ALBERTA LENTIC WETLAND INVENTORY
USER MANUAL
(Current as of 5/20/2010)

The user manual is intended to accompany the *Alberta Lentic Wetland Inventory Form* for the inventory of still water (lentic) wetlands. This document serves as a field reference to assist data collectors in answering each item on the form. It can also serve as an aid to the database user in the interpretation of data presented in the *Alberta Lentic Wetland Inventory* format. Another form entitled *Alberta Lotic Wetland Inventory,* with a different set of user guidelines, is available for lotic (flowing water) wetlands.

ACKNOWLEDGEMENTS

Development of these assessment tools has been a collaborative and reiterative process. Many people from many agencies and organizations have contributed greatly their time, effort, funding, and moral support for the creation of these documents, as well as to the general idea of devising a way for people to look critically at wetlands and riparian areas in a systematic and consistent way. Some individuals and the agencies/organizations they represent who have been instrumental in enabling this work are Dan Hinckley, Tim Bozorth, and Jim Roscoe of the USDI Bureau of Land Management in Montana; Karen Rice and Karl Gebhardt of the USDI Bureau of Land Management in Idaho; Bill Haglan of the USDI Fish and Wildlife Service in Montana; Mike Frisina of the Montana Department of Fish, Wildlife and Parks; Barry Adams and Gerry Ehlert of Alberta Sustainable Resource Development; Lorne Fitch of Alberta Environmental Protection; and Greg Hale and Norine Ambrose of the Alberta Cows and Fish Program.

BACKGROUND INFORMATION

Flowing Water (Lotic) Wetlands vs. Still Water (Lentic) Wetlands

Cowardin and others (1979) point out that no single, correct definition for wetlands exists, primarily due to the nearly unlimited variation in hydrology, soil, and vegetative types. Wetlands are lands transitional between aquatic (water) and terrestrial (upland) ecosystems. Windell and others (1986) state, "wetlands are part of a continuous landscape that grades from wet to dry. In many cases, it is not easy to determine precisely where they begin and where they end."

In the semiarid and arid portions of western North America, a useful distinction has been made between wetland types based on association with different aquatic ecosystems. Several authors have used ***lotic*** and ***lentic*** to separate wetlands associated with running water from those associated with still water. The following definitions represent a synthesis and refinement of terminology from Shaw and Fredine (1956), Stewart and Kantrud (1972), Boldt and others (1978), Cowardin and others (1979), American Fisheries Society (1980), Johnson and Carothers (1980), Cooperrider and others (1986), Windell and others (1986), Environmental Laboratory (1987), Kovalchik (1987), Federal Interagency Committee for Wetland Delineation (1989), Mitsch and Gosselink (1993), and Kent (1994).

Lentic wetlands are associated with still water systems. These wetlands occur in basins and lack a defined channel and floodplain. Included are permanent (i.e., perennial) or intermittent bodies of water such as lakes, reservoirs, potholes, marshes, ponds, and stockponds. Other examples include fens, bogs, wet meadows, and seeps not associated with a defined channel.

Lotic wetlands are associated with rivers, streams, and drainage ways. They contain a defined channel and floodplain. The channel is an open conduit, which periodically or continuously carries flowing water. Beaver ponds, seeps, springs, and wet meadows on the floodplain of, or associated with, a river or stream are part of the lotic wetland.

Functional vs. Jurisdictional Wetland Criteria

Defining wetlands has become more difficult as greater economic stakes have increased the potential for conflict between politics and science. A universally accepted wetland definition satisfactory to all users has not yet been developed because the definition depends on the objectives and the field of interest. However, scientists generally agree that wetlands are characterized by one or more of the following features: 1) ***wetland hydrology,*** the driving force creating all wetlands, 2) ***hydric soils,*** an indicator of the absence of oxygen, and 3) ***hydrophytic vegetation,*** an indicator of wetland site conditions. The problem is how to define and obtain consensus on thresholds for these three criteria and various combinations of them.

Wetlands are not easily identified and delineated for jurisdictional purposes. Functional definitions have generally been difficult to apply to the regulation of wetland dredging or filling. Although the intent of regulation is to protect wetland functions, the current delineation of jurisdictional wetland still relies upon structural features or attributes.

The prevailing view among many wetland scientists is that functional wetlands need to meet only one of the three criteria as outlined by Cowardin and others (1979) (e.g., hydric soils, hydrophytic plants, and wetland hydrology). On the other hand, jurisdictional wetlands need to meet all three criteria, except in limited situations. Even though functional wetlands may not meet jurisdictional wetland requirements, they certainly perform wetland functions resulting from the greater amount of water that accumulates on or near the soil surface relative to the adjacent uplands. Examples include some woody draws occupied by the *Acer negundo/Prunus virginiana* (Manitoba maple/choke cherry) habitat type (Thompson and Hansen 2002) and some floodplain sites occupied by the *Artemisia cana/Agropyron smithii* (silver sagebrush/western wheat grass) habitat type or the *Populus tremuloides/Cornus stolonifera* (aspen/red-osier dogwood) habitat type. Currently, many of these sites fail to meet jurisdictional wetland criteria. Nevertheless, these functional wetlands provide important wetland functions vital to wetland dependent species and may warrant special managerial consideration. The current interpretation is that not all functional wetlands are jurisdictional wetlands, but that all jurisdictional wetlands are functional wetlands.

Polygon Delineation

The lentic wetland inventory process incorporates data on a wide range of biological and physical categories. The basic unit of delineation within which this data is collected is referred to as a ***polygon.*** A polygon is the area upon which one set of data is collected. One inventory form is completed (i.e., one set of data is collected) for each polygon. One or more (usually several) polygons constitute a project. A lentic (still water) wetland polygon is a wetland, or portion of a wetland, which is not associated with a waterway (stream or river) and which has no defined channel. Polygons are delineated on topographic maps before observers go to the field. It is important to clearly mark and number the polygons on the map.

If aerial photos are available, polygon delineations can be based on vegetation differences, geologic features, or other observable characteristics. On larger systems with wide wetland areas, aerial photos may allow delineation of multiple vegetation-based polygons away from the water source. In these cases, where polygons can be drawn as enclosed units a minimum mapping unit of possibly 2 to 4 ha (5 to 10 ac) should be followed. The size of the minimum mapping unit should be based on factors such as management capabilities, available funds, and capabilities of data collection.

If pre-delineated polygons are drawn on the maps, and pre-assigned numbers are given, be sure the inventoried polygons correspond exactly to those drawn. Observers are allowed to move polygon boundaries, create new polygons, or consolidate polygons if the vegetation, geography, location of fences, or width of the wetland zone warrant. If polygon boundaries are changed, the changes must be clearly marked on the field copies of the maps. Observers should draw the complete polygon boundary onto their field maps if possible at the 1:20,000 or 1:50,000 scale.

In most cases involving small bodies of water or small lentic wetlands, the inventoried polygon will be a single unit of area. Around larger lakes, extensive marshes, or other large lentic wetlands, it may be necessary to divide the wetland into separate polygons (Figure 1). Polygons should be divided at distinct locations such as fences, stream entrances or exits, or other features easily recognized in the field. When selecting "representative sites," consideration should be given to the differences presented by landform position (i.e., point vs. bay, or windward vs. leeward side of the water body). ***Polygons should not cross fences between areas with different management.***

The outer boundaries of polygons are usually at the wetland ecosystem outer edges. These boundaries are sometimes easily determined by abrupt changes in the landform and/or vegetation, but proper determination often depends on experienced interpretation of more subtle features. Do not include deep water habitat within the polygon area. The inner polygon boundary is the landward edge of the deep-water habitat, or where persistent emergent vegetation gives way to open water. In concept, deep-water habitat is the area covered by surface water deeper than 2 m (6.6 ft), or where sunlight cannot penetrate to support persistent, erect, rooted, plant life. Persistent emergent vegetation consists of species that normally remain standing at least until the beginning of the next growing season, e.g., *Typha* species (cattails) or *Scirpus* species (bulrushes). In practice, include all emergent vegetation (i.e., go out to open water) regardless of depth. If emergent vegetation has been removed by human activity, include out to where it would be expected in the absence of that impact. If there is no emergent vegetation, and there is no apparent potential for it, then stop the polygon where persistent vegetation ends and the open water begins.

In cases where observer access and visibility on part of the site to be assessed is impeded by deep water that may have extensive areas of emergent vegetation, the observer may choose, with documented reason, to either:

- Break the area into separate polygons in cases where large areas are utilized differently, such as where the landward area (onshore) is heavily impacted by human use and the wetted area (marsh) is unimpacted;
- Draw an arbitrary outer edge of the polygon that does not include all of the area with emergent vegetation, in which case the observer must carefully document the delineation and the rationale employed; or
- Include the entire dry and wet area together in a single polygon with careful commentary noting any areas that may be impacted differently due to having such greatly different conditions.

When using the inventory on artificial or artificially enlarged water bodies (e.g. dugout, manmade pond, reservoirs), use the same criteria, but remember that there will be questions that are difficult to apply appropriately. Focus on consistently applying the methods, including site boundaries, as well as recording all decisions made in applying the methodology. The goal of this exercise is to assess the ability of the site to perform riparian functions to its potential.

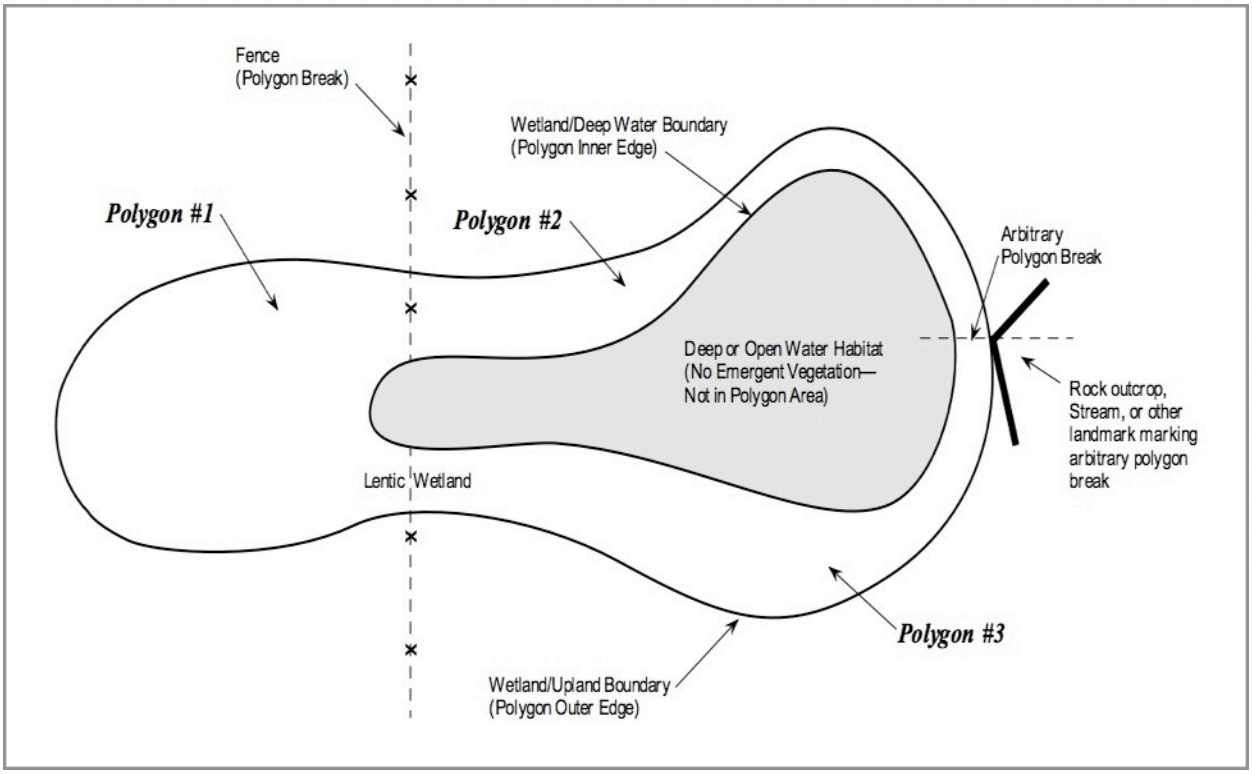


Figure 1. Schematic drawing of a lentic (still water) wetland showing: 1) delineation of polygons on larger systems, i.e. those too big to inventory as a single polygon (more than about 1.6 km [0.5 mi] in length) or those with managerial breaks crossing them; 2) a typical relationship between deep water habitat (lacking emergent vegetation) and surrounding lentic wetland, which includes all areas of persistent emergent vegetation in standing water.

