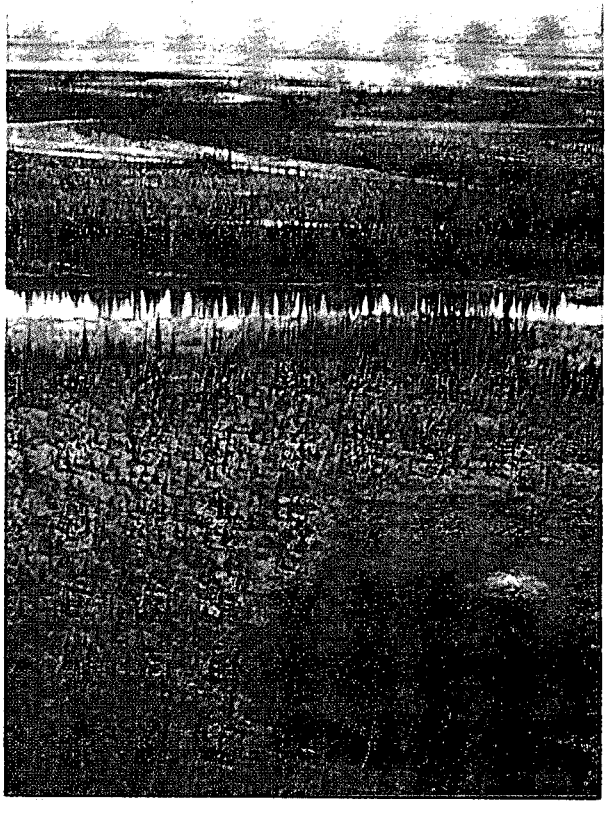
Ecological Land Classification Series

The Canadian Wetland Classification System



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Environment Canada
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Ecological Land Classification Series No. 21

The Canadian Wetland Classification System

National Wetlands Working Group
Canada Committee on
Ecological Land Classification

Provisional Edition
1987

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The Canadian Wetland Classification System

The development of a nationally applicable wetland classification system in Canada was first envisaged in 1973 with the completion of an organic terrain classification system by the National Committee on Forest Lands. Subsequently, Zoltai et al. *(1975) proposed a four-level, hierarchical, ecologically based wetland classification system. This was refined for Canadian wetland classification by Tarnocai (1980). Jeglum* et al. *(1974) and Millar (1976) refined regional wetland classifications for Ontario and the Prairies. Other regional Canadian systems also exist, including that developed for Quebec by Couillard and Grondin (1986) and for British Columbia by Runka and Lewis (1981). The Canadian Wetland Classification System represents a synthesis of existing systems at the national level.*

In its current form, this national classification system has been developed through the National Wetlands Working Group (NWWG) of the Canada Committee on Ecological Land Classification on the basis of the collective expertise and research of many wetland scientists across Canada. The NWWG, created in 1976, promotes holistic, ecologically based management, use, and conservation of Canadian wetlands. It acts through the informal support and contributions of federal, provincial, territorial, and non-government agencies.

The Canadian Wetland Classification System has not been fully applied and tested throughout Canada in all local and regional settings. As such, it remains "provisional" and subject to revision in future editions. Recently, it was used to form the basis of a national perspective on Canada's wetlands (National Wetlands Working Group 1986).

This classification system continues to evolve as new research is undertaken. The classification keys for the wetland forms will be refined based on their field application. In addition, the NWWG is developing a generalized key for wetland classes. Specific experience with the wording of wetland form and type descriptions will also govern future versions of this classification. Breakdown into more specific types for categories such as mosses and forbs may also occur.

A national field description and registry form for wetland ecosystems was developed by the NWWG (Tarnocai 1980).

Subsequently, this field form was modified for computerized data entry. Entitled "Canadian Wetland Registry Input Document for Field Data", the form and a companion manual are available from the Land Resource Research Centre, Agriculture Canada, Ottawa. They permit the collection of standardized field data and the organization of descriptive information on the location, soils, hydrology, peat development, and physical and chemical properties of soil and water in Canadian wetlands.

What is a Wetland?

A *wetland* is defined as land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation, and various kinds of biological activity which are adapted to a wet environment. Wetlands include:

Organic wetlands

- Peatlands which are characterized by more than 40 cm of peat accumulation on which Organic soils (excluding Folisols) develop.

Mineral wetlands

- Mineral soil areas which are influenced by excess water but which, for climatic, edaphic (factors related to soil), or biotic reasons, produce little or no peat. Gleysolic soils or peaty phases of Gleysolic soils are characteristic of these wetlands.
- Mineral soil areas of shallow open water which is generally less than 2 m deep. In certain of these wetlands, vegetation is lacking and soils are poorly developed as a result of frequent and drastic fluctuations of surface water levels or of wave action, water flow, turbidity, or a high concentration of salts or other toxic substances in the water or in the soil.
- Mineral soil areas which are modified by water-control structures (e.g. dams) or which are tilled and planted but which, if allowed to revert to their original state, become saturated for long periods and are then associated with wet soils (e.g. Gleysols) and hydrophytic vegetation.

Channel and shore marshes and associated wetlands in the Mackenzie Delta, Northwest Territories.

Wetland Classification

The Canadian Wetland Classification System contains three hierarchical levels: (1) class; (2) form; and (3) type. Five *wetland classes* are recognized on the basis of the overall genetic origin of wetland ecosystems. Seventy *wetland forms* are differentiated on the basis of surface morphology, surface pattern, water type, and morphology of underlying mineral soil. *Wetland types* are classified according to vegetation physiognomy.

This text is organized according to the five wetland classes: bog, fen, marsh, swamp, and shallow water. A class definition and description, and a classification key for the specific wetland forms of each class, are presented. Descriptions of wetland types, which are applicable to all wetland classes, appear at the end. Soil classification terms used in this text are taken from Canada Soil Survey Committee (1978).

Bog Wetland Class

A *bog* is a peatland, generally with the water table at or near the surface. The bog surface, which may be raised or level with the surrounding terrain, is virtually unaffected by the nutrient-rich groundwaters from the surrounding mineral soils and is thus generally acid and low in nutrients. The dominant materials are weakly to moderately decomposed *Sphagnum* and woody peat, underlain at times by sedge peat. The soils are mainly Fibrisols, Mesisols, and Organic Cryosols (permafrost soils). Bogs may be treed or treeless, and they are usually covered with *Sphagnum* spp. and ericaceous shrubs.

