

GENERAL DESCRIPTION OF THE PAS MAP SHEET AREA, 63F

The area encompassed by The Pas map sheet lies in northwestern Manitoba and northeastern Saskatchewan, and occupies about 5780 square miles between 53° and 54° north latitude and 100° and 102° west longitude. Physiographically, the area is in the Manitoba Lowlands. Elevations range from 830 feet above sea level on Lake Winnipegosis to 1000 feet on The Pas Moraine and 1060 feet near the headwaters of Niska Creek. About 25 percent of the area is occupied by permanent lakes such as Winnipegosis, Cedar, Moose, Red Deer, Connolly, Kelsey, Landry, Redearth, and Atikameg. The Saskatchewan River and delta form the chief drainage system in the area.

The area is underlain by flat-lying bedrock of four major geological formations. A minor belt of Lower Cretaceous sandstone and shale underlies the foot of The Pasquia Hills in the extreme southwest and contacts an adjacent band of Devonian limestone and dolomite that extends to Lake Winnipegosis. The northeastern quarter of the area is underlain by undivided rocks of Ordovician age, with scattered plateaus of limestone outcrops, especially in the vicinity of Moose Lake. Beds of Silurian dolomite underlie the surface deposits on the rest of the area.

WATER REGIME

The Pas Moraine forms the divide between Cedar and Winnipegosis lakes, extending northwest and north to divide the Saskatchewan Delta into upper and lower sections. The river crosses the moraine at The Pas, after being joined by the Carrot, Pasquia, and Saskeram rivers. In the Lower Delta, the Saskatchewan River intercepts flow from several creeks, and drains Cormorant, Landry, and Moose lakes by way of the Summerberry and Moose rivers. Waters in the numerous deltaic lakes and marshes are replenished by seasonal flooding from these rivers and streams. Below the 842-foot contour, the Saskatchewan and Summerberry rivers merge into flooded levees, flats, and inundated lakes that make up the flooded part of the Grand Rapids Reservoir.

This part of the Delta lies south of the Summerberry River and Trader Lake, and is inundated each fall by waters attaining depths of 6 to 10 feet. Back flooding from the reservoir has also caused a damming of seasonal water flows in the district north of the Summerberry River, resulting in an excess of 1 to 2 feet of water flooding Moose Lake and adjacent marshes. Dikes and other engineering works constructed by Ducks Unlimited may alleviate some of this flooding problem.

In The Pasquia district of the Upper Delta, farmland has been reclaimed by draining fertile marshland and by diverting The Pasquia River through Cul de Sac and the Salt channel to the Carrot River. This diversion has reduced the seasonal water supply for Big Lake, Pasquia Lake, and other downstream marshes.

The southwestern part of the area is drained by The Pasquia, Waskwei, and Niska rivers which flow north to the Upper Delta, and by the Overflowing River, Santon River, and Swamp Creek, which drain eastward into Lake Winnipegosis.

TOPOGRAPHY AND SURFACE MATERIALS

The area comprises five physiographic subdivisions: the Upper Delta, the Lower Delta, The Pas Moraine, the Interlake Till Plain, and the Lacustrine Plain.

The Upper Delta is a flat, poorly drained plain varying in elevation from 850 to 860 feet above sea level. Minor surface relief is provided by levees 2 to 10 feet high, and some low drumlin hills. Surface deposits of recent alluvial sandy loams, silts, and clays which attain maximum depths of 60 feet, overlie layers of lacustrine clay. The most extensive soils are Gleysols, Humic Gleysols, Regosols, and Fibrisols, but some saline soils occur in the vicinities of Cul de Sac and Big Lakes. Much of the original layer of shallow peat present on The Pasquia Project has been destroyed; but extensive deposits of deep peat are found west of Saskeram and Birch lakes.

The Lower Delta, which lies at 831 to 854 feet above sea level, is similar to the Upper Delta, but there are more numerous channels and shifting river levees interspersed by shallow lakes. The recent delta, located below 842 feet, was sustained by recurrent floodings and drawdowns that have maintained vegetation in early successional stages, resulting in little accumulation of peat. Soils are largely immature alluvial silts, except north of the Summerberry River where there are more extensive peatlands.