INVENTORY FORM CODES AND INSTRUCTIONS

Class Codes

Field observers will use class codes to represent ranges of percent wherever percent data is recorded. The class codes are defined below. These codes and range classes are from the USDA Forest Service Northern Regions ECODATA (1989) program.

T = 0.1<1%	**2** = 15<25%	**5** = 45<55%	**8** = 75<85%
P = 1<5%	**3** = 25<35%	**6** = 55<65%	**9** = 85<95%
1 = 5<15%	**4** = 35<45%	**7** = 65<75%	**F** = 95-100%

The class codes are converted to class midpoints in the office. The class midpoints are: **T** = 0.5%; **P** = 3.0%; **1** = 10.0%; **2** = 20.0%; **3** = 30.0%; **4** = 40.0%; **5** = 50.0%; **6** = 60.0%; **7** = 70.0%; **8** = 80.0%; **9** = 90.0%; **F** = 97.5%. These class midpoints are used in data reporting and in all calculations throughout the data analysis process.

Polygon Data
The following are the codes and instructions for the individual data items on the form. All data items are to be recorded in the field unless otherwise noted. Numbering corresponds to that of items on the form. Also included are comments about the data, how it is collected, and its meaning. When the inventory methodology follows a published source, that source is cited. However, in many instances, due to the lack of pre-existing guidelines, we have developed our own methodologies.

Fill in all blanks on the field form, except those that are completed in the office. Enter "0" for any item to indicate the absence of value. Do not use "—" and do not leave items blank, except for the following: 1) items that logically would not be answered because they follow an answer of "No" in a leading "Yes/No" question, and 2) lines in a species list below the last species observed. An answer of "**0**" means the observer looked and saw none, whereas a blank line means the observer did not look, either by negligence or because the point was moot. ***NA*** means the item is not applicable to a particular polygon. ***NC*** means data was not collected for that item in a particular polygon. Observers must write legibly and should limit their use of abbreviations throughout to those, which allow for no confusion.

Record ID No. This is the unique identifier allocated to each polygon. This number will be assigned in the office when the form is entered into the database.

Administrative Data
A1. Identify what organization is doing the evaluation field work.

A2. Identify what organization is paying for the work.

A3. Date that the field data was collected**:** Use the format: month/day/year.

A4. Record the year that the field data was collected**.**

A5. Observers: Name the evaluators recording the data in the field.

Land ownership may include more than one entity or person, but more than one type of landownership (eg. private and government) should only be selected after considering a number of factors. Factors to consider are the level of detail that the client is looking to extrapolate, the proportion of the area relative to the rest of the polygon and whether it is a typical situation where the multiple types (e.g., crown or non crown land) will not be included. For example, where very minimal Crown bed and shore area exists within the polygon (such as just at the waterline), as part of a primarily privately owned parcel, the private ownership may be listed as the only ownership type.

A6a, b. Identify any Indian or Métis Reserve on which work is being done. If Yes, identify which reserve name is established.

A7a, b. Identify any National, Provincial, or Rural/Urban, or other Park(s) on which work is being done. If Yes, identify which type of park is established. More than one type may occur.

A7c. Indicate the full ***official*** name of the National, Provincial, or Rural/Urban park on which work is being done. If "Other" kind of park, identify the type of park and its established name.

A8a, b. Identify any ***other protected areas*** on which work is being done. If Yes, properly identify the type and name of the protected area that is established. *(Exclude National, Provincial, or Rural/Urban, or other Park(s) recorded in A7.)*

This question includes all areas with regulatory or administrative protection, other than parks, which are covered in A7. There are many types, including:
Ecological Reserves are areas of Crown Land (Provincial Government), which have the potential to contain representative, rare and fragile landscapes, plants, animals and geological features. The intent is for the preservation of natural ecosystems, habitats and features associated with biodiversity. Public access to ecological reserves is by foot only; public roads and other facilities do not normally exist and will not be developed.

Environmental reserve generally are those lands that are considered un-developable and may consist of a swamp, gully, ravine, coulee or natural drainage course, flood prone areas, steep slopes or land immediately adjacent to lakes, rivers, stream or other bodies of water. Governed by *The Municipal Government Act (Alberta)*.
Municipal reserve may also be known, in part, as reserve, park reserve, park or community reserve. Municipal reserves are lands that have been given to the municipality by the developer of a subdivision as part of the subdivision approval process. Governed by *The Municipal Government Act (Alberta)*.
Other types of Protected Area (designated nationally, provincially, or municipally—e.g., Provincial Recreation Areas, Wilderness areas, Natural Areas, Heritage Rangelands, National Historic Sites, and Migratory Bird Sanctuaries.

A9. If this polygon has an association with a Watershed Group/Community Affiliation name the group.

A10. Identify the organizations project name. This may be a internal name not recognized by the Watershed Group or Community Affiliation but a name used to group a series of polygons.

A11. Identify if work was done on Private Land? Answer "Yes" or "No." If applicable give the Landowners Name.

A12a-d. Identify if work is being done on Private Land that is rented out? Answer "Yes" or "No." If applicable give Renters Name, their Legal Land Description of residence as well as County name if different than work being in.

A13a-c. Public Land is Provincial lands owned by the provincial government and administered under the authority of the *Public Lands Act*. Identify if work was done on Public Land? Answer "Yes" or "No." If applicable give Managers Name. as well as the Provincial office and their department associated with the management of this land to which work is being done.

A14a. Identify if site is a Grazing lease or Grazing reserve on which work is being done. If applicable give Lessees/Group name.
A14c. Identify which Disposition this land falls under and its license number associated with it. i.e., GRL: Grazing Lease, GRP Grazing Permit, GRR Grazing Reserve, FGL Forest Grazing Licence, CUP Cultivation Permit.

A14d. Give any other grazing name (e.g. Community Pasture) to identify where the work is being done.

A15. The several parts of these items identify various ways in which a data record may represent a resampling of a polygon that may have been inventoried again at some other time. The data in this record may have been collected on an area that coincides precisely with an area inventoried at another time and recorded as another record in the database. It may also represent the resampling of only a part of an area previously sampled. This would include the case where this polygon overlaps, but does not precisely and entirely coincide with one inventoried at another time. One other case is where more than one polygon inventoried one year coincides with a single polygon inventoried another year. All of these cases are represented in the database, and all have some value for monitoring purposes, in that they give some information on how the status on a site changes over time. ***This is done in the office with access to the database; field evaluators need not complete these items.***

A15a. Has any part of the area within this polygon been inventoried previously, or subsequently, as represented by another data record in the database? Such other records would logically carry different dates as well as Identification Numbers.

A15b. If A13a is answered "Yes," then enter the years of any inventories of this exact polygon.

A15c. Does the area extent of this polygon exactly coincide with that of any other inventory represented in the database? In many cases, subsequent inventories only partially overlap spatially.

A15d. If A15c is answered "Yes," identify those database record ID numbers for other polygons that can be compared as representing exactly the same ground area.

A16a. Even though this polygon is not a re-inventory of the exact same area as any other polygon, does it share at least some common area with one or more polygons inventoried at another time?

A16b. If A16a is answered "Yes," enter the record ID number(s) of any other polygon(s) sharing common area with this one.

A17a, b. Has a management change been implemented on this polygon? Simply answer "Yes," "No" or "Unknown." If applicable, in what year was the management change implemented and describe the management change implemented?

A18. ***The primary contact is the person (landowner, land manager, or renter, etc.) who initiated the contact with the funding organization to have this riparian work conducted. Therefore, if the renter initiated the contact, the land owner would be a secondary contact.***

Location Data
B1. Province in which the field work is being done (i.e., where the polygon is located).

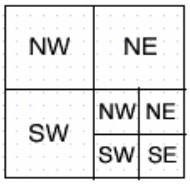
B2. County or municipal district in which the field work is being done.

B3a-d. The name of the city, town, or village in which the fieldwork is being done. If applicable list the subdivision plan number, block number and lot number of the area to which the work was being done on.

B4. Name the water body or area on which the field work is being done.

B5. Polygon number is a sequential identifier of the actual piece of land being surveyed. This is referenced to the water body code list from the Training Manual.
B6. Identify the side of the polygon that the Assessment is completed for by using "North, South, East or West," if assessment includes both sides enter "Both."

B7. The location of the polygon is presented as a legal land description (1/4, 1/4 section, 1/4 section, Township, Range, and Meridian) are read from smallest to largest unit.



B8a, b. Identify the Natural Region and Sub-Region in which the field work is being done. Use the Natural Regions and Subregions of Alberta (Alberta Natural Heritage Information Centre [1999]).

B9a. Name the major watershed (e.g. North Saskatchewan River) of which the site being surveyed is a part. List of the seven major Basins by Alberta Environment: Hay River, Peace/Slave River, Churchill River, North Saskatchewan River, South Saskatchewan River, and Missouri River Watersheds.

B9b. Name the minor watershed (e.g. Battle River) of which the site being surveyed is a part. This is normally subordinate to the major watershed named above in B10a.

B9c. Name the sub-basin in which you are working (e.g. Iron Creek). This is the third level down from the largest (major watershed) (e.g., North Saskatchewan River—Battle River—***Iron Creek***; or South Saskatchewan River—Red Deer River—***Little Red Deer River***), although you may be working on an even lower level tributary. The sub-basin is the local watershed of which the site being surveyed is a part. It is subordinate to the minor watershed named above in B10b.

