracted soil for evidence of mottling and gleying. If you are unsure about the presence or absence of these indicators take photos of the extracted soil from the pit and submit them with your application. Soil mottles and gleyed soils will only be present in seasonal to permanent wetland classes (i.e., Class 3, 4 and 5). Mottled and gleyed soils will not be present in Class 1 and 2 wetlands. See **Appendix F** for additional examples of mottling and gleying.

STEPS FOR CLASSIFYING YOUR WETLAND

1. Determine the best timing for data collection

Data collection is best done in late July through early August. Conducting the data collection at this time increases the ease and accuracy of the data and its interpretation. Data collection includes acquiring available aerial imagery of the site, and identifying plant species, vegetation zones and wetland soil indicators by collecting data in the field. Most plants are mature and flowering in late July and August, making for easier identification. In normal moisture years Class 3 wetlands may still be holding some water, while Class 2 wetlands will be dry, helping to differentiate between these two classes. Class 2 and 3 wetlands are the most difficult and important to differentiate as it will determine if the wetland is protected (Class 3, 4 and 5) or not (Class 1 and 2). However, if you know you will be submitting a water rights application, monitoring the site over 2-3 years, or in at least one year from early spring until winter will help to better understand what class it is. Data forms, provided in **Appendix B**, can be used to record data. A quick reference guide on wetland classes and associated vegetation zones and plant species can be found in **Appendix C**.

2. Collect and inspect available aerial imagery

Obtaining aerial photos that span multiple years and seasons of the wetland in question will allow you to observe how water levels fluctuate between seasons and between years. Determine what sources of imagery are available for your area. This can be done through your local Rural Municipality (RM) or Conservation District (CD) office, as well as on-line through Google Earth. See 'Wetland Classification Tools' for a description on the types of aerial imagery that may be available and where to find it. If imagery is found, record the dates of the images and the condition of the wetland in question (i.e., wet, dry).

3. Local knowledge of the site

Your local knowledge of the wetland in question is valuable for determining wetland class. Consider the following when using the decision key to determine the class of a wetland:

- Has the wetland ever been cultivated?
    - If yes, what time of the year is it dry enough to cultivate?
    - Can it only be cultivated in a *dry moisture year*? *Normal moisture year*?
    - How often can it be cultivated? (i.e., every year, 1 in every 5 years, 1 in every 10 years, etc.)
- Has the wetland been used for hay?
    - If yes, what time of the year is it dry enough to mow?
    - Can it only be hayed in a dry moisture year? Normal moisture year?
    - How often can it be hayed? (i.e., every year, 1 in every 5 years, 1 in every 10 years, etc.)
- Does the wetland typically hold water year round?

4. Plant observations

Determining the plant species present in the wetland basin will indicate wetland. In the field, locate the area of the wetland that possess the deepest standing water, or if dry, the lowest elevation. Identify the plant species that dominate this area (See 'Wetland Classification Tools' for plant identification resources and **Appendix D** for common plant species). The plant species in this community will determine what vegetation zone dominates the wetland and therefore what wetland class it is (See **Appendix C** for the Wetland Classification Quick Reference table).

5. Wetland soil indicators

Observing wetland soil indicators is done at the wetland site. Investigating soils provides one of the most streamlined tools you possess for correctly determining wetland class. This requires a shovel to dig a 60 cm deep soil pit in what would have been the deepest *flooded* area of the wetland (if dry), or as close to the water's edge without the pit filling with water. Lay the soil out beside the pit from shallowest to deepest. Determine if *mottles* or *gleying* is present and record observations in the field form. See the section on Soil indicators below for descriptions of mottles and gleying. Identifying the presence of wetland indicators within soils provides the most effective data for accurately identifying the class of a wetland.

6. Field forms

Ensure that all data required is noted on the field form. This will make using the decision key more simple and accurate.

7. The Wetland Decision Key

Using the data that has been described above select the appropriate decision key for the wetland in question (i.e., see disturbed or undisturbed wetland classification in **Figures 9 and 10**). Navigate the flow chart using the collected data, your field forms and the information provided in this guide to record your class result.

There are several steps that should be done in sequence. Following the reference material in this guide can help you. Your final classification will be based on your visual observations and your local knowledge of the water permanence of the wetland under consideration, however further data collection may be required to best understand your site. Fill in the field form found in Appendix B as you collect data to ensure that you have all the information you need to complete the application process.

WETLAND CLASSIFICATION DECISION KEY

The decision keys provided are tools to more effectively guide wetland classification using the data and observations recommended in this field guide. Once hydrology, vegetation and soil indicator data has been collected you can navigate the decision key to arrive at the appropriate wetland classification. Two keys are provided; the first key (**Figure 9**) is tailored for wetlands whose surface vegetation and hydrology has not been altered by human impacts, such as cultivation through the wetland or wetland drainage. The second key (**Figure 10**) is for those wetlands whose surface vegetation or water holding characteristics have been altered by human activities (**Figure 7, 8**).