The Pas Moraine is a lake-modified till plain that slopes gently to the northeast. A steep escarpment and a high ridge consisting of gravelly and stony beach and till deposits marks the western edge of the moraine. On the surface, the relief consists of alternating low ridges and swales with peat deposits occupying the swales.

The Interlake Till Plain, located in the vicinity of Moose Lake, is an area of glacially scoured limestone bedrock and shallow calcareous till deposits. The Plain has gently to moderately sloping relief, except for some steeply sloping shorelines on East Moose and Talbot lakes.

The Lacustrine Plain, which is located west of The Pas Moraine and south of the Upper Delta, is flat and depressional, broken only by streams, remnants of beach ridges, and low knolls. The surface materials are fine-textured lacustrine and alluvial sediments, water-worked till, and expanses of wet fibric peat. The Plain includes a vast peatland locally known as the Bog, which is located north of Overflow Bay.

CLIMATE

The area has a subhumid continental climate, characterized by a mean annual precipitation of 17 to 18 inches, a mean annual potential evapotranspiration rate of 20 inches, and July mean temperatures of 64°F to 66°F. About 8 inches of precipitation falls as rain during May through August. The average annual frost-free period is 110 days, and lakes are usually frozen for 6 to 7 months.

ECOLOGY

The area lies in the Manitoba Lowland Section of the Boreal Forest Region. The prevailing vegetation on the well-drained sites is chiefly white spruce (*Picea glauca*), white birch (*Betula papyrifera*), trembling aspen (*Populus tremuloides*), jack pine (*Pinus banksiana*), and balsam poplar (*Populus balsamifera*). Forest vegetation on the poorly drained sites is black spruce (*Picea mariana*), tamarack (*Larix laricina*), and small isolated stands of eastern white cedar (*Thuja occidentalis*).

However, the vegetative cover is greatly influenced by local soil and moisture conditions, and deviations from the typical boreal forest components occur in the Saskatchewan Delta. The flats support meadow grasses and marsh vegetation, whereas the peatlands are vegetated by sedges, grasses, willows (*Salix* spp.), and dwarf birch (*Betula glandulosa*). Mixed woods composed of balsam poplar, trembling aspen, white spruce, white elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), boxelder (*Acer negundo*), and speckled alder (*Alnus rugosa*) grow on the higher levees.

Wetlands in the area may be roughly divided into those sites that are usually permanently flooded and hold surface waters throughout the year, and those sites that are subject to seasonal flooding or are characterized by saturated organic soils.

The area includes five types of open water bodies: deep lakes, shallow eutrophic lakes, shallow drawdown lakes, bog lakes, and open water marshes.

Deep, fresh, or slightly brackish water lakes include lakes with mean depths exceeding 5 feet, and with a mineral soil or rocky shoreline. Examples are lakes Winnipegosis, Red Deer, Cedar, and Atikameg. Aquatic vegetation, which is usually confined to shoals or offshore zones, consists of flat-stemmed pondweed (*Potamogeton zosteriformis*), big sheath pondweed (*P. vaseyi*), and clasping-leaf pondweed (*P. richardsonii*).

Shallow (less than 5 feet deep), eutrophic lakes are characterized by shorelines of mineral soil or peat, an emergent fringe of cattail (*Typha latifolia*) or hardstem bulrush (*Scirpus acutus*) and a silt or muck bottom vegetated by dense rooted aquatic plants such as big sheath pondweed, clasping-leaf pondweed, spatterdock (*Nuphar variegatum*), northern water-milfoil (*Myriophyllum exaltatum*), common coontail (*Ceratophyllum demersum*), and musk grass (*Chara* spp.). Examples are Elm, Murphy, and Mawdesley lakes.

Shallow drawdown lakes are usually less than 5 feet deep, and are characterized by sparsely vegetated and recessional shorelines, and a sandy or silty bottom. Their waters are often turbid and may undergo considerable fluctuations in levels, such as Kelsey Lake.