Bog Wetland Forms

All bog wetland forms are bogs as defined by the wetland classes, differing from one another in surface form, relief, or proximity to water bodies.

Atlantic Plateau Bog—A bog with a flat to undulating surface raised above the surrounding terrain, with the bog edges often steeply sloping down towards the mineral soil terrain. Pools that are often large are scattered on the bog, reaching a depth of 2–4 m.

Basin Bog—A bog situated in a basin that has an essentially closed drainage, receiving water from precipitation and from runoff from the immediate surroundings. The surface of the bog is flat, but the peat is generally deepest at the centre.

Blanket Bog—A bog consisting of extensive peat deposits that occur more or less uniformly over gently sloping hills and valleys. The peat thickness seldom exceeds 2 m.

Collapse Scar Bog—A circular or oval-shaped wet depression in a perennially frozen peatland. The collapse scar bog was once part of the perennially frozen peatland, but the permafrost thawed, causing the surface to subside. The depression is poor in nutrients, as it is not connected to the minerotrophic fens in which the palsa or peat plateau occurs.

Domed Bog—A large (usually more than 500 m in diameter) bog with a convex surface, rising several metres above the surrounding terrain. The centre is usually draining in all directions. Small crescentic pools often form around the highest point. If the highest point is in the centre, the pools form a concentric pattern, or eccentric if the pattern is off-centre. Peat development is usually in excess of 3 m.

Flat Bog—A bog having a flat, featureless surface. It occurs in broad, poorly defined depressions. The depth of peat is generally uniform.

Basin bog, with treeless, fire-scarred centre, near Lac La Biche, Alberta.

Floating Bog—A bog which occurs as a floating mat on or adjacent to ponds, and which is underlain by water or by fluid, loose peat. The surface of the floating bog is sufficiently elevated for the rooting zone to be free from contact with mineral-enriched lake water.

Lowland Polygon Bog—A bog with flat-topped or convex peat surfaces (often referred to as "high-centre polygons") separated by trenches over ice wedges that form a polygonal pattern when viewed from above. The peat was deposited in a permafrost environment, as shown by internal structures.

Mound Bog—A bog with small (up to 3 m in diameter and 0.5–1 m in height), isolated mounds occurring in fens. Mound bogs are sometimes referred to as "fen hummocks". The rooting environment is above the fen surface and is not affected by the mineral-rich waters of the fen. Several mounds may coalesce into larger bog "islands" in fens.

Northern Plateau Bog—A raised bog elevated 0.5–1 m above the surrounding fen. The surface is generally even, characterized only by small wet depressions. The plateau bog is usually teardrop-shaped, with the pointed end oriented in the downslope direction.

Palsa Bog—A bog composed of individual or coalesced palsas, occurring in an unfrozen peatland. Palsas are mounds of perennially frozen peat and mineral soil, up to 5 m high, with a maximum diameter of 100 m. The surface is highly uneven, often containing collapse scar bogs.

Peat Mound Bog—A bog with small (less than 3 m in diameter) mounds of frozen peat, rising less than 1 m above the surrounding perennially frozen fen. These bogs are found in arctic areas.

Peat Plateau Bog—A bog composed of perennially frozen peat, rising abruptly about 1 m from the surrounding unfrozen fen. The surface is relatively flat and even, and often covers very large areas. The peat was originally deposited in a non-permafrost environment and is often associated with collapse scar bogs or fens.

Polygonal Peat Plateau Bog—A perennially frozen bog, rising about 1 m above the surrounding fen. The surface is relatively flat, scored by a polygonal pattern of trenches that developed over ice wedges. The permafrost and ice wedges developed in peat originally deposited in a non-permafrost environment.

Shore Bog—A non-floating bog forming at the shore of a pond or lake. The bog surface is elevated at least 0.5 m above the level of the lake and its rooting zone is not affected by lake water. The bog often encroaches over the lake as shown by underlying lacustrine peat sediments.

Slope Bog—A bog occurring in areas of high rainfall on appreciably sloping land surfaces, fed by rainwater and by water draining from other nutrient-poor peatlands. The peat may exceed 1 m in thickness.

String Bog—A pattern of narrow (2–3 m wide), low (less than 1 m deep) ridges oriented at right angles to the direction of drainage. Wet depressions or pools occur between the ridges. The water and peat are very low in nutrients, as the water has been derived from other ombrotrophic wetlands. Peat thickness exceeds 1 m.

Veneer Bog—A bog occurring on gently sloping terrain underlain by generally discontinuous permafrost. Although drainage is predominantly below the surface, overland flow occurs in poorly defined drainage-ways during peak runoff. Peat thickness is usually less than 1.5 m.

Domed bog with concentric pattern of flarks and ridges near Cartwright, Labrador.

Flat bog in Experimental Lakes Area near Kenora, Ontario.

Classification Key to Bog Wetland Forms

1. Surface raised above surrounding terrain	
2. Surface convex	
3. Core frozen; abruptly domed; usually in fens	
4. Over 1 m high, diameter up to 100 m	Palsa Bog
4. Less than 1 m high, diameter up to 3 m	Peat Mound Bog
3. Core not frozen	
5. Convex surface small (1–3 m diameter); occurring in fens	Mound Bog
5. Convex surface often extensive; not occurring in fens	Domed Bog
2. Surface flat to irregular	
6. Core perennially frozen	
7. Surface with network of polygonal fissures	
8. Surface even	Polygonal Peat Plateau Bog
8. Surface with high centres in a polygonal network	Lowland Polygon Bog
7. Surface without polygonal fissures; surface about 1 m above the surrounding fen	Peat Plateau Bog
6. Core not frozen	
9. Bogs generally teardrop-shaped	Northern Plateau Bog
9. Bogs not teardrop-shaped; abundance of surface water	Atlantic Plateau Bog
1. Surface not raised above surrounding terrain	
10. Surface relatively level	
11. With abrupt marginal peat walls	Collapse Scar Bog
11. Without marginal peat walls	
12. Adjacent to water bodies	
13. Floating	Floating Bog
13. Not floating	Shore Bog
12. Not adjacent to water bodies	
14. Surface flat; topographically confined	
15. Basin deposit; depth greatest in centre	Basin Bog
15. Flat deposit; depth generally uniform	Flat Bog
14. Surface flat to undulating, often appreciably sloping	
16. Surface pattern of ridges and pools distinct	String Bog
16. Surface pattern of pools usually absent; extensive	Blanket Bog
10. Surface not level; appreciably sloping	
17. Core not frozen	Slope Bog
17. Core perennially frozen	Veneer Bog

Fen Wetland Class

A *fen* is a peatland with the water table usually at or just above the surface. The waters are mainly nutrient-rich and minerotrophic from mineral soils. The dominant materials are moderately to well decomposed sedge and/or brown moss peat of variable thickness. The soils are mainly Mesisols, Humisols, and Organic Cryosols. The vegetation consists predominantly of sedges, grasses, reeds, and brown mosses with some shrubs and, at times, a sparse tree layer.