B10a-c. Universal Transverse Mercator (UTM) coordinates are recorded for the northern/western and southern/eastern ends of the polygon using GPS units in the field. Other locations of special interest may be recorded using the GPS unit. These coordinates are considered accurate to within approximately 10 m (33 ft). Field observers are to use GPS units to obtain these coordinates following standard protocol. Record UTM coordinates at each end of the long axis of the polygon.

Enter the UTM coordinate data, including the UTM zone and the identifying waypoint number, on the form for each point collected. Save the data in the GPS unit for downloading to the computer later. When starting work in a new location, always check the GPS receiving unit against a known point by using the UTM grid and map.

B10d, e. Identify the GPS unit used, and the name or number designator of the waypoints saved for the northern/western and southern/eastern ends of the polygon and for other locations. Describe any comments worth noting about the waypoints (i.e., monument referenced or general location descriptions).

B11a-c. Record the name(s), scale, and publication year of the quadrangle map(s) or any other map(s) locating the polygon. Use precisely the name listed on the map sheet. Provision is made for listing two maps in case the polygon crosses between two maps.

B12. Record identifying data for any aerial photos used on this polygon.

Selected Summary Data

C1. Wetland/water body type is a categorical description of predominant polygon character. Select from the following list of categories that may occur within a lentic system the one that best characterizes the majority of the polygon. Observers will ***select only one category*** as representative of the entire polygon. If significant amounts of other categories are present, indicate this in Vegetation Comments (item D17) or consider dividing the original polygon into two or more polygons.

Category	Description
Wet Meadow.	A grassland with waterlogged soil near the surface, but without standing water for most of the year. This type of wetland may occur in either riparian (lotic) or in still water (lentic) systems. A lotic wet meadow has a defined channel or flowing surface water nearby, but is typically much wider than the riparian zone associated with the classes described above. This is often the result of the influence of lateral groundwater not associated with the stream flow. Lotic and lentic wet meadows may occur in proximity (e.g., when enough groundwater emerges to begin to flow from a mountain meadow, the system goes from lentic to lotic). Such communities are typically dominated by herbaceous hydrophytic vegetation that requires saturated soils near the surface, but tolerates no standing water for most of the year. This type of wetland typically occurs as the filled-in basin of old beaver ponds, lakes, and potholes.
Marsh.	A frequently or continually inundated wetland characterized by emergent herbaceous vegetation adapted to saturated soil conditions. A marsh generally has a mineral soil substrate does not accumulate peat.
Fen.	A peat-accumulating wetland that receives some drainage from surrounding mineral soil and usually supports marsh-like vegetation.
Bog.	A peat-accumulating wetland that has no significant inflows or outflows and supports acidophilic mosses, particularly sphagnum.
Spring/Seep.	Groundwater discharge areas. In general, springs have more flow than seeps. This wetland type may occur in a riparian (lotic) or still water (lentic) system.
Reservoir.	An artificial (dammed) water body with at least 8 ha (20 ac) covered by surface water.
Stock pond.	An artificial (dammed) body of water of less than 8 ha (20 ac) covered by surface water.
Lake.	A natural topographic depression collecting a body of water covering at least 8 ha (20 ac) with surface water.
Pothole, Slough, or Small Mountain Lake.	A natural topographic depression collecting a body of water covering less than 8 ha (20 ac) with surface water.
Other.	Describe any other wetland type encountered, which is not associated with a surface water channel.
Non-wetland (Upland).	This designation is for those areas which are included in the inventoried polygon, but which do not support functional wetland vegetation communities. Such areas may be undisturbed inclusions of naturally occurring high ground or such disturbed high ground as roadways and other elevated sites of human activity.

C2. The size (acres/hectares) of polygons large enough to be drawn as enclosed units on topographic maps is determined in the office using a planimeter, dot grid, or GIS. For polygons too small to be accurately drawn as enclosed units on the maps, polygon size is calculated using polygon length (item C7) and average polygon width (item C8a).

C3a-d. Evaluators may be asked to survey some areas that have not been determined to be wetlands for the purpose of making such a determination. Other polygons include areas supporting non-wetland vegetation types. A "Yes" answer here indicates that no part of the polygon keys to a riparian habitat type or community type (HT/CT). Areas classified in item C8 as any vegetation type described in a riparian and/or wetland classification document for the region in which you are working are counted as functional wetlands. Areas listed as UNCLASSIFIED WETLAND TYPE are also counted as functional wetlands. Other areas are counted as non-wetlands, or uplands. The functional wetland fraction of the polygon area is listed in item C3c in acres and as a percentage of the entire polygon area in item C3d.

C4. Lentic wetlands associated with open water, like lakes and ponds, typically have a shore. The ***shore*** is defined here as a variable width area that contains all points reached over time by the water's edge along the water body between its high stage and current water level—i.e., the area that is visibly affected by periods of inundation and drying between seasonal and longer cyclic high and low water levels. (The time frame is generally taken to mean the recent period of hydrologic record, or the extent indicated by physical evidence present.) The ***shoreline*** is defined much more narrowly as a 1-2 m (3.3-6.6 ft) band stretching along the landward side of the water's edge TODAY. Therefore, the actual position of the shoreline shifts over time with water level.

Some lentic polygons may not contain a shore between wetland and open water. In some cases these polygons are in ephemeral depressions which may be infrequently inundated, but do support wetland plant communities. In other cases, these polygons may be part of large marsh systems that may or may not be associated with lakes, but where polygons may be delineated in areas not adjacent to open water.

C5. Polygon length is measured in the field or by scaling from the map. This data is considered accurate to the nearest 0.16 km (0.1 mi). Polygon length may be the same as shoreline length, but may not be in cases of much curved shoreline, or for polygons that have no shoreline (i.e., wet meadows or marshes). The shoreline is defined here as a linear feature extending at the time of observation along the water's edge 1 m (3 ft) wide back from the water onto the land.

C6. In some cases, the polygon data is used to characterize, or represent, a much larger, or longer, area. The length represented by the polygon is given here. For example, a 0.8 km (0.5 mi) polygon may be used to represent 3.2 km (2 mi) of total shoreline length. In this case, 0.8 km (0.5 mi) is the shoreline length in the polygon (item C5), and 3.2 km (2 mi) is the overall shoreline length entered in item C6.

C7a. Record average width of the polygon, which in smaller wetlands corresponds to the width of the entire wetland area.

C7b. Record the range of width (ft/m), narrowest to widest, of the wetland area in the polygon.

Health Evaluation Summary

C8. Polygon Health (PFC) Score is an ecological function rating derived by computer using data from several items in the polygon inventory. For detailed discussion of this process, see the companion document *Lentic Wetland Health Assessment* (derived from the *Lentic Wetland Inventory Form*). The techniques used to obtain the data do not allow the ratings to be interpreted with a fine degree of precision. For example, two polygons rating 74% and 79% should be interpreted as functionally equivalent to each other, but they both are likely to differ functionally from a third polygon that rates 61%, although all three fall within the "Functional At Risk (Healthy, but with Problems)" category. When considering the health assessment result for any site, one should always look at the individual items, as well as the total score. Two sites can score overall identical results, but have profoundly differing areas of problems.

The health ratings are presented both as an overall polygon score and in two subsections (vegetation and physical site) to give a broad indication of what part of the system may be in need of more management attention.

Vegetation Data

D1a. The wetland prevalence index is compiled by the computer from the U.S. National Wetland Inventory (NWI) wetland status classes for plant species recorded on the site (Reed 1988) and weighted by species abundance measured in terms of canopy cover. The range of index values is from 1.0 to 5.0. Lower values indicate wetter sites.

D1b. The vegetation structural diversity category is automatically calculated in the office by computer using plant group and height layer data (item D9). Trees and shrubs are considered major components of structural diversity. These terms are used to describe vegetation height: tall = > 1.8 m (6.0 ft) (layer 3); medium = >0.5-1.8 m (1.5-6.0 ft) (layer 2); short = 0-0.5 m (0-1.5 f) (layer 1). Graminoids and forbs are combined as the "herbaceous" lifeform. Trees and shrubs in layer 2 are also combined as "medium trees/ shrubs." A polygon is assigned the highest structural diversity category it can meet. To meet a category, each lifeform (by height) named in the description must have a canopy cover of at least 15% in the polygon. Combination groups (i.e., medium trees/shrubs; and short, medium, and tall herbaceous) must have at least 5% cover of both components or at least 15% cover of one component. ***Note:*** Structural diversity on a site can change as succession proceeds or if management changes.

Category Description
Tall trees; tall shrubs; medium trees/shrubs; herbaceous understory present[1]
Tall trees; tall shrubs; herbaceous understory present[1]
Tall trees; medium trees/shrubs; herbaceous understory present[1]
Tall trees; herbaceous understory present[1]
Tall shrubs; medium trees/shrubs; herbaceous understory present[1]
Tall shrubs; herbaceous understory present[1]
Medium trees/shrubs; herbaceous understory present[1]
Tall herbaceous
Medium herbaceous
Short herbaceous
Sparsely vegetated[2]

[1]The herbaceous understory present does not need to have a minimum canopy cover.
[2]Sparsely vegetated refers to polygons in which the minimum canopy cover by the various lifeforms is not met.

D2a, b. If present, record the 7-letter species code and the canopy cover in the two left-most columns for ***ALL*** tree species observed. Canopy cover is evaluated using ocular estimation following the Daubenmire (1959) method. Within the total canopy cover of each species, estimate the proportion of each of five groups (seedling, sapling, pole, mature, and dead trees). The canopy covers of the five groups of each species must total approximately 100%. If some individuals in an age group have at least 30% of the upper canopy dead (are decadent), record the decadence as a percentage of that group. Record the total group cover to the left of the slash (/) and the decadent portion to the right.

Example:

Species	Cover	Sdlg/Dec	Splg/Dec	Pole/Dec	Mat/Dec	Dead
POPUBAL	3	T / 0	P / 0	1 / P	8 / 1	P

Note 1: The most common usage of the term ***decadent*** may be for over mature trees past their prime and which may be dying, but we use the term in a broader sense. We count decadent plants, both trees and shrubs, as those with 30% or more dead wood in the upper canopy. In this item, scores are based on the percentage of total woody canopy cover which is decadent or dead, not on how much of the total polygon canopy cover consists of dead and decadent woody material. Only decadent and dead standing material is included, not that which is lying on the ground. The observer is to ignore (not count) decadence in poplars or cottonwoods which are decadent ***due to old age*** (rough and furrowed bark extends substantially up into the crowns of the trees) (species: *Populus deltoides* [plains cottonwood], *P. angustifolia* [narrow-leaf cottonwood], and *P. balsamifera* [balsam poplar]), because cottonwoods/poplars are early seral species and naturally die off in the absence of disturbance to yield the site to later seral species. The observer is to consider (count) decadence in these species if apparently caused by de-watering, browse stress, climatic influences, or parasitic infestation (insects/disease). The observer should comment on conflicting or confounding indicators, and/or if the cause of decadence is simply unknown (*but not due to old age*).

Note 2: Do not count the resprouts from cut-off stumps as regeneration of a plant that was cut. As a general rule, count sprouts ONLY that emanate from the soil, and NOT from the stem above ground.