Bog lakes are usually characterized by restricted drainage, stained water, a conspicuous floating mat shoreline, and a bottom layer of deep organic sediment; these include Watkins, Cul de Sac, and a bog lake located in the Lacustrine Plain north of Overflow Bay. The common aquatic plants in these lakes are floating-leaf pondweed (*Potamogeton natans*), spatterdock, common bladderwort (*Utricularia vulgaris*), and aquatic moss (*Drepanocladus* sp.).

Open water marshes are very shallow, semi-permanent areas of open water which usually have mineral soil shorelines, an interspersion of offshore emergents such as hardstem bulrush and cattail, and abundant growths of submerged plants. The open water marshes support most of the aquatic plant species characteristic of other open water types, but also sustain heavy growths of Canadian waterweed (*Anacharis canadensis*), star duckweed (*Lemna trisulca*), variable-leaved pondweed (*Potamogeton gramineus*), sago pondweed (*P. pectinatus*), and Fries pondweed (*P. friesii*). This type includes Saskeram, Watsekwatapi, Pasquia, and Shirley lakes.

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Sedge fens are peatlands that are saturated with alkaline waters and are blanketed by layers of moderately to poorly decomposed peat from 1 foot to more than 8 feet in depth. The surface vegetation consists of sedges such as beaked sedge and water sedge (*Carex aquatilis*), northern reed grass, horsetail (*Equisetum* sp.), hoary willow (*Salix candida*), and dwarf birch. Patterned fens with low ridge and swale microrelief are more common on the Till and Lacustrine plains, where the hummocks and low ridges support stunted tamarack. Floating fens which are common around the periphery of bog lakes and sluggish streams, are floating mats of peat, consisting of decomposed sedges and aquatic mosses. The characteristic vegetation includes water sedge, woolly sedge (*Carex lanuginosa*), horsetail, sweet gale (*Myrica gale*), bog bean (*Menyanthes trifoliata*), hoary willow, marsh cinquefoil (*Potentilla palustris*), cattail, and often an outer fringe of common reed (*Phragmites communis*).

Marches, which usually occupy seasonally flooded, non-peaty areas or shallow basins of lakes, are recognized by solid or interspersed stands of emergents such as hardstem bulrush, softstem bulrush (*Scirpus validus*), common reed, spartina (*Spartina festucacea*), awned sedge, and cattail. Other less common emergents include smartweed (*Polygonum amphibium*), horsetail, giant bur-reed (*Sparganium eurycarpum*), and sweet flag (*Acorus calamus*). Pools support growths of submerged and floating plants.

Swamps are forested wetlands dominated by alder, willows, balsam poplar, tamarack, and black spruce. They are most common on levees, margins of peatlands, and on alluvium.

Bogs or acidic peatlands have a moss substrate overlying fibric peat. The vegetation cover consists of forests of black spruce and tamarack, with a shrub layer of leather leaf (*Chamaedaphne calyculata*), and Labrador tea (*Ledum groenlandicum*). Examples of true bogs occur throughout the Lacustrine Plain, The Pas Moraine, and at a few isolated sites in the deltas.

LAND CLASSIFICATION FOR WATERFOWL

High-capability (Classes 1, 2 and 3) waterfowl breeding sites and staging areas (Class 3M) comprise about 9 percent of the area. Almost all the important sites are located within the Saskatchewan Delta, or along the shoreline of Lake Winnipegosis. The most favorable breeding habitats for dabbling duck species, such as Mallard (*Anas platyrhynchos*), Blue-winged teal (*Anas discors*), and American Widgeon (*Anas americana*), are the shallow marshes, meadow-pothole complexes, and grassy stream channels. Some examples of the better production habitat include the shorelines of Saskeram, Watsekwatapi, Pasquia, and Barrier lakes, the marshes located south of Shirley Lake, and Saskeram River, and Little Frog Creek. Shallow lakes with broad marsh and meadow borders, such as Saskeram, Birch, Reader, and Shirley lakes and the Class 1 lake situated 5 miles east of Watkins Lake, provide good breeding conditions for dabbling ducks and diving ducks, such as the Redhead (*Aythya americana*), and the Canadasuck (*A. valisineria*). Diving ducks, including the Lesser Scaup (*A. affinis*), Canadasuck, Redhead, and Common Goldeneye (*Bucephala clangula*), are the most numerous breeding birds on the shallow, eutrophic lakes bordered by a narrow emergent fringe. The Scaup and Ring-necked Duck (*Aythya collaris*) frequent the bog lakes and nest on the floating mats. Open waters in fens are less productive, especially on the lacustrine and till plains, but scattered pairs of Canada Geese (*Branta canadensis*) have been observed using this habitat. Islands, including Spruce Island, and reefs in Lake Winnipegosis support some large colonies of nesting Double Crested Cormorants (*Phalacrocorax auritus*), gulls (*Larus* spp.), and terns (*Sterna* spp.).