Fen Wetland Forms

All fen wetland forms are fens as defined in the wetland classes, differing from one another in surface form, relief, proximity to water bodies, or basin topography.

Atlantic Ribbed Fen—A fen with parallel peat ridges and pools that are oriented perpendicular to the direction of slope and drainage. The peaty strings are often narrow (less than 1 m wide) and generally low (less than 1 m deep). Pools may sometimes comprise about 75% of the area. The thickness of peat is 0.5–1.5 m.

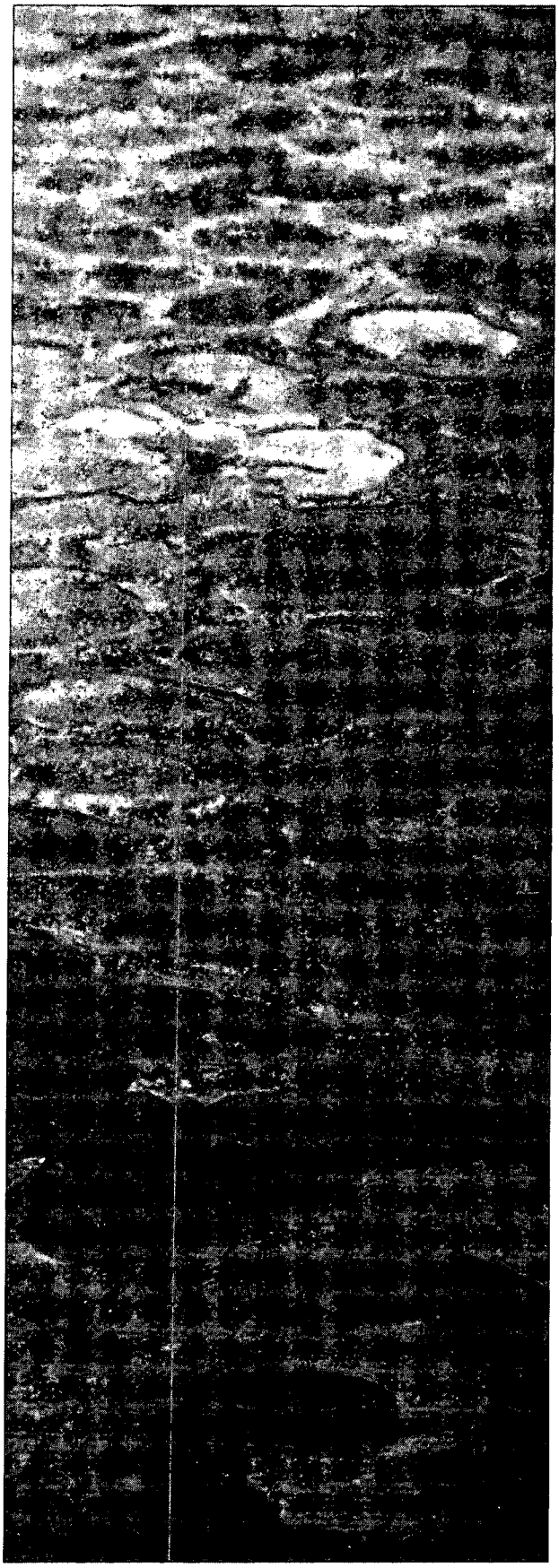
Basin Fen—A fen occupying a topographically defined basin. However, the basins do not receive drainage from upstream and the fens are thus influenced mainly by local hydrological conditions. The depth of peat increases towards the centre.

Channel Fen—A fen occurring in a topographically well-defined channel which at present does not contain a continuously flowing stream. The depth of peat is usually uniform.

Collapse Scar Fen—A fen with circular or oval depressions, up to 100 m in diameter, occurring in larger fens, marking the subsidence of thawed permafrost peatlands. Dead trees, remnants of the subsided vegetation of permafrost peatlands, are often evident.

Feather Fen—A fen situated on a long, narrow ridge of mineral soil. The centre of the ridge is occupied by a bog, but many narrow, subparallel drainage-ways originate from the ridge and are occupied by a feather fen. Water from the fen drainage-ways is usually collected by a stream running parallel to the ridge. The average depth of peat is 1.5 m.

Floating Fen—A fen occurring adjacent to ponds or lakes, forming a floating mat, underlain by water or fluid, loose peat. The fen surface is less than 0.5 m above the level of the lake and the rooting zone is affected by lake water.



Lowland polygon fens located near Shingle Point on the Yukon coastal plain.

Horizontal Fen—A fen with a very gently sloping, featureless surface. This fen occupies broad, often ill-defined depressions, and may be interconnected with other fens. Peat accumulation is generally uniform.

Ladder Fen—A fen composed of parallel, low peat ridges and shallow pools oriented at right angles to the direction of drainage. It occurs as a narrow fen strip along the edges of domed bogs. The peat is usually 1–2 m deep.

Lowland Polygon Fen—A fen developed on perennially frozen lowlands where the intense winter cold causes the formation of polygonal cracks and ice wedges. The polygons consist of somewhat better-drained ridges which enclose very wet, low centres (hence the frequently used name "low-centre polygon"). Peat deposits are generally less than 1 m thick.

Net Fen—A fen with a broad net pattern of low, interconnected peat ridges ("strings"), enclosing wet hollows or shallow pools. The wetland surface is almost completely level; greater slopes result in the formation of northern ribbed fens.

Northern Ribbed Fen—A fen with parallel, low peat ridges ("strings") alternating with wet hollows or shallow pools, oriented across the major slope at right angles to water movement. The depth of peat exceeds 1 m.