Figure 7. Wetland affected by cultivation.

Figure 8. Class 2 wetland affected by cultivation.

FIGURE 9. UNDISTURBED AND UNCULTIVATED WETLANDS

WETLAND CLASSIFICATION DECISION TREE

1) Is the basin holding water during site inspection (late July-early August)?

NO → **Possible CLASS 1 or 2**

YES → **Possible CLASS 3, 4, 5**

2a) Check site for:

- ☐ Soil: Is there mottling and/or gleying present in the soil extracted from a soil pit?

NO → **CLASS 1 or 2**

YES → **Possible CLASS 3, 4, 5**

2b) Check site for:

- ☐ Vegetation: Low Prairie (Kentucky and fowl blue grass, goldenrod, asters, snowberry and wheat grasses)
- ☐ Water: Dry early spring (mid-May) in a normal moisture year.

YES → **CLASS 1**

NO →

3) Check site for:

- ☐ Vegetation: Wet Meadow (sedges, rushes, cordgrass, dock, potentilla, foxtail barley)
- ☐ Water: Dry by mid-June in a normal moisture year.

YES → **CLASS 2**

NO → Re-check beginning at # 1

Complete 4a) or 4b)

4a) Check site for:

- ☐ Vegetation: Shallow Marsh (softstem bulrush, water plantain, water parsnip, water smart weed, sedge, sloughgrass, giant burred, arrow arum)
- ☐ Water: Dry mid to late July in a normal moisture year.

NO → **CLASS 1, 2 (see #2b)**

YES → **CLASS 3**

4b) Check site for:

- ☐ Soil: Is there mottling and/or gleying present in the soil extracted from a soil pit?

NO → **CLASS 1, 2 (see #2b)**

YES → **Mottles present = CLASS 3**

Gleying present = CLASS 4 or 5

5) Check site for:

- ☐ Vegetation: Deep Marsh (hardstem bulrush, river bulrush, broadleaf cattail, duckweed, bladderwort, and sago pondweed)
- ☐ Water: Holds water until September/October in a normal moisture year.

NO →

YES → **CLASS 4**

6) Check site for:

- ☐ Vegetation: Open water zone (Sago pondweed, hornweed, bladderwort, algal mats, no emergent vegetation)
- ☐ Water: Holds water year round (in 9 out of 10 years)

NO →

YES → **CLASS 5**

7) Check site for:

- ☐ Water levels low, with a mudflat visible in the deepest area?

NO →

YES → **CLASS 5**

Re-check beginning at #4

FIGURE 10. DISTURBED AND CULTIVATED WETLANDS

WETLAND CLASSIFICATION DECISION TREE

1) Is the basin holding water during site inspection (late July-early August)?

NO → **Possible CLASS 1 or 2**

YES → **Possible CLASS 3, 4, 5**

2a) Check site for:

- ☐ Soil: Is there mottling and/or gleying present in the soil extracted from a soil pit?

NO → **CLASS 1 or 2**

YES → **2b)** Check site for:

- ☐ Vegetation: Low Prairie (Green foxtail, flixweed, dandelion, field bindweed, field penny-cress, quack grass and mustard species)
- ☐ Water: Can be seeded at the same time as the surrounding land in most springs.

NO → **3)** Check site for:

- ☐ Vegetation: Wet Meadow (Couch grass, barnyard grass, Canada thistle, curled dock and pale smartweed)
- ☐ Water: Dry by mid-June in a normal moisture year.

YES → **CLASS 2**

NO → Re-check beginning at # 1

YES → **CLASS 1**

Complete 4a) or 4b)

4a) Check site for:

- ☐ Vegetation: Shallow Marsh (Pale smartweed, Canada thistle, goosefoot species, and reed canary grass)
- ☐ Water: Can be used for hay. Is it dry by mid summer (June to July)?

NO → **CLASS 1, 2 (see #2b)**

YES → **CLASS 3**

4b) Check site for:

- ☐ Soil: Is there mottling and/or gleying present in the soil extracted from a soil pit?

NO → **CLASS 1, 2 (see #2b)**

YES → **Mottles present = CLASS 3**

Gleying present = CLASS 4 or 5

5) Check site for:

- ☐ Vegetation: Deep Marsh (Eurasian milfoil, phragmites, narrow-leaf cattail).
- ☐ Water: The wetland typically dries by late fall/winter in a normal year.

NO → **6)** Check site for:

- ☐ Vegetation: Open water zone (Eurasian milfoil, phragmites, narrow-leaf cattail).
- ☐ Water: The water persist all year (except in extreme drought years).

NO → **7)** Check site for:

- ☐ Water levels low, with a mudflat visible in the deepest area?

NO → Re-check beginning at #4

YES → **CLASS 5**

YES → **CLASS 5**

YES → **CLASS 4**

GLOSSARY

Aerial imagery – images gathered from a satellite or an aircraft.

Clay – fine grained soil particles often forming an impenetrable layer in the soil profile.