Tree Age Groups

Age Group	Conifers[1] and Cottonwoods/Poplars	Other Broadleaf Species [2]
Seedling	<4.5 ft tall ***OR*** <1.0 inch dbh	<3.0 ft tall
Sapling	≥4.5 ft tall ***AND*** 1.0 inch to 4.9 inch dbh	>3.0 ft tall ***AND*** <3.0 inch dbh
Pole	5.0 inch to 8.9-inch dbh	>6.0 ft tall ***AND*** 3.0 inch to 5.0-inch dbh
Mature	> 9.0-inch dbh	>5.0-inch dbh
Dead	100% of canopy is dead	100% of canopy is dead

[1]*Juniperus scopulorum* (Rocky Mountain juniper) is an exception to the specifications given, because it lacks typical coniferous size, age, and growth form relationships. Assign age classes to individuals based on relative size, reproductive ability, and overall appearance.

[2]Other Broadleaf Species may include *Fraxinus pennsylvanica* (green ash), *Acer negundo* (Manitoba maple), *Populus tremuloides* (aspen), *Betula papyrifera* (white birch), and *Ulmus americana* (American elm).

D3. The tree regeneration category is automatically calculated in the office by the computer using the age group data collected with the species' canopy cover as described in item D2b. The canopy covers of the seedling and sapling age groups are combined to quantify tree regeneration. The categories represent actual, not potential, tree regeneration.

Code	Description
1	No seedlings or saplings were observed in the polygon.
2	Seedlings and/or saplings were observed; individually, or in combination, these age groups have less than 5% of the species canopy cover.
3	Seedlings and/or saplings were observed; individually, or in combination, these age groups have 5% or more of the species canopy cover, but less than 15%.
4	Seedlings and/or saplings were observed; individually, or in combination, these age groups have 15% or more of the species canopy cover, but less than 25%.
5	Seedlings and/or saplings were observed; individually, or in combination, these age groups have 25% or more of the species canopy cover.

D4. The tree age group distribution category is automatically calculated in the office by the computer using age group canopy covers recorded in item D2b. In classifying tree age group distribution, the seedling and sapling groups are combined. Three resulting age groups (seedlings/saplings, pole, and mature), ***and*** the percent of the mature individuals which are decadent, determine age group distribution categories.

Decadence of younger age groups is ignored in this calculation. Younger decadent trees are assumed to have the capacity to grow out of any current condition caused by injury, disease, or other non-age related factors. A species with decadent mature individuals may fall into one of two classes: those having 75% or more of mature individuals decadent and those having less than 75% of mature individuals decadent. The age distribution category of a tree species on a polygon is defined by the presence of certain age groups. To be present, age groups must have minimum canopy covers in the polygon: seedlings/saplings must have a combined total canopy cover of at least 1%; pole and mature are treated separately and must each have at least 5% canopy cover.

Tree Age Group Distribution Categories (An "X" under an age group indicates presence in that category.)

Category Code	Sdlg[1]/Splg[2] (CC >1%)	Pole (CC >5%)	Mature (Decadent[3]) (CC>5%)	Description
1	X			seedling/sapling only
2		X		pole age only
3	X	X		seedling/sapling and pole
4	X		X	seedling/sapling and mature (<75% dec.)
5		X	X	pole and mature (<75% dec.)
6	X	X	X	seedling/sapling, pole, and mature (<75% dec.)
7			X	mature only (<75% dec.)
8	X		X	seedling/sapling and mature (≥75% dec.)
9		X	X	pole and mature (≥75% dec.)
10	X	X	X	seedling/sapling, pole, and mature (≥75% dec.)
11			X	mature only (≥75% dec.)

[1]Sdlg indicates seedlings, Splg indicates saplings, Decadent indicates percent of mature trees, which are decadent

D5a. Record the appropriate category, which best describes the amount of browse utilization (Utl) of the combined seedling (Sdlg) and sapling (Splg) age groups for each tree species. When estimating amount of utilization, count browsed second year and older leaders on representative plants of tree species normally browsed by ungulates. Do not count current year's use,

because this would not accurately reflect actual use when more browsing can occur later in the season. Browsing of second year or older material affects the overall health of the plant and continual high use will affect the plant's ability to maintain itself on the site. Determine percentage by comparing the number of leaders browsed or utilized with the total number of leaders available (those within animal reach) on a representative sample (at least three plants) of each tree species present. Do not count utilization on dead plants, unless it is clear that death resulted from over-grazing. ***Note:*** If a shrub is entirely mushroom/umbrella shaped by long term intense browse or rubbing, count utilization of it as heavy.

Category	Description
None	0 to 5% of the available second year and older leaders are clipped (browsed).
Light	>5 to 25% of the available second year and older leaders are clipped (browsed).
Moderate	>25 to 50% of the available second year and older leaders are clipped (browsed).
Heavy	More than 50% of the available second year and older leaders are clipped (browsed).
Unavailable	Woody plants provide no browsed or unbrowsed material below 1.5 m (5 ft), or are inaccessible due to location or protection by other plants.
NA	Neither seedlings nor saplings of tree species are present.

D5b. Estimate the overall proportion (percentage) of all cottonwood regeneration on the polygon (seedlings and saplings of *Populus* species other than *P. tremuloides* [aspen]) that are from seed, ***rather than from any form of asexual reproduction***, such as root sprouts. ***Note:*** *Enter "NA" for this question if you are working north of the Red Deer River valley (and some areas farther south in higher precipitation zones, such as the foothills west of Highway 2) count any mode of reproduction for this group of trees, because in these cooler/moister zones cottonwoods and balsam poplar populations are not dependent on seed deposited on riverine alluvium.*

D6a, b. Are there shrubs present on the polygon, and does the polygon have potential for woody species, such as tall shrubs and trees? Some riparian and wetland sites are marshes, wet meadows, or other wetland types that lack potential for woody species. Such sites should not be penalized on health assessment rating for this lack of potential. Other sites lacking these species do have the potential, but lack the plants due to disturbance. Observers are to answer D6b on the basis of species noted on similar, nearby, less disturbed sites, or other indications. On polygons where the observer cannot find sufficient evidence to make a confident determination, enter NC and explain in the comment field at the end of the Vegetation Section.

D6c. Record the species code and canopy cover for ***every*** shrub species observed on the polygon. Determine the portion of the species cover represented by each of three groups: seedling/saplings, mature, or decadent/dead. (***Note:*** For shrubs, all decadent individuals are included in one group with dead individuals. This contrasts with the method of recording tree decadence, where the decadence within each age group is recorded.) As with trees, decadent shrubs are individuals having 30% or more dead material in the canopy. The canopy covers of the three age/size groups for a species must total approximately 100%.

In general, shrub seedling/saplings can be distinguished from mature plants on the following basis: For normally tall shrubs, which have an average mature height of over 1.8 m (6.0 ft), seedlings and saplings will be plants reaching only into the first and second vegetation layers (shorter than 1.8 m [6.0 ft]). For shrub species having normal mature height between 0.5 m (1.5 ft) and 1.8 m (6.0 ft), seedlings and saplings are individuals reaching only into the first vegetation layer (below 0.5 m [1.5 ft]). For short shrub species, whose mature height is 0.5 m (1.5 ft) or less, observers must judge individual plants for height, reproductive structures, and other characteristics that indicate relative age. Refer to reference manuals on the regional flora for information of normal sizes for unfamiliar species. Count plants installed by human planting, if these are successfully established; which means they have survived at least one full year after planting. (***Note:*** Evaluators should take care not to confuse short stature resulting from intense browsing with that due to young plants.)

When estimating degree of utilization, count browsed second year and older leaders on representative plants of woody species normally browsed by ungulates. Do not count current year's use, because this would not accurately reflect actual use when more browsing can occur later in the season. Browsing of second year or older material affects the overall health of the plant and continual high use will affect the plant's ability to maintain itself on the site. Determine percentage by comparing the number of leaders browsed or utilized with the total number of leaders available (those within animal reach) on a representative sample (at least three plants) of each shrub species present. Do not count utilization on dead plants, unless it is clear that death resulted from over-grazing. ***Note:*** If a shrub is entirely mushroom/umbrella shaped by long term intense

browse or rubbing, count utilization of it as heavy. Record to the right of the slash (/) the ***one category*** that best describes shrub utilization for each age group (using the five categories in item D5 above).

Example:	Species	Cover	Sdlg-Splg/Util	Mature/Util	Dec-Dead/Util	Shrub Growth Form
	ALNUTEN	2	P / Moderate	7 / Light	3 / Unavail.	N

D6d. Record the category best describing the dominant appearance of each shrub species in the polygon.

Code	Description
N	***Normal Growth Form.*** No apparent deviation from the normal appearance of the lifeform.
F	***Flat-Topped Growth Form*****.** Shrubs with the tallest leaders hedged (e.g., hedging from the top down). (Moose during winter in deep snow browse exposed branches of shorter plants.)
U	***Umbrella-shaped/Heavily-hedged/High-lined.*** Shrubs that have most of the branches (up to 1.5 m [5 ft] in height) removed by browsing.
C	***Cut Off at or Near the Ground.*** Shrubs that have been cut off by beaver or humans, at or near the base of the main stem(s).

D6e. (*Skip this item if the polygon lacks trees and shrubs **AND** there are no stumps or cut woody plants to indicate that it ever had any.*) Excessive cutting or removing parts of plants or whole plants by agents other than browsing animals (e.g., human clearing, cutting, beaver activity, etc.) can result in many of the same negative effects to the community that are caused by excessive browsing. However, other effects from this kind of removal are direct and immediate, including reduction of physical community structure and wildlife habitat values. ***Do not include natural phenomena such as natural fire, insect infestation, etc. in this evaluation.***

Removal of woody vegetation may occur at once (a logging operation), or it may be cumulative over time (annual firewood cutting or beaver activity). This question is not so much to assess long term incremental harvest, as it is to assess the extent that the stand is lacking vegetation that would otherwise be there today. Give credit for re-growth. Consider how much the removal of a tree many years ago may have now been mitigated with young replacements.

Three nonnative species or genera are excluded from consideration here because these are aggressive, invasive exotic plants that should be removed. They are *Elaeagnus angustifolia* (Russian olive), *Rhamnus cathartica* (European/common buckthorn), and *Tamarix* species (salt cedar).

Determine the extent to which woody vegetation (trees and shrubs) is lacking due to being physically removed (i.e., cut, mowed, trimmed, logged, cut by beaver, or otherwise removed from their growing position). The timeframe is less important than the ecological effect. Time to recover from this kind of damage can vary widely with site characteristics. The objective is to measure the extent of any damage remaining ***today*** to the vegetation structure resulting from woody removal. We expect that the woody community will recover over time (re-grow), just as an eroding bank will heal with re-growing plant roots. This question simply asks “How much woody material is still missing from what should be here?” The amount of time since removal doesn't really matter, if re-growth has been allowed to progress. If 20 years after logging, the site has a stand of sapling spruce trees, then it should get partial re-growth credit, but not full credit, since the trees still lack much of their potential habitat and ecological value. (***NOTE:*** In general, the more recent the removal, the more entirely it should be fully counted; and conversely, the older the removal, the more likely it will have been mitigated by re-growth.)