Palsa Fen—A fen with mounds of perennially frozen peat (sedge and brown moss peat) and mineral soil, up to 5 m high and 100 m in diameter although they can be much smaller. Palsa fens generally occur in unfrozen peatlands and are frequently associated with collapse scar fens.

Shore Fen—A fen with an anchored surface mat that forms the shore of a pond or lake. The rooting zone is affected by the water of the lake at both normal and flood levels.

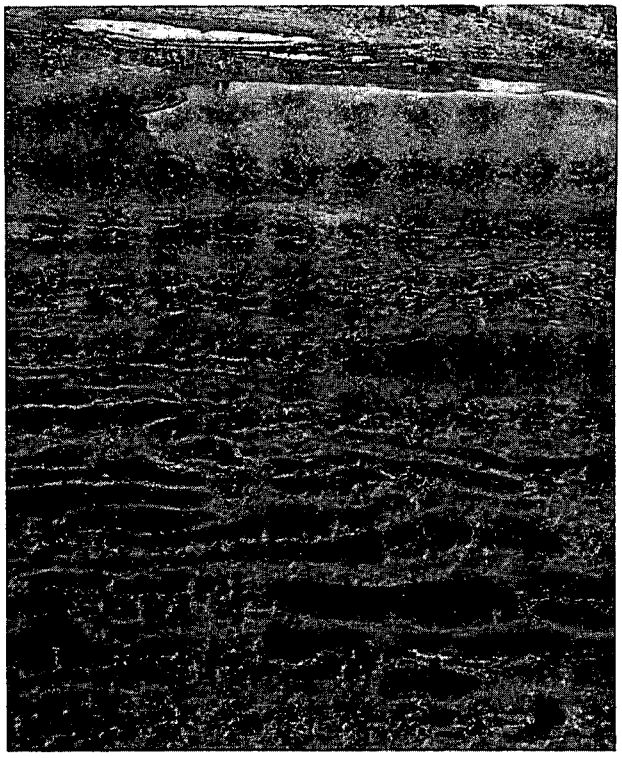
Slope Fen—A fen occurring mainly on slowly draining, nutrient-enriched seepage slopes. Pools are usually absent, but wet seepage tracks may occur. Peat thickness seldom exceeds 2 m.

Snowpatch Fen—A fen occurring on uniform slopes underlain by permafrost. These fens are fed by the gradual melting of persistent snowpatches on the slopes above the fens. The thickness of peat is usually less than 0.5 m.

Spring Fen—A fen nourished by a continuous discharge of groundwater. The surface is marked by pools, drainage tracks, and, occasionally, somewhat elevated "islands". The nutrient level of water is highly variable between locations.

Stream Fen—A fen located in the main channel or along the banks of permanent or semi-permanent streams. This fen is affected by the water of the stream at normal and flood stages.

Atlantic ribbed fen near Lac Joseph, eastern Quebec.



Horizontal fen near Prince Rupert, British Columbia.

Classification Key to Fen Wetland Forms

1. Surface not raised above surrounding terrain except in low hummocks and ridges	
2. Surface pattern of ridges and depressions	
3. Subparallel pattern of ridges and furrows	
4. Broad pattern; often very extensive	
5. Northern regions; lowland drainage; peat deep	Northern Ribbed Fen
5. Atlantic regions; mainly upland drainage; peat shallow	Atlantic Ribbed Fen
4. Narrow ladder-like pattern; along bog flanks	Ladder Fen
3. Reticulate pattern of ridges	Net Fen
2. Without pronounced surface pattern	
6. Featureless, adjacent to water bodies	
7. Floating	Floating Fen
7. Not floating	
8. Located in main channel or along banks of continuously flowing or semi-permanent streams	Stream Fen
8. Located along shores of semi-permanent or permanent lakes	Shore Fen
6. Depressed thaw hollows with high-water content peat; not adjacent to water bodies	Collapse Scar Fen
1. Surface raised above surrounding terrain	
9. Surface sloping appreciably	
10. With frozen core	
11. Mounds in patterned fen	Palsa Fen
11. Surface regular but sloping	Snowpatch Fen
10. Without frozen core	
12. Water from underground discharge	Spring Fen
12. Water from overland flow	
13. Surface with parallel drainage-ways	Feather Fen
13. Surface smooth or with irregular tracts	Slope Fen
9. Surface flat or depressional	
14. Core perennially frozen, surface with network of polygonal fissures	Lowland Polygon Fen
14. Core not frozen, surface without pronounced surface pattern	
15. Basin part of regional drainage system	
16. Occupying broad depressions or plains	Horizontal Fen
16. Occupying well-defined, often eroded channels	Channel Fen
15. Basin does not receive regional drainage water	Basin Fen

Marsh Wetland Class

A *marsh* is a mineral wetland or a peatland that is periodically inundated by standing or slowly moving water. Surface water levels may fluctuate seasonally, with declining levels exposing drawdown zones of matted vegetation or mudflats. The waters are rich in nutrients, varying from fresh to highly saline. The substratum usually consists of mineral material, although occasionally it consists of well-decomposed peat. The soils are predominantly Gleysols, with some Humisols and Mesisols. Marshes characteristically show zonal or mosaic surface patterns composed of pools or channels interspersed with clumps of emergent sedges, grasses, rushes, and reeds, bordering grassy meadows and peripheral bands of shrubs or trees. Submerged and floating aquatics flourish where open water areas occur.

Marsh Wetland Forms

All marsh wetland forms are marshes as defined in the wetland classes, differing from one another in source of water or basin topography.