The shorelines and shoals of Moose, Kelsey and Mawdesley lakes and Lake Winnipegosis are less important as production areas, but serve as important migratory stops for waterfowl. Other important waterfowl staging sites include Saskeram, Reader, Birch, Big, Pasquia, Hellidiver, Shirley, Driftwood, Trader, Lamb, and Ravensnest lakes, and parts of the Delta adjoining Cedar Lake. Concentrations of up to 200,000 ducks have been observed on Saskeram Lake. In some years, large flocks of the Mallard and Pintail (*Anas acuta*) cause extensive crop damage in the Upper Delta west of The Pas.

In The Pas area, the chief limiting factors affecting duck production are the flat, adverse topography, poor interspersion of shallow waters, low fertility, and inundation. Proper control and regulating of water levels on the Delta are necessary to ensure optimum depths, promote early plant succession, control flooding, and establish an interspersion of marsh plants attractive to nesting and resting waterfowl species. These have been goals of Ducks Unlimited, whose control structures such as those built on Murphy, Reader, and Saskeram lakes have helped to maintain waterfowl habitat.

However, the inundation or more than 60 percent of the Lower Delta by the Grand Rapids Reservoir has had adverse effects on waterfowl habitat there. About 600 square miles of the finest waterfowl marshland in Manitoba has been lost. This area once consisted of numerous interspersed marshes, wet meadows, levees, and shallow lakes that supported rich growths of aquatic plants and provided abundant nesting sites. Before flooding, most of the area would have been rated Classes 1 and 2 for production capability.

Subsequently, the flooding and extreme water fluctuations have resulted in overwashing of levees, flooding the lakes, and destruction of much of the vegetation. Layers of peat have broken up and lifted, forming floating vegetal mats that eventually disintegrate as a result of wave action. Water quality has been affected by organic staining and suspended silt, and many lakes are becoming devoid of dense growths of submersed plants. Spring drawdowns annually expose sparsely vegetated mud flats, turbid lakes, denuded strains, and tangles of dead timber. Increased reservoir levels in the fall limit the use of the impoundment by migrating waterfowl. As a result of this habitat deterioration, the capability for waterfowl production is considered very low (Class 6), although peripheries of the reservoir still attract migrating birds.

Capability classification by G. D. Adams and R. C. Hutchison, Canadian Wildlife Service, Winnipeg.

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CLIMAT

Le territoire jouit d'un climat de type continental sub-humide. La précipitation annuelle moyenne est de 17 à 18 po et le taux d'évapotranspiration potentielle annuelle moyenne de 20 po. La température moyenne en juillet varie de 64 à 66°F. Environ 6 po de la précipitation tombe sous forme de pluie de mai à fin d'août. La période sans gelure dure en moyenne 110 jours et les lacs sont habituellement gelés pendant 6 à 7 mois.

ÉCOLOGIE

Le territoire appartient à la section des basses terres du Manitoba de la région de la forêt boréale. Sur les stations bien drainées, le couvert végétal est surtout constitué d'épinette blanche (*Picea glauca*), bouleau à papier (*Betula papyrifera*), peuplier faux-tremble (*Populus tremuloides*), pin gris (*Pinus banksiana*), et peuplier baumier (*Populus balsamifera*). Le couvert forestier, sur les endroits mal drainés, est constitué d'épinette noire (*Picea mariana*), mélange larin (*Alnus larinina*) et de petits peuplements isolés de thuya de l'est (*Thuja occidentalis*).