This question is really looking at volume (three dimensions) and not canopy cover (two dimensions). For example, if an old growth spruce tree is removed, a number of new seedlings/saplings may become established and could soon achieve the same canopy cover as the old tree had. However, the value of the old tree to wildlife and overall habitat values is far greater than that of the seedling/saplings. It will take a very long time before the seedlings/saplings can grow to replace all the lost habitat values that were provided by the tall old tree. On the other hand, shrubs, such as willows, grow faster and may replace the volume of removed plants in a much shorter time. Answer this question by estimating the percent of woody material that is missing from the site due to having been removed by human action. Select a range category from the choices given that best represents the percent of missing woody material.

D6f. Record comments giving evidence for the above call.

D7 and **D8.** Record the species code and the percent canopy cover for graminoid and forb species observed in the polygon. ***As a minimum,*** include all species having at least 5% cover on the polygon. This inventory is not intended to be comprehensive. It is not necessary to search for obscure species, just record all species readily seen. Observers should especially look, however, for hydrophytic (wetland) species that may be reduced to trace representation by site disturbance. Herbaceous species other than invasive species (see item D13) with minor presence may be overlooked without serious compromise to the inventory value.

D9. The purpose of this item is to describe the vegetation structure in terms of height layers and plant lifeforms on the polygon. (Think of the layering as though it were a GIS file with 12 layers, each one representing one of four lifeforms [trees, shrubs, graminoids, and forbs] in one of three height layers.) Include the canopy cover on the polygon that is provided by all standing, rooted plants (live or dead). Do not include fallen wood or other plant litter.

Record the percent canopy cover of each plant lifeform in each of the three height layers. Consider each group in each layer separately. For example, shrubs in layer 2 will be the canopy cover of all plants of all shrubs in the polygon between >0.5 m (1.5 ft) and 1.8 m (6.0 ft) tall (roughly knee high to head high). In estimating this value, ignore all plants taller and shorter than this range. Similarly, estimate the cover separately of those taller and those shorter shrubs. Proceed in this way through each lifeform and layer. As a check, refer to your species/canopy lists to help remember what all you have seen on the site. ***Leave no field blank***; enter "0" to indicate absence of a value. (A blank field means the observer forgot to collect the data; a value means the observer looked.) See further discussion in the note for item D10.

D10. Record the total percent of the polygon area occupied by canopy cover of each plant lifeform. Include the canopy cover on the polygon that is provided by all standing, rooted plants (live or dead). Do not include fallen wood or other plant litter. Avoid counting overlapping areas more than once for one group. (For example, an area is not counted twice for total tree cover if seedlings cover all ground under mature trees.) However, the same piece of ground may occur under the canopy of more than one group. (For example, areas covered by grass which are also under trees would be counted for both tree and grass lifeforms.) On the other hand, when estimating total cover of all plants (item D12), the area covered by both trees and grass would only be counted once—trees and grass in this case being part of the same group ("all four plant groups").

D11. Record the percent of the polygon area covered by tree and shrub (woody species) canopy considered as a group in the sense described above. Include the canopy cover on the polygon that is provided by all standing, rooted plants (live or dead). Do not include fallen wood.

D12. Record the percent of the polygon area covered by the canopy of all four plant groups together. Include the canopy cover on the polygon that is provided by all standing, rooted plants (live or dead). Do not include fallen wood or other plant litter. Do not consider the polygon area covered by water (such as between emergent plants).

D13a, b. Invasive plants (noxious weeds) are alien species whose introduction does or is likely to cause economic or environmental harm. Without regard to whether the disturbance that allowed their establishment is natural or human-caused, weed presence indicates a degrading ecosystem. While some of these species may contribute to some riparian functions, their negative impacts reduce overall site health. This item assesses the degree and extent to which the site is impacted by the presence of noxious weeds. The severity of the weed problem on a site is a function of density/distribution (pattern of occurrence), as well as abundance of the weeds. A weed list should be used that is standard for the region (i.e., *Weeds and Disturbance Species Fact Sheet* [Cows and Fish 2001]).

Record the combined percent canopy cover and the overall density distribution class of all invasive plants on the polygon. Common invasive species in Alberta are listed on the form, and space is allowed for recording others. ***Leave no listed species field blank, however;*** enter "0" to indicate absence of a species. (A blank field means the observer forgot to collect the data; a value means the observer looked.) For each weed species observed record canopy cover as a percentage of the polygon (area being evaluated) and density/distribution class. Choose a density/distribution class from the chart (Figure 2) below that best represents each species' pattern of presence on the site.

NOTE: Prior to the 2001 season, the health score for weed infestation was assessed from a single numerical value that does not represent weed canopy cover, but instead represents the fraction of the polygon area on which weeds had a well established population of individuals (i.e., the area infested).

CLASS	DESCRIPTION OF ABUNDANCE	DISTRIBUTION PATTERN
0	No invasive plants on the polygon	
1	Rare occurrence	
2	A few sporadically occurring individual plants	
3	A single patch	
4	A single patch plus a few sporadically occurring plants	
5	Several sporadically occurring plants	
6	A single patch plus several sporadically occurring plants	
7	A few patches	
8	A few patches plus several sporadically occurring plants	
9	Several well spaced patches	
10	Continuous uniform occurrence of well spaced plants	
11	Continuous occurrence of plants with a few gaps in the distribution	
12	Continuous dense occurrence of plants	
13	Continuous occurrence of plants associated with a wetter or drier zone within the polygon.	

Figure 2. Weed density distribution class guidelines

D13c. Record total presence of all invasive species on the polygon. Use the same method described above without consideration of individual species, but instead by considering all weed species together as though they were one. Enter the total canopy cover of all invasive species and the density/distribution class of all invasive species considered together.

D13d, e. Does this county or municipal district place elevated weed status on other species that are present on this polygon? If so, then list the species and give the canopy cover and density distribution.

D14a, b. Areas with historically intense grazing often have large canopy cover of undesirable herbaceous species, which tend to be less productive and which contribute less to ecological functions. A large cover of disturbance-increaser undesirable herbaceous species, native or exotic, indicates displacement from the potential natural community (PNC) and a reduction in riparian health. These species generally are less productive, have shallow roots, and poorly perform most riparian functions. They usually result from some disturbance, which removes more desirable species. Invasive species considered in the previous item are not reconsidered here.

Record the percent area covered by this general group, which may include the following listed species, among others of like character. ***Count overlapping areas only once.*** The following list is intended only to be representative. Additional species may be appropriate for specific regions and can be added in the spaces below.

Antennaria spp. (pussy-toes)
Brassicaceae (mustards)
Bromus inermis (awnless brome)
Fragaria spp. (strawberries)
Hordeum jubatum (foxtail barley)
Plantago spp. (plantains)
Poa pratensis (Kentucky bluegrass)
Potentilla anserina (silverweed)
Taraxacum spp. (dandelion)
Trifolium spp. (clovers)

_____ _____ _____

_____ _____ _____

D15. List the riparian habitat type(s) and/or community type(s) found in the polygon using a manual for identifying types in the region in which you are working, such as *Classification and Management of Riparian and Wetland Sites of the Alberta Grassland Natural Region and Adjacent Subregions* (Thompson and Hansen 2002), *Classification and Management of Riparian and Wetland Sites of Alberta's Parkland Natural Region and Dry Mixedwood Natural Subregion* (Thompson and Hansen 2003), *Classification and Management of Riparian and Wetland Sites of the Saskatchewan Prairie Ecozone and Parts of Adjacent Subregions* (Thompson and Hansen 2001) or a similar publication written for the region in which you are working. If the habitat type cannot be determined for a portion of the polygon, then list the appropriate community type(s) of that portion. If neither the habitat type nor community type can be determined for any portion of the polygon (or in areas where the habitat and community types have not been named and described), list the area in question as "unclassified wetland type" and give the dominant species present. Indicate with the appropriate abbreviation if these are habitat types (HT),

community types (CT), or dominance types (DT), for example, SALILUT/CORNSTO HT (*Salix lutea/Cornus stolonifera* [yellow willow/red-osier dogwood] Habitat Type). For each type listed, estimate the percent of the polygon represented. If known, record the successional stage (i.e., early seral, mid-seral, late seral, and climax), or give other comments about the type. As a minimum, list all types that cover 5% or more of the polygon. The total must approximate 100%. Slight deviations due to use of class codes or to omission of types covering less than 5% of the polygon are allowed. ***Note:*** For any area designated as an "unclassified wetland type," it is important to list any species present that can indicate the wetness or dryness of the site.

NOTE: Open water in the polygon that does not have emergent vegetation, but that is less than 2 m (6.6 ft) deep is counted here as a "type" called "Open Water."

D16. Select the ***one category*** (Improving, Degrading, Static, or Trend Unknown) that best indicates the current trend of the vegetative community on the polygon to the extent possible. Trend refers, in the sense used here, not specifically to successional pathway change, but in a more general sense of apparent community health. By definition, trend implies change over time. Accordingly, a trend analysis would require comparison of repeated observations over time. However, some insights into trend can be observed in a single visit. For example, the observer may notice healing (revegetating) of a degraded shore area and recent establishment of woody seedlings and saplings. This would indicate changing conditions that suggest an improving trend. If such indicators are not apparent, select the category "status unknown."

D17. Add any necessary commentary to explain or amplify the vegetation data recorded. ***Do not leave this space blank.*** Describe any unique characteristics of the site and other observations relating to the vegetation. This space is the place for general commentary to help the reader understand the larger context of the data. Such things as landscape setting and local land use history are appropriate here.

Water Quality Data
Note: This data will be entered in the office.

E1. Give the water body number (FMIS/Hydro code).

E2a, b. If water quality data is available on this water body, list the reference where the data can be found.

Physical Site Data
F1. Record the primary water source for the polygon from the listed choices. If appropriate, list more than one in descending order of volume. Explain "unknown" and "other" entries.

F2. Indicate whether the water body has an outlet or is an internally draining closed basin. Refer to the topographic map to determine this.

F3. Make the distinction between "fresh water" and "alkaline/saline water" systems on the basis of the presence or absence of crystallized salts on the soil surface or a predominance of salt tolerant plant species.

F4a. Although water levels naturally fluctuate on a seasonal basis in most systems, many wetland systems are affected by human-caused (artificial) additions or withdrawals. This artificial changes of water level rarely follow a temporal regime that maintains healthy native wetland plant communities. The result is often a barren band of shore that has been exposed or inundated for much of each growing season. This causes shore material to destabilize, and often provides sites for weeds to invade. Such conditions are extremely detrimental to healthy riparian function.

Not all lentic wetlands evaluated with this form will have surface water, but any wetland may have its water table degraded by draining, pumping, or diverting its surface or subsurface supply. On such lentic wetlands as marshes and wet meadows, look for evidence of drainage ditching, pumping, and the interruption of normal surface drainage inputs by livestock watering dugouts, cross slope ditches, or dams upslope.