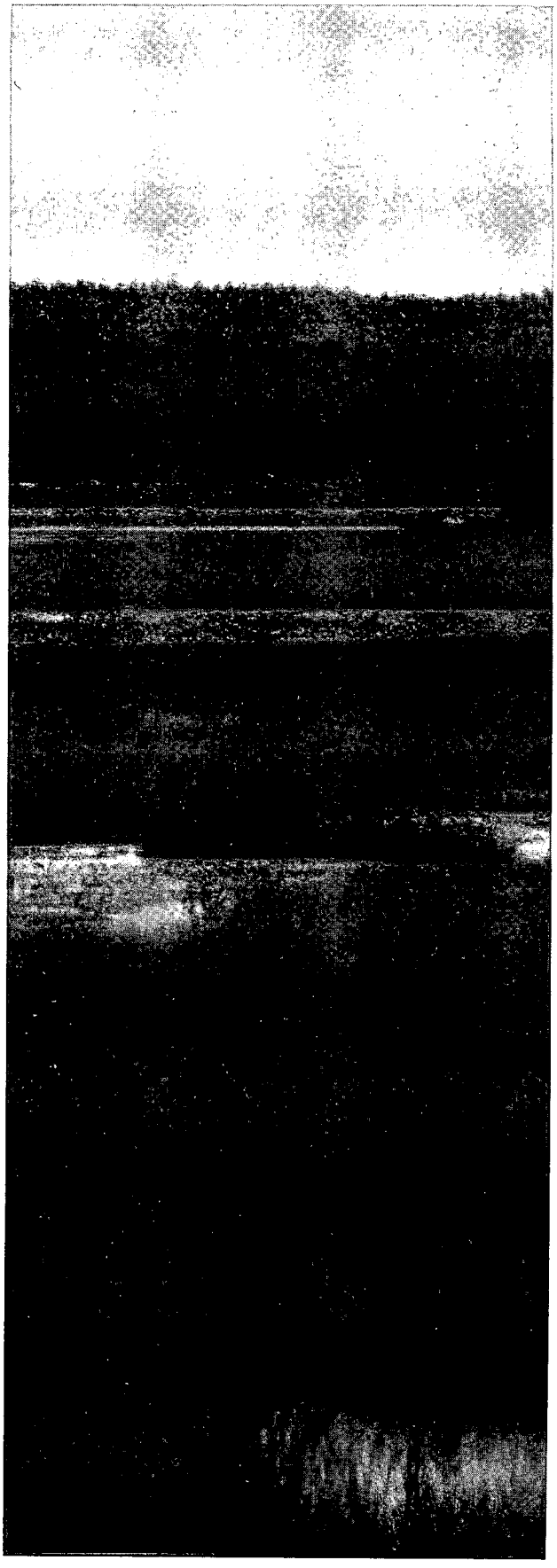
Active Delta Marsh—A marsh occupying lowlands on deltas, usually with drainage connections to active river channels. The marsh is subject to inundation at least once during a season, followed by a slow drawdown of the water levels. A high rate of sedimentation may occur in many parts of the marsh.

Channel Marsh—A marsh occurring in well-defined, abandoned channels where stream flow is discontinuous or blocked. Spring freshets or groundwater inflows may flood large portions of the channel, inducing marsh development.

Coastal High Marsh—A marsh influenced by brackish or saline waters of tidal marine origin. It is located above mean high-water levels and is inundated only by flood tides. It occurs on marine terraces, flats, embayments, or lagoons.

Coastal Low Marsh—A marsh influenced by brackish or saline waters of tidal marine origin. It is located below mean high-water levels and is inundated daily. It occurs on marine terraces, flats, embayments, or lagoons.

Estuarine High Marsh—A marsh influenced by waters of varying salinity and of tidal marine origin. It is located above mean high-water levels and is inundated only at highest tides and/or storm surges. It occurs in river estuaries or in connecting bays.



Estuarine low marsh, Chezzetcook Inlet, Nova Scotia.

Stream marsh near McConnell, Manitoba, with patches of open water and scattered emergent vegetation.

Estuarine Low Marsh—A marsh influenced by waters of varying salinity and of tidal marine origin. It is located below mean high-water levels and is frequently inundated. It occurs in river estuaries or in connecting bays.

Floodplain Marsh—A marsh occurring on fluvial floodplains adjacent to river channels. The marsh is subject to annual flooding and sedimentation for various lengths of time, with possibly some water impounded on the marsh following flooding.

Inactive Delta Marsh—A marsh occupying higher portions of a delta, usually some distance from active river channels. The marsh is inundated only during very high flood stages or by wind-driven waves. Shallow water may be impounded for long periods of time.

Kettle Marsh—A marsh usually occupying well-defined elliptical catch basins located in moraines and glacio-fluvial or glacio-lacustrine landscapes. The kettles are moderately deep bowls with moderately to steeply sloping sides. The water sources are chiefly surface runoff from a local catchment area and some interbasin flow or groundwater inflow.

Seepage Track Marsh—A marsh occupying spring or water discharge sites on or at the base of slopes. This marsh features saturated, quaking ground, flowages or drainage tracks, and occasional open pools where drainage is impeded.

Shallow Basin Marsh—A marsh occurring in a uniformly shallow depression or swale, having a gradual gradient from the edge to the deepest portion. The marsh edge may be poorly defined due to rapidly receding water levels.

Shore Marsh—A marsh occupying the contact zone between high and low water marks bordering semi-permanent or permanent lakes. The marsh is usually found along protected shorelines, in lagoons behind barrier beaches, on islands, or in embayments. The marsh is subject to flooding by rises in lake levels, wind waves, or surface runoff.

Stream Marsh—A marsh occupying shorelines, bars, streambeds, or islands in continuously flowing water courses. The marsh is subject to prolonged annual flooding and is often covered by thick layers of sediments.

Terminal Basin Marsh—A marsh occurring in a topographically low catch basin situated at the terminal end of internal drainage systems receiving a variable water supply from surface runoff, channel wetlands, streams, or groundwater. The marsh has no overflow or drainage outlets and most water loss is due to evaporation.