Les conditions pédologiques et les conditions d'humidité qui prévalent localement influent fortement sur le couvert végétal. Dans le delta de la Saskatchewan, apparaissent des couverts forestiers qui diffèrent de la forêt boréale typique. Des graminées de prairie humide et une végétation de marécage croissent dans les bas-fonds. Dans les terres tourbeuses se trouvent des carex, des graminées, des saules (*Salix* spp.) et du bouleau noir (*Betula glandulosa*). Des peuplements mixtes de peuplier baumier, peuplier faux-tremble, épinette blanche, orme d'Amérique (*Ulmus americana*), frêne de Pennsylvanie (*Fraxinus pennsylvanica*), érable rouge (*Acer negundo*) et aulne rugueux (*Alnus rugosa*) occupent les bordures de rive les plus élevées.

Les mouillères sont des station inondées en permanence, qui retiennent pendant toute l'année les eaux de surface ou soumises à des débordements saisonniers ou caractérisées par la présence de sols organiques saturés.

Il y a dans le territoire plusieurs types de nappes d'eau: lacs profonds, lacs peu profonds, lacs affaissés (drawdown), lacs de marais, marécages aux eaux libres.

Les lacs profonds, aux eaux douces ou légèrement saumâtres, ont une profondeur moyenne supérieure à 5 pi et des rives rocheuses ou couvertes d'un sol minéral. Appartenant à cette catégorie les lacs Winnipegosis, Red Deer, Cedar et Atikameg. La végétation aquatique, qui ne crée habituellement que sur les bas-fonds ou à une bonne distance des rives, se compose principalement de potamots (*Potamogeton* spp.).

Les lacs eutropiques peu profonds (moins de 5 pieds) sont caractérisés par la présence sur leurs rives de sols minéraux ou tourbeux, par une bordure émergente de types (*Typha latifolia*) ou de scripe à tige dure (*Scirpus acutus*) et un fond limoneux ou boueux qui occupe un réseau dense de plantes aquatiques énervées: potamot engainé, potamot de Richardson, nénuphar (*Nuphar variegatum*), myriophylle blanchissant (*Myriophyllum exaltatum*), cornille nageante (*Ceratophyllum demersum*), et charagnes (*Chara* spp.). Appartiennent à cette catégorie les lacs Elm, Murphy et Mawdesley.

Les lacs affaissés ont habituellement eux aussi moins de 5 pieds de profondeur ont des rives en voie de recul portant une végétation clairsemée et un fond limoneux ou sableux. Leurs eaux sont souvent troubles et leur niveau peut changer considérablement comme c'est le cas pour le lac Kelsey. Les mauvaises conditions de drainage, des rives souillées, une présence de dépôts d'origine organique et une absence de fonds émergents sont typiques des lacs marais. Appartiennent à cette catégorie les lacs Watkins, Cul de Sac et un autre site dans la plaine lacustre au nord de la baie Overflow. Les plaines aquatiques les plus communes dans ces lacs sont le potamot flottant (*Potamogeton natans*), le nénuphar, l'utriculaire vulgaire (*Utricularia vulgaris*) et la mousse aquatique (*Drepanocladus* sp.).

Les marécages aux eaux libres sont des nappes d'eau libres très peu profondes et semi-permanentes sur les rives desquelles on trouve habituellement des sols minéraux et où croissent, à une certaine distance des rives, un mélange de plantes émergentes telles que les scripes et les typhes; une grande quantité de plantes poussent également sous l'eau. Dans les marécages aux eaux libres croissent la plupart des plantes aquatiques des autres types de nappes d'eau libre mais on y trouve en outre des quantités assez considérables d'élodée du Canada (*Anacharis canadensis*), de la lentille trisulquée (*Lemna trisulca*), de potamot graminé (*Potamogeton gramineus*), de potamot pectiné (*P. pectinatus*) et de potamot de Fries (*P. friesii*). Dans cette catégorie se placent les lacs Saskeram, Watsekwatapi, Pasquia et Shirley.