In this item the evaluator is asked to categorize the degree to which the system is subjected to artificially rapid or unnaturally timed fluctuations in water level. Reservoirs intended for storage of water for power generation, irrigation, and/or livestock watering typically exhibit the most severe effects, but water may be diverted or pumped from (or into) natural systems for many other reasons (domestic use, industrial use, livestock watering, etc.). This item requires the evaluator to make a subjective call by choosing as a "best fit" one of the categories of severity described. (***Note:*** Be careful to consider the size of

the water body related to the scale of change. Pumping a small dugout full of water for livestock might severely impact a two acre slough, but be negligible to a lake covering a section of land.)

Be sure to document the reason for your estimate here. If there is no way to know with any reasonable degree of certainty how much water is being added or removed, it may be better to describe the situation and to "zero out" this item (not answer it). During periods of drought lakebeds become exposed, and often exhibit wide zones of almost barren shore. ***The evaluator must be careful not to attribute this natural phenomenon unfairly to a human cause.***

Categories of Lentic Water Removal Severity	
Not Subjected	The water body, or wetland, is not subjected to artificial water level change (e.g., drawdown, addition, stabilization, etc.). This category may include very small amounts of change that cause no detectible fluctuation in water level.
Minor	The water body or wetland is subject to no more than minor artificial water level change. The shore area remains vegetated, and withdrawal of water is limited or slow enough that vegetation is able to maintain growth and prevent exposed soil. A relatively narrow band affected by the water level fluctuation may support only annual plants.
Moderate	The water body or wetland is subject to moderate quantities, speed and/or frequency of artificial water level change. Where water is removed, it is done in a way that allows pioneer plants to vegetate at least half of the exposed area resulting from drawdown. Where water is added, some flooding may occur at levels or times not typical to the area/ season.
Extreme	The water body or wetland is subjected to extreme changes in water level due to volume (extent), speed and/or frequency of artificial water addition or removal. Frequent or unnatural levels of flooding occur where water is added, including extensive flooding into riparian and/or upland areas; or no natural annual drawdown is allowed to occur. In extreme artificial drawdown situations, a wide band of exposed bottom remains unvegetated.

F4b. Describe the evidence upon which you made your call.

F5a-c. Many lentic wetlands are associated with human constructed water impoundments having dams and overflow control structures. For human-constructed dams, indicate the type of provision made for passage of overflow. Indicate the type of structure (if any) observed, its location on the water body, and its apparent stability. If no protected overflow structure is provided, describe any evidence of dam overflow and resultant cutting. Describe any other apparent instability (erosion, cutting, through-dam leakage, etc.) Categories of stability are described below. (***Note:*** Water need not be at the level of the overflow structure, to answer this question regarding stability and condition of the structure.)

Categories of Stability of Lentic System Overflow Structures	
Highly Stable	Overflow channelled through a protected and durable conduit; unable to erode at either end.
Moderately Stable	Overflow structure of durable material, but showing some sign of inadequacy in the form of slight erosion at the ends or infrequent inability to contain maximum overflows.
Marginally Stable	Earthen overflow (spillway directly over earthen dam) or a durable material overflow structure showing sign of frequent inability to contain high overflow events.
Unstable	An overflow structure showing significant erosion at the ends, sign of dam erosion due to downcutting by overflows in excess of the capacity of the structure, or an earthen overflow showing definite downcutting.

F5d. Describe the location on the water body of any overflow structure, even if it is not on the polygon. Use GPS coordinates, if possible.

F6a-c. If the lentic wetland has a distinguishable shoreline and there is mineral shore substrate visibly exposed, then estimate the proportional breakdown of this mineral substrate into the listed particle size categories. (The ***shoreline*** is defined as a 1-2 m (3.3-6.6 ft) band stretching along the landward side of the water's edge TODAY.) If the mineral substrate is obscured by vegetation, organic matter, or otherwise so that the observer cannot be confident of accurate representation, then mark "No" for **F6b**. (Category sizes are based on the measurement of the middle length axis of the particle. This is the dimension that would limit the screen size the particle could pass through.) The sum of these values must approximate 100%.

F7. The vegetation covering the soil and along a shoreline performs the primary physical functions of stabilizing the soil against wave erosion with a deep, binding root mass and filtering sediments from overland flow. Few studies have documented the depth and extent of the root systems of the various plant species that are found in Alberta wetlands. Despite this lack of documented evidence, some generalizations can be made. All tree and shrub species are considered to have deep, binding root masses. Among wetland herbaceous species, annuals do not have deep, binding root masses. Perennial species offer a wide range of root mass qualities. Some rhizomatous species, such as the deep-rooted *Carex* species (sedges), *Typha* species (cattails), and *Scirpus* species (bulrushes), are excellent shoreline stabilizers. Other rhizomatous species, such as *Poa pratensis* (Kentucky bluegrass), have only shallow root systems and are poor shore stabilizers. Still other species, such as *Juncus balticus* (wire rush), appear to have root systems that are intermediate in their ability to stabilize shores. (Information is being accumulated on the ability of various wetland species to perform this function. This information will be incorporated as available.)

In rating this item consider a band 2 m (6.6 ft) wide adjacent to the edge of the current level of surface water. If the wetland has no surface water at the time of inventory, you should have answered "No" to Item F6a, and you should skip this item. Answer this question by estimating the percent of the 2 m (6.6 ft) wide band that is covered by vegetation species with deep-binding root masses appropriate to the location (i.e., larger species with deeper roots are needed to hold banks where large waves may strike; and smaller species, such as grasses and sedges, where less energetic overland flows are likely).

F8. Is there human-caused alteration of the vegetation on this polygon? Human alteration of the vegetation is meant to include all changes to the plant community composition or structure on the polygon from human causes. It is not meant to include transitory or short-term removal of plant material that does not impact plant community composition (i.e., grazing at carefully managed levels). In **F8a,** estimate the cumulative total part (percentage) of the polygon vegetation that has been altered in ways such as described in F8b and F8c below.

F8b. Human causes of alteration to the vegetation may take many forms. In **F8b** break this total down among the causes or agents of cause listed on the form. This breakdown attributed to each cause is only for management information. Rough estimation is appropriate, with some overlap likely among the effects. Causes identified need to approximate 100%. Great precision is not expected or needed here. Common human causes of alteration of vegetation composition on a lentic wetland site include:

- **Grazing.** Long term livestock use often results in conversion of certain components of the plant community to dominance by species that are tolerant of such use, or that are less utilized by the domestic animals.
- **Cultivation.** This cause of alteration is either the conversion of wild vegetation to domestic pasture species for grazing, or the actual cropping of planted vegetation for hay or other products.
- **Timber Harvest.** The alteration from this cause is not simply the removal of some trees (which might be done without any real change to the vegetation community), but rather it is the larger scale "opening" of the canopy and the induced "regression" of the site to a much earlier seral stage of vegetation succession. Also common with this cause of disturbance is introduction of alien plant species, or even pro-active re-planting of more "desired" species.
- **Mining.** With mining activities comes necessary disturbance of the land surface. The minerals introduced to the site may be unnatural to the native vegetation. The introduction of alien plant species may also occur.
- **Cottage or Urban Development.** Cottage development commonly occurs around lakeshores, causing disruption of the natural vegetation. Human development of domestic or commercial enterprise also occurs around water bodies in urban settings. Such development necessarily causes the disruption of natural vegetation in many cases.
- **Construction.** Human infrastructure (roads, railroads, and/or earth moving for other construction purposes) often are located within the riparian/wetland zone associated with natural water bodies. They inevitably represent disrupted natural vegetation, but also impermeable surface area, and the introduction of alien or invasive species.
- **Recreation.** The additional traffic of human usage may trample the vegetation, introduce trails with compaction of the soil, and introduce alien or invasive species.
- **Other.** List any other causes of alteration to the polygon vegetation that are not listed above, and describe them in the space provided.

F8c. Also of concern are the kinds of change that diminish the presence or disrupt the natural function of the vegetation, and that result from the causes listed above. As for the various causes, estimate the distribution of kinds of alteration observed on the site. Again, rough estimation is appropriate. Some overlap is likely and great precision is not needed, but recorded kinds indicated must add to approximate 100%. Among the kinds of change to look for are:

- **Physical clearing of vegetation,** such as removing woody species to create more herbaceous cover for hay production or livestock forage, to enhance lake visibility or access, timber harvest, road construction, etc. Clearing is

purposeful, long term removal of vegetation. Do not count short term removal of plant parts, such as from foraging by well managed livestock, or mowing of hay from a herbaceous meadow;

- **Replacing tall species with short species** (e.g., willows for rose and buckbrush). This is a common result of long term intense use by livestock in tall shrub communities. Such species as *Symphoricarpos occidentalis* (buckbrush) and *Rosa woodsii* (common wild rose) are more tolerant of intensive grazing than are most of the willows and tall riparian shrubs.;
- **Replacing native plants with non-native species,** such as for landscaping or to create pasture for livestock (e.g., *Alopecurus pratensis* [meadow foxtail] or *Poa pratensis* [Kentucky bluegrass] to replace native riparian graminoids, or displacement of native forbs by plantains, dandelion, and low clovers by long term grazing pressure);
- **Replacing woody species with herbaceous species,** such as shrubs for grasses and forbs (e.g., replacement of a tall shrub layer under a tree canopy by *Bromus inermis* [awnless brome]);
- **Other** kinds of alteration of the vegetation to consider (which may overlap with those listed above) include such as:
    - Replacing deep rooted species with shallow rooted species;
    - Removal of structural layers; and
    - Allowing invasion by weedy species
    - Replacing late seral with early seral communities

Human changes to the vegetation community do not include beaver activities—this activity is included in the utilization section. On polygons adjacent to water, remember that the polygon extends out to deep water habitat or open water if no potential for emergents exist. ***NOTE:*** Do not count the same area twice by including it as both a vegetative and a physical alteration, unless there clearly are both kinds of alteration. Decide into which category a particular effect should go. For example: A timber harvest may clear vegetation, but not necessarily cause physical damage on one site; while on another site it causes both clearing of vegetation and disruption of the soil by heavy equipment.

F8d. Comment here to explain your answers for F8b, c. Use this space to elaborate on any overlap between the various causes and kinds of alteration noted.

F9. Is there human-caused physical alteration on this polygon? (***Note:*** If "No," item F9d must still be answered.)

Human alteration of the physical site is meant to include all changes to physical attributes of the site caused by human actions (e.g., logging, mining, human structures, etc.) or by agents of human management (e.g., livestock). The kinds of physical change that diminish or disrupt natural wetland functions include, but are not limited to, such things as:

Hummocking, pugging, and trails by large animals	Roads, driveways, walkways, trails, etc.
Buildings and landscaping	Boat launches and docks
Beach clearing and building	Rip-rapping of shores and banks
Plowing and tilling the land	Hydrologic draining, ditching, berming, etc.

(***NOTE:*** Do not count the same area twice by including it as both a vegetative and a physical alteration, unless there clearly are both kinds of alteration. Decide into which category a particular effect should go. For example: A cottage owner may clear vegetation to gain a view of the lake causing vegetation, but not physical, damage; whereas, if he/she hauls in sand to make a beach, then there is also physical alteration.)

F9a. Estimate the total part of the polygon area that has been altered physically by human or livestock activity.