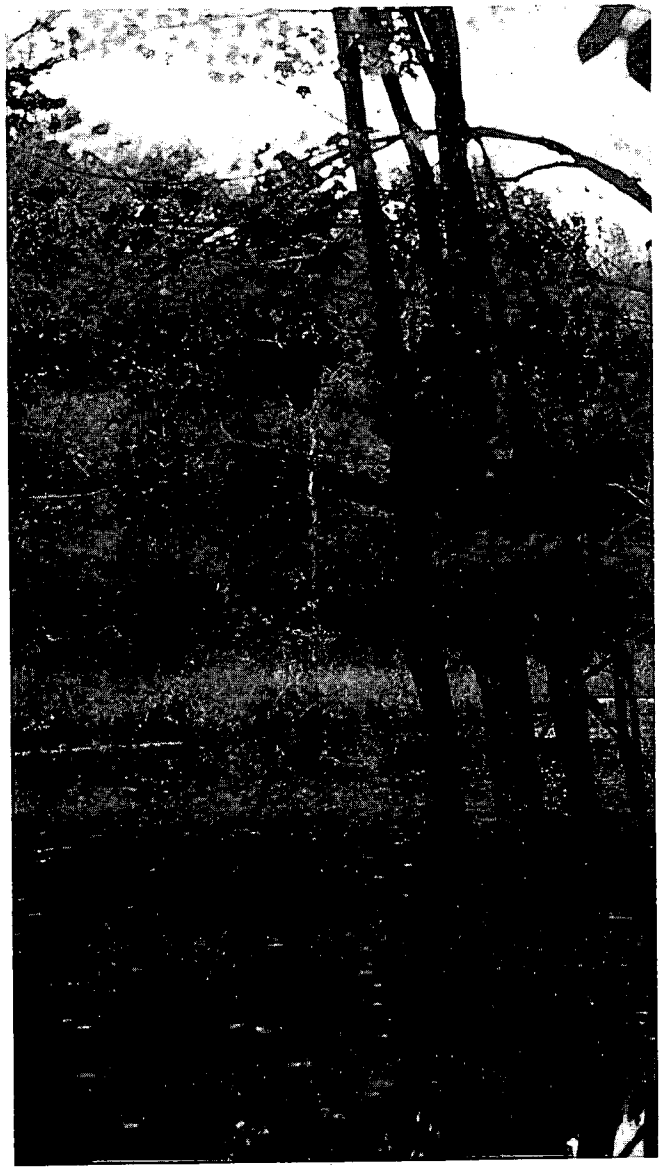
Tidal Freshwater Marsh—A marsh located upstream from estuarine and coastal marshes. The marsh is characterized by almost freshwater conditions, plant and animal communities dominated by freshwater species, and daily, lunar tidal fluctuations.

Classification Key to Marsh Wetland Forms

1. Influenced by tidal water	
2. Water saline	
3. In river estuaries or connecting bays where tidal flats, channels, and pools are periodically inundated by water of varying salinity	
4. Located above mean high-water levels; inundated only at highest tides and/or storm surges	Estuarine High Marsh
4. Located below mean high-water levels; frequently inundated	Estuarine Low Marsh
3. On marine terraces, flats, embayments, or lagoons behind barrier beaches, remote from estuaries, where there is periodic inundation by tidal brackish or salt water, including salt spray	
5. Located above mean high-water levels; inundated only at flood tides	Coastal High Marsh
5. Located below mean high-water levels	Coastal Low Marsh
2. Water fresh	Tidal Freshwater Marsh
1. Not influenced by tidal water	
6. Located in topographically defined catch basins or valleys	
7. Associated with riverine or linear systems	
8. Adjacent to, or flooded by, flowing water	
9. Located on active fluvial floodplains adjacent to channels	Floodplain Marsh
9. Not on fluvial floodplains	
10. Occupying shorelines, bars, streambeds, or islands in continuously flowing water courses	Stream Marsh
10. Occupying abandoned glacial meltwater spillways, intermittent drainage courses, or open-ended, eroded channels	Channel Marsh
8. Located on river deltas	
11. Unrestricted water circulation, open connections to river channels and lakes, seasonally inundated	Active Delta Marsh
11. Restricted water circulation, inundated only during infrequent high river flows or wind tides	Inactive Delta Marsh
7. Associated with defined basins having poorly integrated surface drainage, fed by local runoff or groundwater	
12. Located at the terminus of an internal drainage system, may be flat or concave in topographically low areas, no outflow	Terminal Basin Marsh
12. Located along an internal drainage system; surface or underground water passes through the basin	
13. Shallow, gently sloping depressions that occur as natural swales or that occupy intervening areas between ridges or undulations on low-relief landforms	Shallow Basin Marsh
13. Sharply defined, bowl-shaped catch basin, usually located in high or intermediate topographic positions on moderate- to high-relief hummocky moraine, glacio-lacustrine or glacio-fluvial landforms	Kettle Marsh
6. Not located in topographically defined catch basins	
14. Occupying groundwater discharge sites, usually on or at the base of slopes	Seepage Track Marsh
14. Occupying the shores of semi-permanent or permanent lakes, receiving water from lake flooding or surface runoff	Shore Marsh

Swamp Wetland Class

A *swamp* is a mineral wetland or a peatland with standing water or water gently flowing through pools or channels. The water table is usually at or near the surface. There is pronounced internal water movement from the margin or other mineral sources; hence the waters are rich in nutrients. If peat is present, it is mainly well-decomposed wood, underlain at times by sedge peat. The associated soils are Mesisols, Humisols, and Gleysols. The vegetation is characterized by a dense cover of deciduous or coniferous trees or shrubs, herbs, and some mosses.



Basin swamp at Backus Woods, near Tillsonburg, Ontario.

Swamp Wetland Forms

All swamp wetland forms are swamps as defined in the wetland classes, differing from one another in surface form, basin topography, or proximity to water bodies.

Basin Swamp—A swamp developed in a topographically defined basin where the water is derived locally but may be augmented by drainage from other parts of the watershed. Accumulation of well-decomposed peat is shallow (less than 0.5 m) at the edge, and may reach 2 m at the centre.

Flat Swamp—A swamp occurring in broad areas of poorly drained lowlands. The outer edges of the swamp usually merge gradually into the upland, without sharp boundaries. Peat build-up is generally thin (less than 0.5 m), but may exceed 2 m.

Floodplain Swamp—A swamp occurring in a valley which may be inundated by a seasonally flooding river. Slow drawdown after flooding preserves a high water table for most of the growing season. Shallow peat development may be encountered.

Peat Margin Swamp—A swamp occurring in a relatively narrow (up to 25 m wide) zone between the mineral uplands and the peatland. The high water table is maintained by the peatland, but drainage from the upland adds nutrient-enriched water to the swamp. Peat deposition (less than 1 m) is common.

Shore Swamp—A swamp occurring along the shores of permanent ponds or lakes. The high water table is maintained by the water level in the lakes, but seasonal flooding may take place. Peat development is possible.

Spring Swamp—A swamp nourished by the discharge of groundwater. The surface is characterized by low hummocks, small pools, and drainage tracks. The amounts of dissolved solids in the spring water vary regionally.

Stream Swamp—A swamp occurring along the banks of permanent or semi-permanent streams. The high water table is maintained by the level of water in the stream. The swamp is seasonally inundated, with subsequent sediment deposition.