Deep marsh plants – wetland plants that position themselves in the deep emergent zone and prefer to grow in water depths up to 60 cm (see also emergents and deep marsh zone).

Deep marsh zone – an area of the emergent plant zone that is dominated by wetland plants that prefer to grow in water depths ranging from 30 to 60 cm (see also emergents and deep marsh plants).

Dry moisture year – precipitation levels for the current year are lower than historical average precipitation values.

Emergents – wetland plants rooted in wetland soils, with leaves and stems that grow above (emerge from) the surface of the water. Includes species such as bulrushes, cattails and sedges.

Flooded – surface inundation by slow, moderate or fast moving water. May be associated with sedimentation and erosion.

Gleying – soil condition resulting from prolonged soil saturation, which is observable by the presence of bluish, grey or greenish colours within the soil profile (see also mottling).

Habitat – the specific area or environment in which a particular type of plant or animal lives.

Hydric indicators – signs that demonstrate that moisture is or has been present.

Invasive plant species – a plant species that is not native to a specific region.

Mottling – soil condition resulting from prolonged soil saturation combined with the occasional exposure to oxygen within the soil profile (e.g. wetting and drying), which is observable by the presence of orange and rust colored spots, or streaks, within the soil profile (see also gleying).

Native Plant – a plant species that is indigenous to a given region as a result of natural processes, is adapted to the local environment and has evolved relationships with other organisms in the region.

Normal Moisture Year – precipitation levels for the current year are similar to historical average precipitation values.

Hydrology – the movement and distribution of water on a site including: the inflows and outflows, both surface and subsurface; the flood/drought cycle; the annual water cycle; and environmental watershed sustainability.

Hydric soil – soils formed under conditions of seasonal or permanent water saturation, that lead to soil characteristics developed under anaerobic conditions (lacking oxygen) in the upper part of the soil profile. It is characteristic of Class 3, 4 and 5.

Hydrophytic vegetation – plant-life that thrives in wet soils or flooded conditions (see also wetland plant).

Indicator plant species – the presence of certain plant species that can help characterize specific site conditions.

Low prairie plants – they are typically dominated by Kentucky bluegrass, goldenrod and other wetland or low prairie species.

Low prairie zone – wetland plants that position themselves in the low prairie zone of wetlands and prefer to grow where soils are saturated or holding very shallow water (e.g. 0 to 10 cm) (see also wet meadow zone). The transitional zone between wetlands and uplands where soils are saturated with water just below the soil surface for a very short period of time in April and early May. Positioned between the surrounding uplands and the 'wetter' wet meadow zone of a wetland, it often contains a high plant diversity compared to other wetland zones because of its location.

Open water – an area within a wetland where water depths are deep enough to inhibit the growth of emergent vegetation.

Poorly-drained soils – a condition in which water is removed from the soil so slowly that the soil will hold water periodically or remains wetter for longer periods.

Porous soils – soils comprised of coarse particles (i.e., sand) that allows water to move quickly into the soil.

Prairie level – the existing level of the ground before any excavation, filling or building work occurs.

Sand – a loose, granular component of soil often found in well-drained soil types.

Saturated – a soil condition in which all voids between soil particles within the soil profile are temporarily or permanently filled with water.

Silt – a component of soil with particle size < 74 μm.

Shallow marsh plants – wetland plants that position themselves in the shallow emergent zone and prefer to grow in water depths ranging between 10 to 30 cm (see also emergents and shallow marsh zone).

Shallow marsh zone – an area of the emergent plant zone that is dominated by wetland plants that prefer to grow in 10 and 30 cm of water (see also emergents and shallow marsh plants).

Soil profile – a vertical section of the soil that is exposed by a soil pit.

Species diversity – the number of different plant species present in a plant community or ecosystem and the relative abundance of each species.

Submergent plants – plants that have most of their structures beneath water, but that may not root in wetland soils. Often present in the open water zone of a wetland. Some species have flowering parts that float on, or emerge above, the water surface. Common examples include coontail, milfoils, and pondweeds.

Surface water – water on the Earth's surface found in rivers, streams, ponds, lakes, marshes, wetlands, as ice and snow, and transitional, coastal and marine waters. Although separate from groundwater, surface water is interrelated to groundwater.

Water marks – stains on vegetation or other objects, such as rocks, fences or bridge pillars that indicate where water levels previously sat.

Water permanency – the frequency and length of time a wetland holds water.

Weed – a species that has the potential to outcompete and overpopulate an area interrupting the natural ecological plant composition of an area. It may be native or invasive. Weedy plants tend to grow and reproduce quickly and outcompete other plants.

Wetland plant – any plant adapted to growing on temporary to permanently saturated soils (see also hydrophytic vegetation).

Wet meadow plants – wetland plants that position themselves in the wet meadow zone and prefer to grow where soils are saturated or holding very shallow water (e.g. 0 to 10 cm; see also wet meadow zone).

Wet meadow zone – the transitional zone between wetlands and uplands where soils are saturated with water just below the soil surface. Positioned between the emergent marsh zone and upland areas, it often contains the most plant diversity compared to other wetland zones.