F9b. Break the total amount of physical alteration down among the various causes listed:

- **Grazing.** Long term livestock use often results in such physical alterations as erosion, hummocking and pugging in soft soils, and bank damage by hoof shear.
- **Cultivation.** This is the mechanical disruption of natural soil structure by farming activities.
- **Timber Harvest.** Although it may be minimized, timber harvest usually results in at least some physical damage to the soil surface by the machinery used in the process.
- **Mining.** Mining activities usually cause physical damage to the soil surface, but may also include introduction of waste materials to the site, including chemical effects to the soil.
- **Cottage or Urban Development.** Such development generally covers the soil surface with impermeable area. It often typically includes alteration to the local topography and mechanical disruption of drainage and soil structure.
- **Construction.** Human infrastructure (roads, railroads, and/or earth moving for other construction purposes) often is located near wetlands, causing structural disruption or requiring rip-rap protection.

- **Recreation.** Trails at popular sites often cause soil compaction and erosion, especially where mechanical devices (i.e., off-road vehicles and ATVs) are used. The banks of popular fishing sites are often susceptible to foot damage.
- **Water Management.** The withdrawal of water for human purposes can alter the potential of a site to perform natural function. However, other water level manipulations (i.e., storage, addition, or changes in timing) may also have profound effect on the capacity of a site to support natural function. Look for erosion, flooded area, and dead stands of wetland species (killed by either too much or too little water) as possible indications such alteration.
- **Other.** List any other causes of physical alteration not listed above, and describe them in the space provided.

F9c. A polygon will typically have only a few kinds of alteration. For example: There may not be a bank present. Break down the total amount of physical alteration among these kinds:

- **Soil Compaction.** This kind of alteration includes livestock-caused hummocking and pugging, recreational trails that obviously have compacted the soil, vehicle and machine tracks and ruts in soft soil, etc.
- **Human Impervious Surface.** This includes roofs, hardened surfaces like walkways and roads, boat launches, etc.
- **Bank Alteration.** (*The bank is a noticeable topographic rise located near the land-water interface, and serving to contain the area normally covered by the water body. The bank may not coincide with the shore, which is a more variable position.*) This kind of alteration includes livestock hoof shear, rip-rap to stabilize the bank, berms and levees on the bank, bridge abutments, and effects of machinery or vehicles that change the bank profile shape, etc.
- **Hydrologic Change.** Include in this category any area that is physically affected by removal or addition of water for human purpose. The physical effects to look for are erosion due to reduced or increased water, bared soil surface that had water cover removed, or flooded area that normally supports a drier vegetation type.
- **Topographic Change.** This is the deliberate alteration of terrain and/or drainage pattern for human purposes. It may be for aesthetic (landscaping) or other reasons, including such structures as water diversions ditches and canals.
- **Plowing/Tilling.** This is disruption of the soil surface for cultivation purposes. It does not include the alteration of drainage or topographic pattern, which are included in the Topographic Change category.
- **Other.** List any other kind of physical alteration to the actual bank structure, profile, or integrity, that is not named above, and describe it in the space provided.

F9d. If human-caused alteration to the physical site is recorded in F9a above, then estimate the severity of that alteration, without regard to how large or small a fraction of the polygon it might occupy. Categories of alteration degree are described here in terms of change to the site vegetation, physical structure, and hydrologic function. (***Note:*** *This call uses vegetation change to indicate degree of alteration, as a signal of physical alteration, but the alteration must be physical in nature, not just vegetative change alone; e.g., disruption of soil, hydrology (including infiltration/interception of water), topography, etc.*) Document the call with photos and commentary. Categories of severity of human-caused physical alteration are described below with conceptual guidelines. These guidelines are not comprehensive, but are intended as a relative scale by which the observer can judge his/her site. Every case is different, and there is no absolute measuring stick to apply. Use the following comparative descriptions to choose a category of alteration on your site:

- ***None***—No human-caused alteration is observed to the polygon physical site.
- ***Slight***—Physical site integrity is near natural. Human-caused alteration (including recovery from any past severe alterations) is apparent, but it reflects minimal impact to plant communities and/or hydrological function in the altered areas (e.g., the plant community is little changed from that on nearby sites lacking physical alteration; any pugging and hummocking or other disruption of the soil profile is relatively shallow and is well vegetated with appropriate species).
- ***Moderate***—As compared with nearby unaltered sites, human-caused physical alteration on the polygon (including recovery from any past severe alterations) has noticeably altered the physical site integrity to the point that plant communities and/or hydrological function on the altered areas show visible impact. The plant community differs noticeably (by having introduced or missing components) from nearby sites that are on similar landscape position lacking physical alterations. Pugging and hummocking or other disruption of the soil profile is moderate in depth and height of hummocks. Such alteration is either becoming re-vegetated with appropriate species, or is well covered with a mix of less desirable and appropriate species.
- ***Severe***—Human-caused physical site alteration on the polygon has compromised the physical integrity of the altered areas (even if a only small area is altered). Old alterations have not recovered and are still affecting the vegetation and/or hydrological functions (e.g., the plant community differs radically from nearby sites in similar position that lack physical alterations, reflecting altered hydrologic and/or soil conditions). Pugging and hummocking or other disruption of the soil profile is severe in depth of disturbance and/or height of hummocking. Alterations remain mostly bare of plant cover, or are becoming vegetated with invasive or undesirable species.

F9e. Comment on any unusual or odd degree or aspect of the alteration to the polygon physical site. Use this space to elaborate on any overlap between the various causes and kinds of alteration noted.

F10a, b. Record the portion of the polygon with exposed soil surface (bare ground). Exposed soil surfaces are those surfaces not protected from erosional forces by plants, litter or duff, downed woody materials, rocks of cobble size or larger (>6.25 cm [2.5 in]), or hardened impervious surfaces. Hardened, impervious surfaces (e.g., asphalt, concrete, etc.) are not bare ground (i.e., do not erode nor allow weeds to invade) and are counted in item F11. ***NOTE:*** Areas quantified in items D12, F10b, F11, and F15 account for the entire polygon.

F10c. Separate the exposed soil surface from F10b into two categories: that resulting from natural and human causes. These must total approximately 100%. Examples of human causes include livestock wallows and trails, hiking trails, ATV trails, roads, timber harvesting skid trails, mining, and construction activities.

F10d. Within both the natural and human-caused categories, record the proportions of exposed soil surface (bare ground) resulting from the listed causes. Within each category, the portions assigned to the individual causes must total approximately 100%. Explain whatever is put in the "other" category.

Natural processes are:

- **Erosional.** Natural flows and flood events often result in erosion that removes the soil cover. Attribute polygon bare ground to this process when there is no human cause apparent on the site that would cause the erosion. Wave action along a lake shore is the most common case of erosional bare ground in lentic systems.
- **Depositional.** The deposition of sediment by water flow is perhaps the greatest source of naturally occurring bare ground. This is a significant natural process on certain lotic sites, but is less common on lentic sites. If the source of sediment is some human activity (i.e., sheet erosion from ploughed field, road surface, etc.), then list this bare ground under the most appropriate human-caused process.
- **Wildlife Use.** Trails and digging are common wildlife activities that result in natural bare ground.
- **Type Dependent.** Some vegetation types naturally space-out individual plants, leaving bare ground between. Typically this is a characteristic of arid land vegetation.
- **Saline/Alkaline.** The natural accumulation of mineral salts often reaches local concentrations that either support no vegetation, or support only sparse populations of adapted species. The observer should decide whether the source of such mineral accumulation is natural or caused by human activity. If unknown, then default to the natural cause.
- **Natural Drawdown.** The natural drawdown of water levels normally occurs in either annual or short-term climatic cycles. This process often leaves temporary areas of exposed soil surface along a shore. Take care to distinguish this natural cause from the similar result caused by drawdown for human use. In some cases both types of drawdown may be occurring together.
- **Other.** Account for any naturally occurring bare ground here that is not included in the categories named above, and describe what caused it in the field provided.

Human-caused bare ground may result from:

- **Grazing.** Livestock use often results in bare ground from trailing, trampling, hoof shear, and the removal of vegetation cover by overgrazing.
- **Cultivation.** Tillage and other mechanical activities in the process of cultivation of crops result in bare ground.
- **Timber Harvest.** Log skidding and other activities in the process of timber harvest may result in bare ground.
- **Mining.** Extraction and processing of minerals can result in bare ground. The deposition of waste rock (either cast aside overburden or processed tailings) is a common type of mining-caused bare ground.
- **Construction.** Construction activities of all kinds often involve excavation, earth moving, and other disruptions of the soil surface or natural soil covering.
- **Recreation.** Many modern forms of recreation involve use of mechanical vehicles that damage the vegetation cover and the integrity of soil. Even foot traffic along trails or popular fishing spots can result in significant areas of bare ground.
- **Other.** Account for any human-caused bare ground here that is not included in the categories named above, and describe what caused it in the field provided.

F11. Record how much of the polygon is covered by the items listed, which are not already taken into account as live vegetative cover, exposed soil surface, or open water (under the habitat type/community type question). Include areas covered only by litter or duff, downed woody materials, rocks of cobble size or larger (>6.25 cm [2.5 in]), or human-made impervious surface (concrete, asphalt, roofed structure, etc.). These are ground covers not accounted for by exposed soil

surface (bare ground), open standing water, and vascular plant canopy (standing trees, shrubs, or herbaceous of the season), which are recorded elsewhere. Although they do not support vegetation, they are not erodible. ***NOTE:*** Animal dung and dead, non-rooted, plant material that is not considered "wood" are all considered "litter and duff." Also ***NOTE:*** Areas quantified in items D12, F10b, F11, and F15 account for the entire polygon.

If ground covers not named on the form are quantified under the "other" category, describe these in the space provided.

F12a, b. If pugging, hummocking and/or rutting are present in the polygon, record the percent of polygon area affected. ***NOTE:*** Hummocking and pugging are included as one form of alteration to the polygon physical site in Item F9. Other than as that inclusion, this item is not a factor of derived polygon functional health assessment.

Pugging is tracking depressions left by large animals (typically hooved animals, but occasionally humans) left in fine textured soil. Moist clay or silt usually has a consistency to hold tracks. Upon drying, pugged areas will have a hard, irregular surface, difficult to walk across. Bare soil may or may not be present. ***Hummocking*** is a form of micro-topographic relief characterized by raised pedicels of vegetated soil as much as 0.6 m (2 ft) higher than the surrounding ground which results from long term large animal trampling and tracking in soft soil. Vegetation on the pedicels usually differs from that on the surrounding lower area due to moisture difference between the two levels.

F13a-c. Check for sediment and debris being introduced from side slopes immediately adjacent to the polygon. Indicate whether the problem is human-caused or of natural causes and list the causes of the sedimentation: the kind of human disturbance (grazing, logging, recreation, development, roads, etc.) or the major soil type in cases of natural causes (erodible shale, unconsolidated sands and silts, etc.). An example might be a reservoir where the artificial water level is causing slope erosion along its shoreline. A similar situation may be natural if it is occurring along a natural lake and the erosion is not being caused by livestock or other human activities.

F14. This question distinguishes between sites contaminated with materials toxic to wetland plants native to the site and sites upon which viable communities of wetland species normal to the locality are present.