Stream swamp at Mount Tom Brook, Kejimkujik National Park, Nova Scotia.

Classification Key to Swamp Wetland Forms

1. Adjacent to water bodies	
2. Located along banks of continuously flowing or semi-permanent streams	Stream Swamp
2. Located along shores of semi-permanent or permanent lakes	Shore Swamp
1. Not adjacent to permanent water bodies	
3. In topographically defined basins	
4. On perimeter of peatlands	Peat Margin Swamp
4. Basin deposit; depth greatest in centre	Basin Swamp
3. Not in topographically defined basins	
5. Acting as a water discharge area, surface irregular	Spring Swamp
5. Not acting as a water discharge area	
6. Flat deposit, depth generally uniform	Flat Swamp
6. Poorly drained area, associated with floodplains	Floodplain Swamp

Shallow Water Wetland Class

Shallow water is characteristic of intermittently or permanently flooded or seasonally stable water regimes, featuring open expanses of standing or flowing water which are variously called ponds, pools, shallow lakes, oxbows, reaches, channels, or impoundments. Shallow water is distinguished from deep water by mid-summer water depths of less than 2 m, and from other wetlands by summer open water zones occupying 75% or more of the wetland surface area.

Large open water areas (greater than 8 ha), located within wetland complexes, should be classified separately as shallow water units, despite the area or extent of bordering vegetation zones. Periodic flooding may increase water depths, but during droughts, low flows, drainage, or intertidal periods, drawdown flats may be exposed.

Shallow water is distinguished from uplands and bordering wetland complexes by water-eroded shorelines, or by the landward margins of mudflats, floating mats, emergents, or shrubs. In the open water zone, living vegetation, if present, is confined to submerged and floating aquatic plant forms.

Shallow Water Wetland Forms

All shallow water wetland forms are shallow water wetlands as defined in the wetland classes, differing from one another in basin topography or proximity to various kinds of open water.

Channel Water—Shallow, intermittently flowing water in abandoned, eroded glacio-fluvial spillways. Periods of flowing water occur mainly in the spring following snowmelt, and after exceptionally high precipitation.

Delta Water—Shallow ponds occurring on deltas that have been impounded by the shifting of river channels and the deposition of sediments. Periodic flooding in the delta usually inundates the delta water body.

Estuarine Water—Estuarine channels or bays periodically inundated by water of varying salinity. The water is less than 2 m deep.

Kettle Water—Predominantly shallow ponds with deep central portions, occupying basins with moderately sloping sides. The water sources are surface runoff from the local catchment area and seepage inflow. Drainage is limited to subsurface seepage, or overflow during flooding.

Shallow basin potholes and sloughs near Minnedosa, Manitoba.

Non-tidal Water—Brackish water bodies mainly in pools and ponds located above the mean high-tide zone. The water is less than 2 m deep.

Oxbow Water—Shallow ponds or lakes in old, abandoned channels of rivers impounded behind natural levees on river floodplains. Periodic flooding by the river usually inundates the oxbow water body.

Shallow Basin Water—Shallow ponds located in gently sloping depressions, receiving water from the catchment area. The basin edges are usually poorly defined. Surplus water is drained by open outlets or by seepage.

Shore Water—Shallow water confined to the upper littoral or near-shore zone of permanent open water bodies. Shore water may occupy large portions of shallow bays or shoals, merging with deep water zones.

Stream Water—Inland, shallow, fresh to saline flowing water which flows continuously and is confined to a main water course. Seasonal periods of flood stages may occur.

Terminal Basin Water—Shallow ponds in topographically defined basins where incoming water is supplied by drainage of the upper catchment area, as well as from the immediate surroundings. Outlet channels are lacking.

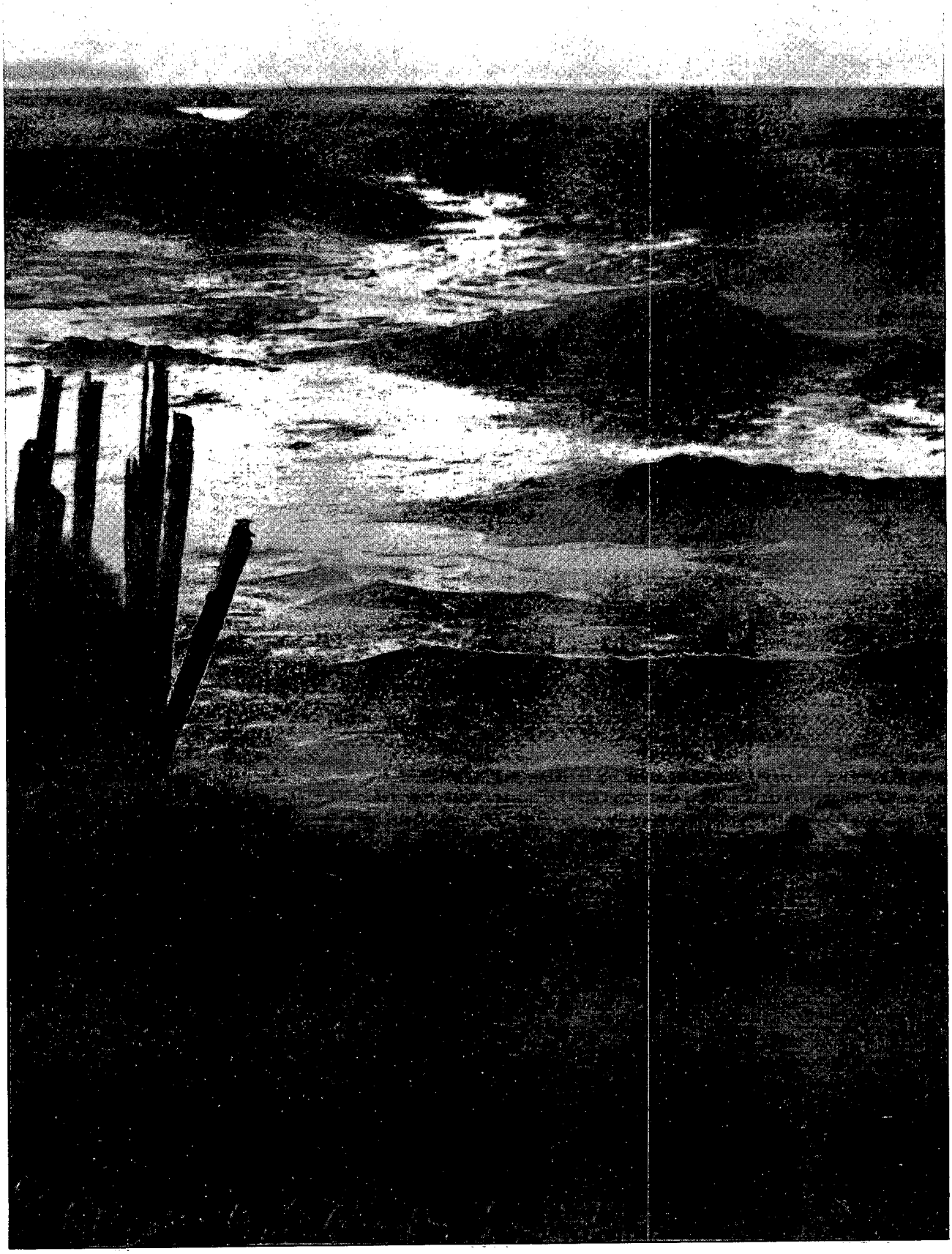
Thermokarst Water—Shallow water body in a basin formed by the thawing and subsidence of ice-rich permafrost. The banks may be unstable due to continuing thermal erosion.