Wet moisture year – precipitation levels for the current year are greater than the historical average precipitation values.

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APPENDIX A— WETLAND CLASS EXAMPLE PHOTOS

CLASS 1 EPHEMERAL WETLAND

CLASS 1 EPHEMERAL WETLAND

APPENDIX A— WETLAND CLASS EXAMPLE PHOTOS

CLASS 2 TEMPORARY WETLAND

CLASS 2 TEMPORARY WETLAND

APPENDIX A— WETLAND CLASS EXAMPLE PHOTOS

CLASS 3 SEASONAL WETLAND

CLASS 3 SEASONAL WETLAND

APPENDIX A— WETLAND CLASS EXAMPLE PHOTOS

CLASS 4 SEMI-PERMANENT WETLAND

CLASS 4 SEMI-PERMANENT WETLAND

APPENDIX A— WETLAND CLASS EXAMPLE PHOTOS

CLASS 5 PERMANENT WETLAND

CLASS 4/5 WETLAND WHEN DRY

APPENDIX B — DATA COLLECTION FIELD FORM

Wetland Classification Field Sheet		
Wetland Location: Legal land description	**Wetland 1**	**Wetland 2**
Wetland Location: GPS coordinates		
Date of Survey		
Site Sketch (label wetland location(s), soil pits, vegetation observations, quarter section, drainage flow) (Y/N)		
Aerial Imagery		
Aerial Imagery found (Y/N)		
Date of Imagery		
Wetland condition in imagery (wet/dry)		
Local Wetland Knowledge		
Has the wetland ever been cultivated? (Y/N)		
If yes, what time of the year is it dry enough to seed in the wetland?		
Can it only be seeded in a dry moisture year? Normal moisture year? Wet moisture year?		
How often can it be cultivated? (i.e., every year, 1 in every 5 years, 1 in every 10 years, etc.)		
Has the wetland been used for hay? (Y/N)		
If yes, what time of the year is it dry enough to mow?		
Can it only be hayed in a dry moisture year? Normal moisture year?		
How often can it be hayed? (i.e., every year, 1 in every 5 years, 1 in every 10 years, etc.)		
Does the wetland typically hold water year round?		
Does the wetland go dry during a normal moisture year? (Y/N)		
If yes, what time of year will it go dry typically?		
Wetland Soil Indicators		
Are mottles present in the soil? (Y/N)		
Is gleying present in the soil? (Y/N)		
Description of soil pit location? (i.e., centre of wetland, edge, depth, etc.)		
Plant species observed at the deepest flooded area of the wetland (lowest elevation if dry)	**Associated Vegetation Zone (Wetland 1)**	**Associated Vegetation Zone (Wetland 2)**

APPENDIX B — DATA COLLECTION FIELD FORM

Wetland Classification Field Sheet		
Wetland Location: Legal land description	**Wetland 1**	**Wetland 2**
Wetland Location: GPS coordinates		
Date of Survey		
Site Sketch (label wetland location(s), soil pits, vegetation observations, quarter section, drainage flow) (Y/N)		
Aerial Imagery		
Aerial Imagery found (Y/N)		
Date of Imagery		
Wetland condition in imagery (wet/dry)		
Local Wetland Knowledge		
Has the wetland ever been cultivated? (Y/N)		
If yes, what time of the year is it dry enough to seed in the wetland?		
Can it only be seeded in a dry moisture year? Normal moisture year? Wet moisture year?		
How often can it be cultivated? (i.e., every year, 1 in every 5 years, 1 in every 10 years, etc.)		
Has the wetland been used for hay? (Y/N)		
If yes, what time of the year is it dry enough to mow?		
Can it only be hayed in a dry moisture year? Normal moisture year?		
How often can it be hayed? (i.e., every year, 1 in every 5 years, 1 in every 10 years, etc.)		
Does the wetland typically hold water year round?		
Does the wetland go dry during a normal moisture year? (Y/N)		
If yes, what time of year will it go dry typically?		
Wetland Soil Indicators		
Are mottles present in the soil? (Y/N)		
Is gleying present in the soil? (Y/N)		
Description of soil pit location? (i.e., centre of wetland, edge, depth, etc.)		
Plant species observed at the deepest flooded area of the wetland (lowest elevation if dry)	**Associated Vegetation Zone (Wetland 1)**	**Associated Vegetation Zone (Wetland 2)**