F15. Open standing water may represent a significant area of some polygons. In many cases this ground cover is temporary or seasonal, but must be quantified to entirely account for the polygon area. There may be bare ground or plant cover that is obscured by the temporary water. The term "open water" is used here to mean area on which the only surface visible is water that obscures whatever is beneath. However, refer again to the discussion of polygon delineation, which indicates that deep water habitat (such as the main body of a lake) is not normally included in the area of the polygon. ***NOTE:*** Areas quantified in items D12, F10b, F11, and F15 account for the entire polygon.

F16. Is there evidence that vegetation productivity or composition is being affected by chemical accumulation on the site, such as salts concentrated by evaporation of water from a closed basin, phytotoxic minerals derived from mine wastes, agricultural chemicals, herbicides or pesticides? Use caution in making this call. **"Yes" answers should have explanation in the comments of item F17.** Photo documentation is also advisable. Soil chemical analysis is unnecessary. Answer "Yes" only for visually apparent cases.

F17. Record comments that would amplify the meaning of the inventory data on the physical characteristics of the polygon. This would include a description of the landform setting context of the site, as well as any alteration or other extreme uses of the site.

F18. Describe the polygon boundaries in terms of landmark features, fences, or whatever the delineation is based upon. This is to help future observers relocate the same polygon area. Describe inner and outer boundaries. Name physical character of the delineations between wetland and upland; or give arbitrary dimensions, if that is what was used.

Photograph Data
Note: At a minimum, take two photos from identifiable points along the upland edge of the polygon viewing toward the water body and along the longitudinal axis of the polygon. Identify all photo point locations sufficiently that they could be relocated by another individual.

G1. At the ***northern*** most end of the polygon take one photo with view to the outside of the polygon and one with view into the polygon. Identify the photo numbers and the enter a description of each photograph taken at the northern most end of the polygon.

G2. At the ***southern*** most end of the polygon take one photo with view to the outside of the polygon and one with view into the polygon. Identify the photo numbers and the enter a description of each photograph taken at the southern most end of the polygon.

G3. Take other photos, as needed to illustrate key features or problems within the polygon. For each "Other" photo, enter the UTM location coordinates and identify each one with its photo number and description.

G4a, b. Indicate if there is another polygon adjacent more to the ***north*** of this one and identify its polygon name.

G5a, b. Indicate if there is another polygon adjacent more to the ***south*** of this one and identify its polygon name.

G6. Identify all additional photos taken outside of polygon (i.e., non-polygon photos) by giving roll number, frame number, and description of view.

G7. Record the type of film (digital or film), film speed or digital quality (dpi), camera lens size, and lens focal length range or magnification, Lens filter used (polarizer or none).

Additional Data Items
H1. Record the rating category that best describes the vegetation use by animals (Platts and others 1987). This is intended as a measure of herbivore utilization of available forage. However, it may be extended to include human removal of this same forage by mowing or other means. Although Platts and others (1987) state that this available forage is mainly herbaceous, the concept here is extended to also include normally utilized and available woody species. Record the category, not a precise value.

Code	Category Description
0% to 25%	Vegetation use is light or none. Almost all plant biomass at the current development stage remains. Vegetative cover is close to that which would occur without use. Unvegetated areas (such as bedrock) are not a result of land uses.
26% to 50%	Vegetation use is moderate. At least half the potential plant biomass remains. Average stubble height is more than half its potential at the present stage of development.
51% to 75%	Vegetation use is high. Less than half the potential plant biomass remains. Plant stubble height is usually more than 5 cm (2 in) (on many ranges).
76% to 100%	Vegetation use is very high. Only short stubble remains (usually less than 5 cm [2 in] on many ranges). Almost all plant biomass has been removed. Only the root systems and parts of the stems remain.

H2. Record the type(s) of uplands adjacent to the lentic wetland; if "other" is selected, describe.

H3. Break down the polygon area into percentages of the land uses listed. Name any "others" observed.

H4. Break down the area adjacent to the polygon into the land uses listed. Name any "others" observed.

H5. Record the percent of polygon area accessible to large hooved animals (livestock and wildlife). In general, only consider topography (steep banks, deep water, etc.) and dense vegetation as restricting access. Fences, unless part of an exclosure with no gate, do not necessarily restrict livestock access, even though they may appear so at the time of inventory.

H6a-d. Note the types and locations of any of the listed human-caused bank modifications observed within the polygon. Use "other" to note kinds of modification observed but not included on this list. (*The bank is a noticeable topographic rise located near the land-water interface, and serving to contain the area normally covered by the water body.*)

Wildlife Data (These wildlife data represent incidental observations only.)
H7a, b. If waterfowl nests or young broods were observed, describe location, type, and whether the nest was in use, of the year, or old.

H8a-e. Respond to the fishery questions based on observations.

H9a, b. Record the number and type of any amphibians observed.

H10a, b. Record the number and type of any reptiles observed.

H11. If possible, name the species, number of each, and sighting locations observed within the polygon (e.g., “upper 1/3 of polygon,” “throughout polygon,” “lower 1/4 of polygon”).

H12a-f. Record evidence of beaver activity in the polygon. Record whether the beaver sign appears current (active) or old (inactive). Describe the types and amounts of beaver evidence observed.

H13a-d. List threatened and endangered animal species observed in the polygon along with any nesting sites. Space is provided to list species observed. Consult relevant documents to determine appropriate species. Record the location in the polygon where animals or nests were sighted.

H14. List incidental sightings of non-waterfowl bird species on the polygon. Give number of individuals seen and any pertinent location information for each species.

H15. List rare plant species found on the polygon. Give number of individuals seen and location information for each species. ***Note:*** Species listed here must also be listed on the appropriate lifeform listing in the VEGETATION SECTION above (Questions D2, D6, D7, or D8).

H16. This space is provided for any additional commentary the observers may wish to record concerning any aspect of the site that is not more appropriately entered in the vegetation section (item D17) or in the physical site section.

LITERATURE CITED

Adams, Barry and Lorne Fitch. 1995. Caring for the green zone, riparian areas and grazing management. Alberta Riparian Habitat Management Project. Lethbridge, Alberta, Canada. 37 p.

Alberta Natural Heritage Information Centre. 1999. Natural regions and subregions of Alberta. Internet website: http://www.gov.ab.ca/env/parks/anhic/abnatreg.html. Edmonton, Alberta, Canada. T5K 2J6.

Cooperrider, Allen Y., Raymond J. Boyd, and Hanson R. Stuart. 1986. Inventory and monitoring of wildlife habitat. USDI Bureau of Land Management, Denver Service Center, Denver, Colorado, USA. 858 p.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of wetlands and deep water habitats of the United States. USDI Fish and Wildlife Service, Office of Biological Services, Washington, DC, USA. Publication Number FWS/OBS-79/31. 107 p.

Cows and Fish. 2001. Invasive Weed and Disturbance-caused Herbaceous Species List For Use in Riparian Health Assessment and Inventory in Alberta--draft. Alberta Riparian Habitat Management Program. Lethbridge, Alberta, Canada.

Daubenmire, R. D. 1959. A canopy-coverage method of vegetation analysis. Northwest Science 33:43-66.

Federal Interagency Committee for Wetland Delineation. 1989. Federal manual for identifying and delineating jurisdictional wetlands. US Army Corps of Engineers, US Environmental Protection Agency, USDI Fish and Wildlife Service, and USDA Soil Conservation Service Cooperative Technical Publication, Washington, DC, USA. 76 p.

Fitch, L., B.W. Adams and G. Hale, Eds. 2001. Riparian Health Assessment for Streams and Small Rivers - Field Workbook. Lethbridge, Alberta: Cows and Fish Program. (adapted from Riparian and Wetland Research Program, School of Forestry. 2001. Lotic health assessments: Riparian Health Assessment for Streams and Small Rivers [Survey] User Guide. University of Montana, Missoula, Montana, USA. January 2001.) 75 p.

Fitch, L. and N. Ambrose. 2003. Riparian areas: A user's guide to health. Lethbridge, Alberta: Cows and Fish Program. ISBN No. 0-7785-2305-5. 46 p.

Hansen, Paul L., Robert D. Pfister, Keith Boggs, Bradley J. Cook, John Joy, and Dan K, Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Miscellaneous Publication No 54. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula, Montana, USA. 646 p.

Kovalchik, Bernard L. 1987. Riparian zone associations: Deschutes, Ochoco, Fremont, and Winema National Forests. USDA Forest Service Region 6 Ecology Technical Paper 279-87. Pacific Northwest Region, Portland, Oregon, USA. 171 p.

Mitsch, William J., and James G. Gosselink. 1993. Wetlands. Second Edition. Van Nostrand Reinhold, Publishers, New York, New York, USA. 722 p.

Platts, W. S., C. Armour, G. D. Booth, M. Bryant, J. L. Bufford, P. Cuplin, S. Jensen, G. W. Lienkaemper, G. W. Minshall, S. B. Monsen, R. L. Nelson, J. R. Sedell, and J. S. Tuhy. 1987. Methods for evaluating riparian habitats with applications to management. USDA Forest Service General Technical Report INT-221. Intermountain Research Station, Ogden, Utah, USA. 187 p.

Reed, Porter B., Jr. 1988. National list of plant species that occur in wetlands: Northwest (Region 9). US Fish and Wildlife Service Biological Report 88 (26.9). USDI Fish and Wildlife Service, Research and Development, Washington, DC, USA. 89 p.

Shaw, S. P., and C. G. Fredine. 1956. Wetlands of the United States: Their extent and their value for waterfowl and other wildlife. USDI Fish and Wildlife Service, Circular 39. Washington, DC, USA. 67 p.

Stewart, R. E., and H. A. Kantrud. 1972. Classification of natural ponds and lakes in the glaciated prairie region. USDI Fish and Wildlife Service, Research Publication 92. 57 p.

Thompson, William H. and Paul L. Hansen. 2001. Classification and management of riparian and wetland sites of the Saskatchewan prairie ecozone and parts of adjacent subregions. Saskatchewan Wetland Conservation Corporation. Regina, Saskatchewan, Canada. 298 p.

Thompson, William H. and Paul L. Hansen. 2002. Classification and management of riparian and wetland sites of the Alberta Grassland Natural Region and adjacent subregions. Bitterroot Restoration, Inc. Prepared for the Alberta Riparian Habitat Management Program-Cows and Fish, Lethbridge, Alberta, Canada. 416 p.

Thompson, William H. and Paul L. Hansen. 2003. Classification and management of riparian and wetland sites of Alberta's Parkland Natural Region and Dry Mixedwood Natural Subregion. Bitterroot Restoration, Inc. Prepared for the Alberta Riparian Habitat Management Program-Cows and Fish, Lethbridge, Alberta, Canada. 340 p.

USDA Forest Service. 1989. Ecosystem classification handbook: ECODATA. USDA Forest Service, Northern Region, Missoula, Montana, USA.

Valastin, Pat and others. 1999. Caring for Shoreline Properties. Alberta Conservation Association. Edmonton, Alberta, Canada. T5L2W4. 29 p.