Tidal Water—Coastal lagoons or bays influenced by tidal action and salt water of marine origin. The normal mean tide-water level is less than 2 m deep.

Tundra Pool Water—Uniformly shallow water body formed in lowlands covered by thin peat. The shores are formed by steep, but low (less than 0.3 m) banks of perennially frozen peat. Permafrost usually occurs under the water bodies.

Classification Key to Shallow Water Wetland Forms

1. Inland; fresh to saline water bodies less than 2 m deep	
2. Associated with riverine systems	
3. Water continuously flowing in main water course	Stream Water
3. Water not continuously flowing	
4. Intermittent flowing water to discontinuous surface flow, confined to glacio-fluvial, eroded spillways	Channel Water
4. Intermittent flow or overbank flooding, impounded behind levees or ridges of alluvial deposits	
5. On river floodplains	Oxbow Water
5. On deltas	Delta Water
2. Not associated with riverine systems	
6. Surface catchment in topographically defined basin	
7. Basin not affected by permafrost	
8. Basin at terminus of drainage system	Terminal Basin Water
8. Basin not at terminus, water passes through the basin	
9. Shallow, gently sloping basin with relatively uniform depth	Shallow Basin Water
9. Relatively deep, bowl-shaped basin with moderately sloping sides	Kettle Water
7. Basin affected by permafrost	
10. Shallow basin with stable, steep shores	Tundra Pool Water
10. Shallow basin with unstable, collapsing shores	Thermokarst Water
6. Not in topographically defined catch basin, occupying the shallow shore zone of permanent open water bodies	Shore Water
1. Coastal, estuarine, or marine water bodies less than 2 m deep	
11. Tidal water	
12. Estuarine channels or bays periodically inundated by fresh and brackish water	Estuarine Water
12. Coastal lagoons or bays primarily influenced by tidal action and marine salt water	Tidal Water
11. Non-tidal water	
13. Fresh to brackish water bodies located above mean high-tide zone	Non-tidal Water



Tidal water mudflats on the edge of the Minas Basin at Wolfville, Nova Scotia.

Wetland Types

The terms used to describe wetland types are based on the general physiognomy of the vegetation cover, rather than on species descriptions. The physiognomic terms, when used in conjunction with wetland forms, constitute the wetland types.

Treed

This wetland type is dominated by tree species. Specific types are:

Coniferous Treed

This wetland type is dominated by needleleaf species in the tree layer (more than 5 m tall). The most common species are *Picea mariana* and *Larix laricina* which grow on organic soils and represent a characteristic type in the boreal forest regions. *Thuja occidentalis* is the most common species found in the nutrient-rich southern wetlands in eastern Canada, and *Pinus contorta, Thuja plicata,* and *Chamaecyparis nootkatensis* occur on the Pacific coast wetlands.

Hardwood Treed

This wetland type is dominated by broadleaf species in the tree layer (more than 5 m tall). The most common species are *Acer* spp., *Fraxinus nigra, Ulmus americana, Betula* spp., and *Populus balsamifera*. Wetlands of this type generally occur on mineral soils or on highly decomposed organic soils.

Shrub

This wetland type is dominated by shrub species. Specific types are:

Tall Shrub

This wetland type includes both tall shrubs (more than 1.5 m) and medium shrubs (0.5–1.5 m). The species include true shrubs and stunted trees.

Low Shrub

This wetland type includes both low shrubs (0.1–0.5 m) and ground shrubs (less than 0.1 m).

Mixed Shrub

This wetland type includes tall shrubs (more than 1.5 m), medium shrubs (0.5–1.5 m), and low shrubs (0.1–0.5 m).

Forb

This wetland type is dominated by forb species (non-grassy herbs).

Graminoid

This wetland type is dominated by undifferentiated grass-like plants. Specific types are:

Grass

This wetland type is dominated by low, tall, or mixed grass species.

Reed

This wetland type is dominated by reed species (*Phragmites*).

Tall Rush

This wetland type is dominated by *Scirpus* spp. and *Typha* spp.

Low Rush

This wetland type is dominated by *Juncus* spp. and *Triglochin* spp.

Sedge

This wetland type is dominated by sedge (*Carex* spp. and *Eriophorum* spp.) vegetation.

Moss

This wetland type is dominated by moss species. The most common mosses are *Sphagnum*, feather-mosses (*Pleurozium* spp., *Hylocomium* spp., and *Ptilium* spp.) and brown mosses (*Drepanocladus* spp., *Scorpidium* spp., and *Tomenthypnum* spp.).

Lichen

This wetland type is dominated by lichen (mostly *Cladina* spp.).

Aquatic

This wetland type is dominated by aquatic species. Specific types are:

Floating Aquatic

This wetland type is dominated by plants with leaves floating on the surface of the water.

Submerged Aquatic

This wetland type is dominated by plants with leaves found mainly below the surface of the water.

Non-vegetated

This wetland type has a vegetation cover that occupies less than 5% of the surface.

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