APPENDIX C — WETLAND CLASS QUICK REFERENCE TABLE

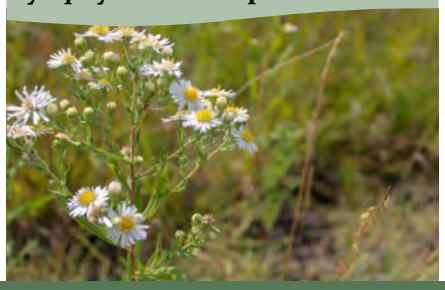
Wetland class	Vegetation zone in deepest flooded area	Water permanence	Typical plant species present	Plant species present in a cultivated wetland	Wetland soil indicators
Class 1	Low prairie	Holds water from April to mid-May (for 1-3 weeks)	Kentucky and blue fowl grass, field bind-weed, ko-chia, goldenrod, asters, snowberry and wheat grasses	Green foxtail, flixweed, field bindweed, kochia, field penny-cress, quack grass and mustard species	None
Class 2	Wet meadow	Holds water from April to mid-June (for 2-6 weeks)	Sedges, rushes, cordgrass, dock, potentilla, foxtail barley	Couch grass, barnyard grass, Canada thistle, curled dock and pale smartweed	None
Class 3	Shallow marsh	Holds water from April to mid/late July	Softstem bulrush, water plantain, water parsnip, water smart weed, sedge, sloughgrass, giant bur reed and arrow-leaf arum	Pale smartweed, Canada thistle and goosefoot species, reed canary grass	Mottles
Class 4	Deep marsh	Holds water from April to September/ October (in 4 out of 5 years)	Hardstem bulrush, river bulrush, broadleaf cattail, duck-weed, bladderwort and sago pondweed	Eurasian milfoil, phrag-mites, narrow-leaf cattail	Mottles/Gleying
Class 5	Open water	Holds water year round (in 9 out of 10 years)	Sago pondweed, hornwort, bladderwort, and algal mats	Eurasian milfoil, phrag-mites, narrow-leaf cattail	Mottles/Gleying

APPENDIX D—COMMON PLANTS AND WEED SPECIES

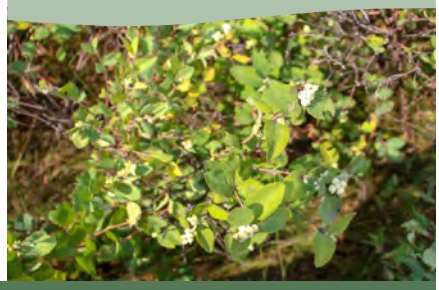
CLASS I WETLAND—COMMON PLANT SPECIES

Goldenrod—*Solidago*

Aster—*Aster* sp. and *Symphyotrichum* sp.



Snowberry—*Symphoricarpos* sp.



CLASS II WETLAND—COMMON PLANT SPECIES

Sedge—*Carex* sp.

Rush—*Juncus* sp.

Prairie Cordgrass—*Spartina pectinata*

CLASS III WETLAND—COMMON PLANT SPECIES

Water Plantain—*Alisma triviale*

Giant bur reed—*Sparganium eurycarpum*

Sloughgrass—*Beckmannia syzigachne*

CLASS IV WETLAND—COMMON PLANT SPECIES

Broadleaf Cattail—*Typha latifolia*

Hardstem Bulrush—*Schoenoplectus acutus*

Duckweed—*Lemna* sp.

APPENDIX E – AERIAL IMAGERY

Aerial imagery

Aerial imagery of your site should be acquired as part of the wetland classification process. Imagery from multiple years and multiple times of the year can be used for assessing how long water persists in a wetland, vegetation identification, and for determining the wetland boundary (**Table E-1**). Suggested sources of imagery include:

Table 1. Aerial imagery resources.

Imagery	Description and Source
Google Earth	Software that can be downloaded and used to view imagery over multiple years
	https://www.google.com/earth/desktop/
Manitoba Land Initiative	Digital imagery that can be downloaded and viewed with GIS software Ortho Refresh imagery from 2007-2014 available for southern Manitoba MrSid imagery from 1991-1998 available for southern Manitoba Additional imagery available for select areas of the province
	http://mli2.gov.mb.ca/
Local RM Office	Many RMs have purchased aerial imagery and may make it available to landowners who request it
AgriMaps	AgriMaps from Manitoba Agriculture allows searching for land by legal descriptions, viewing associated aerial imagery, and marking up a map with text and shapes that can be printed
National Air Photo Library	The National Air Photo Library contains archives of historical aerial photographs that are available for purchase
	https://www.nrcan.gc.ca/earth-sciences/geomatics/satellite-imagery-air-photos/9265
Sentinel	Free satellite imagery that can be viewed in an online view or downloaded for use in GIS software
	https://sentinel.esa.int/
Commercial Imagery Providers	Satellite imagery is available for purchase through various satellite data suppliers

Currently, Google Earth is the most accessible source of imagery available. Manitoba Land Initiative (MLI) imagery and satellite imagery will require Geographic Information Systems (GIS) software to view. Imagery from a local RM or CD office or the National Air Photo Library may potentially require GIS software depending on the available formats. Imagery that requires GIS software can be viewed using commercial software (i.e., ArcGIS) or a free viewer such as GeoViewer from Extensis (Extensis 2018).

When selecting imagery for wetland classification, several factors should be considered including the type and resolution of the imagery, time of year and year of acquisition.

True colour, black and white, and satellite imagery can be used in combination as they each have advantages for wetland classification. True colour imagery can be high resolution which aids in feature identification but is not widely available. Historical black and white images are useful in understanding wetland changes over time but are not widely available and are generally not as high resolution as modern colour imagery. Satellite imagery is widely available and can be obtained for multiple times in a single year but is lower resolution, not historically available, and can be costly. For these reasons it is important to gather imagery from as many sources as possible to best classify your wetland.

Looking at imagery from various times of the year is important to help understand the *water permanency* of wetlands. Early spring imagery (April-May) can be used for identifying the presence of all wetlands on the landscape. Imagery from early summer (June-July) can help to distinguish Class 1 and 2 wetlands from Class 3, 4, and 5's. Fall imagery (August/September/October) can be used to identify Class 4 and 5 wetlands as they usually will still contain water into the fall, while Class 3's are dry.

Acquiring imagery from several years is important to use in wetland classification as water levels will fluctuate from year to year as a result of climate conditions. Historical climate data can also be used in combination with the imagery to better understand the class of wetlands.

APPENDIX E — AERIAL IMAGERY EXAMPLES

Figure E-1 shows examples of common imagery sources. Image A shows MrSid imagery available from the MLI website which is black and white and not as high resolution as other sources. Image B is the Ortho Refresh colour and high resolution imagery from the MLI. Image C is an example of commercial imagery which can be purchased that is not as high resolution as the Ortho Refresh imagery but is available for more time periods. Image D is Sentinel imagery which is freely available and available multiples times in a single year, but lower in resolution than other sources.

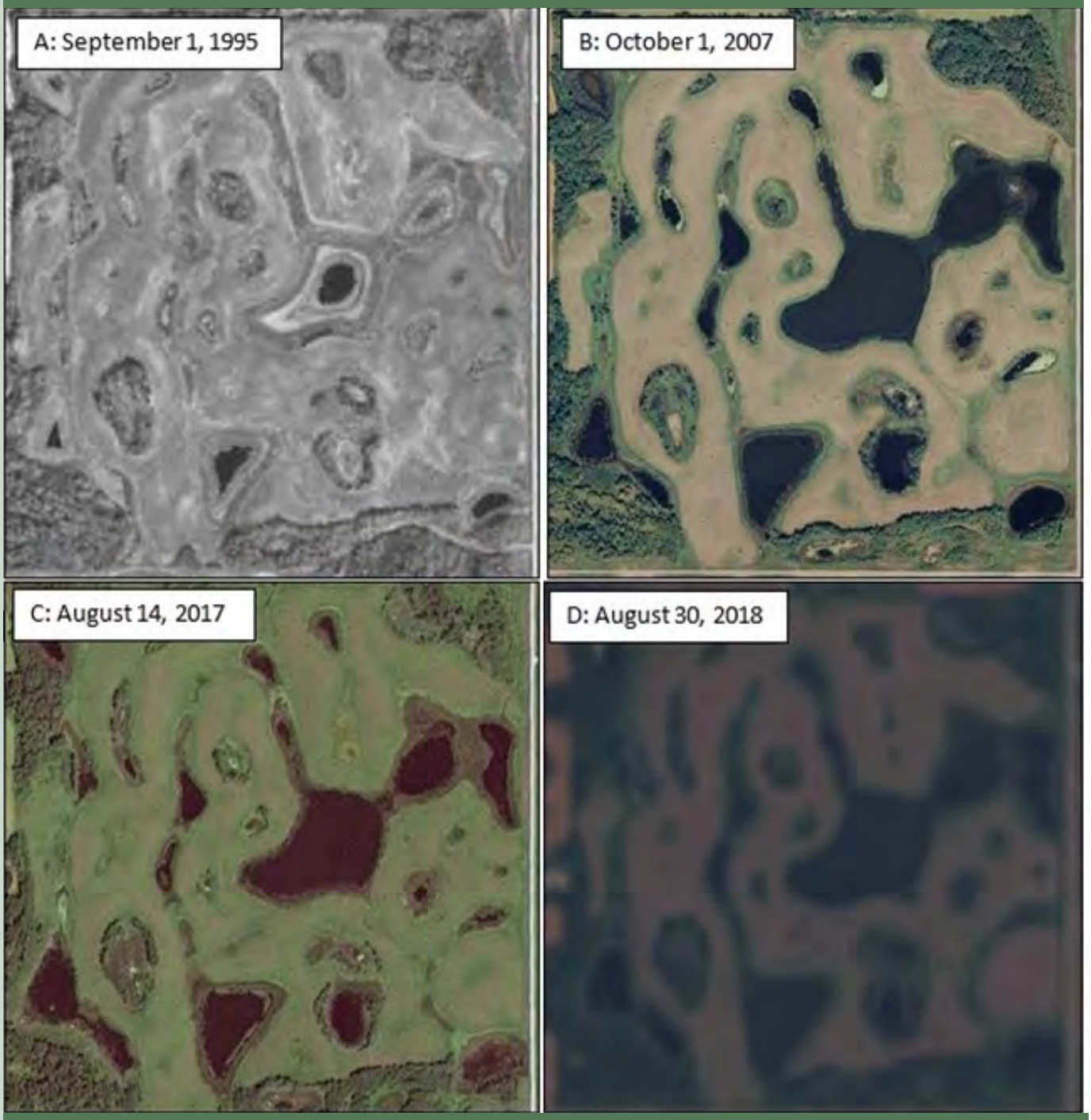


Figure E-1. A visual comparison of available imagery sources

APPENDIX E — AERIAL IMAGERY EXAMPLES

The following figures give examples of how aerial imagery can be used to observe changes in wetlands over multiple years. Figure E-2 is made up of four aerial photos of the same area over four different years. The wetland in the blue square appears to have been cropped only in the 2005 imagery but not in any of the 1995, 2007, or 2017 imagery. Whereas the wetland in the yellow circle has been cropped in every year except for 2017 which is the wettest of these four years. Due to the annual fluctuation in wetland water levels, the only way to accurately classify a wetland is through on-the ground inspections of vegetation and soil characteristics.

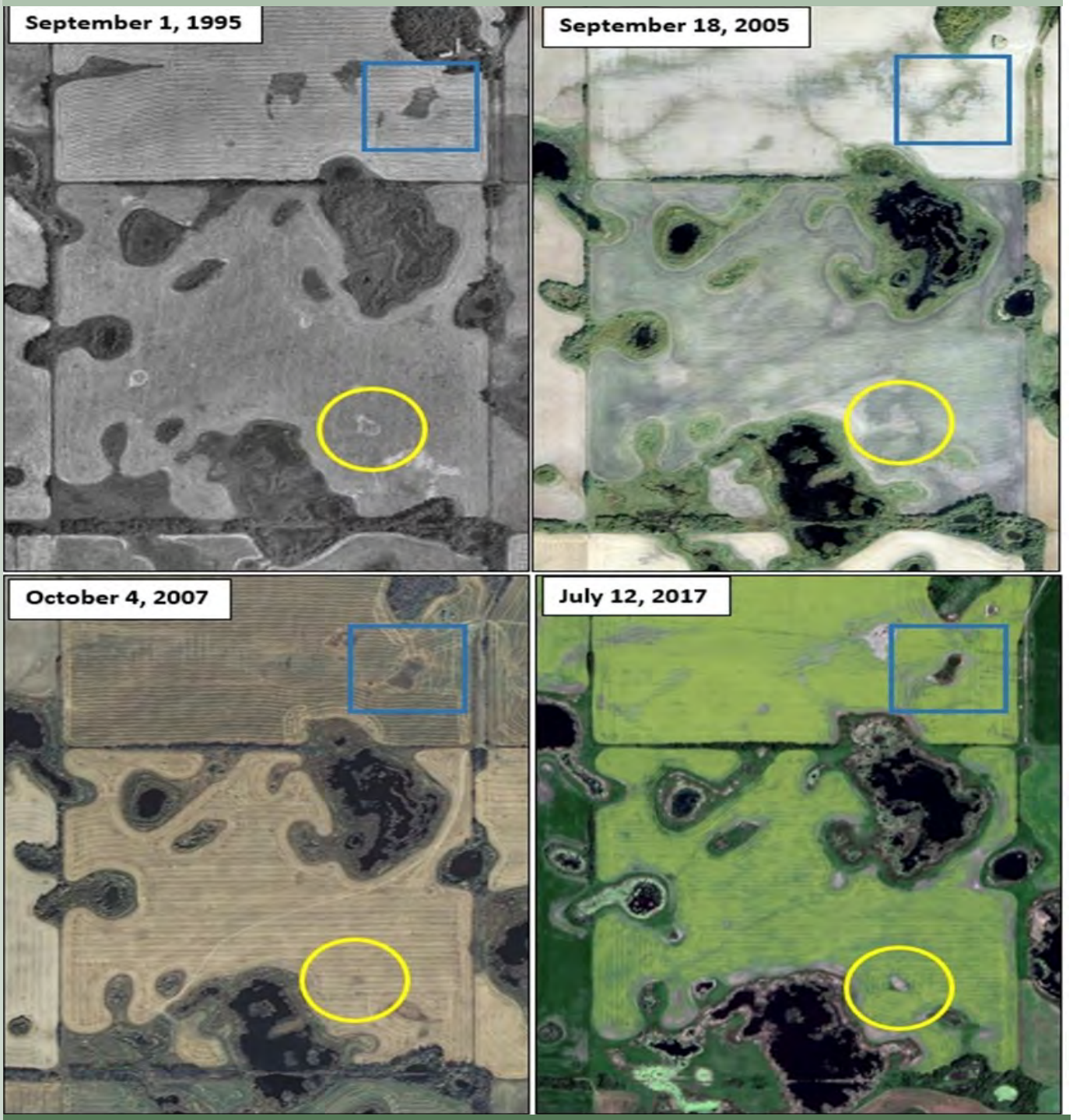


Figure E-2. Wetland changes over time example site 1.

APPENDIX E — AERIAL IMAGERY EXAMPLES

Figure E-3 depicts one area over 4 different years. The wetland in the red square was not cropped in any of the years but was completely vegetated in 2005 and 2007 with open water only showing in the 2017 imagery. The wetland in the yellow circle was cropped in the 2005 and 2007 imagery but not in the 1995 or 2017 images. The area within the blue rectangle has minimal open water in 1995, 2005, and 2007 but is completely flooded in the 2017 imagery.

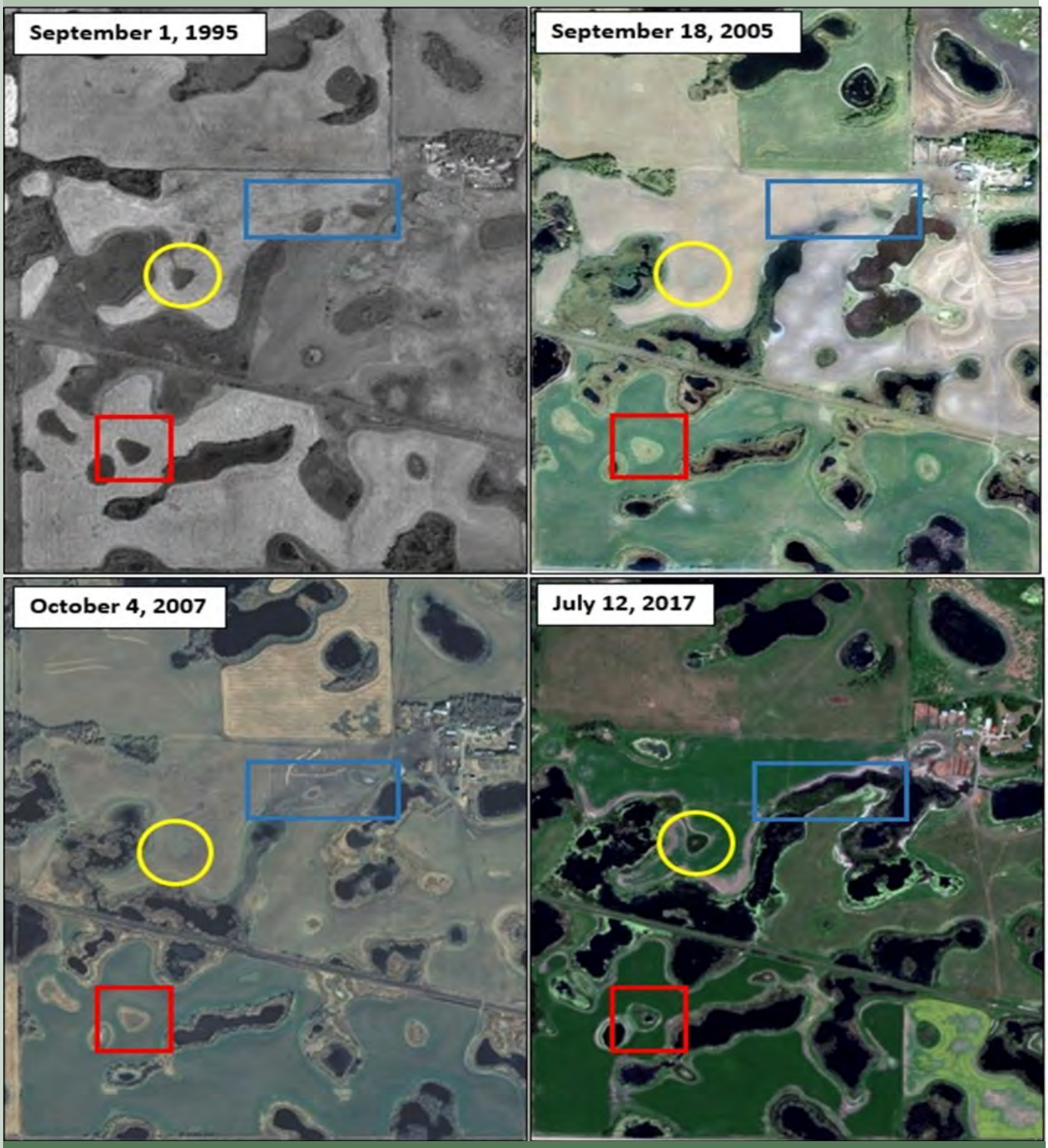


Figure E-3. Wetland changes over time example site 2.

APPENDIX F — SOIL INDICATORS

Mottling – Yellow to red deposits observed within the soil profile as a result of seasonal and fluctuating water within the soil (Class 3 to 5 wetlands).

Mottling can occur alongside gleying in Class 4 and 5 wetlands.

APPENDIX F— SOIL INDICATORS

Gleying – green, blue or grey streaking observed within the soil profile as a result of prolonged flooding conditions within the soil (Class 4 to 5 wetlands).