

BASELINE (1985) HABITAT ESTIMATES FOR THE SETTLED PORTIONS  
OF THE PRAIRIE PROVINCES

Report #9: Saskatchewan Shortgrass Prairie  
Prairie Habitat Monitoring Project

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## ABSTRACT

This report presents data for four transects in four physiographic units in the Saskatchewan Shortgrass Prairie. One additional unit has been sampled with one transect in the Alberta portion of that unit. Collectively these five units account for just over four fifths of the total area of the ecoregion.

Attempts to analyse the habitat data with standard statistical methods have shown that the data are highly variable and frequently skewed to the point where these techniques cannot be legitimately used. As a result, caution must be used in interpreting apparent habitat differences and habitat values extrapolated from sample means for physiographic units.

Distribution of sampling amongst major landform categories is quite variable in relation to the level of occurrence of those categories within the Saskatchewan Shortgrass Prairie.

For the ecoregion sample as a whole:

(a) The distribution of sampling on various parent soil materials and surface forms is confined to undulating, rolling and dissected morainal terrain.

(b) Wetland area averages 1.9 percent of the total land area of sampled physiographic units. This is the lowest level recorded for any of the ecoregions reported on to date.

(c) An overwhelming proportion of wetland area (96.8 percent) and wetland numbers (87.9 percent) are temporary or seasonal in nature. One quarter of the wetland area and one third of the wetland numbers are cultivated.

(d) Only 0.3 percent of the wetland area and 0.6 percent of wetland numbers are classed as permanent water (natural fresh open water). These figures are the second lowest levels recorded to date.

(e) One quarter of the wetland area is not subjected to any human use. Grazing occurs on 44 percent of the wetland area, the third highest level recorded to date.

(f) Annual crops occupy 69 percent of the total upland area and native cover occupies 23.4 percent of the uplands. Both of these values are the fourth highest recorded to date.

(g) Grazing occurs on 25.5 percent of the uplands, the third highest level recorded to date.

(h) The best morainal physiographic unit for waterfowl production habitat in the sampled portion of the Saskatchewan Shortgrass Prairie is the Poplar River Plain and it only rates as a two by Saskatchewan Shortgrass rating values. It drops to a three when rated by Alberta Mixedgrass values and to a four when rated by Saskatchewan Mixedgrass and Alberta and Saskatchewan Parkland rating values. All other sampled morainal units are also bottom-rated as fours when rated by the latter three sets of criteria. Lack of semi-permanent and permanent wetlands throughout the ecoregion is a significant factor in the low rating as waterfowl production habitat which is given to all morainal units.

(i) Amongst all the ecoregions reported on to date Saskatchewan Shortgrass Prairie appears to have experienced the second lowest level of habitat change over the five-year period of the baseline surveys.

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Project Officer 1985-91: J.B. Millar

I. Objective

The objective of this portion of the Prairie Habitat Monitoring Project is to establish baseline habitat values for long-term monitoring sites and to generate estimates of the current distribution and quality of each of a variety of habitat (cover) and land use classes in individual physiographic units (habitat subregions) within each of the ecoregions in the settled portions of the three Prairie Provinces.

II. Introduction

The quality and quantity of prairie migratory bird habitat has progressively declined since the time of settlement. A variety of studies have documented this decline for specific locations and time periods (Millar 1989a) but the rate of loss (and hence the severity of the problem) across the prairies as a whole is largely unknown. There is a need to monitor trends in habitat loss in the various prairie ecoregions to ensure that habitat conservation programs address the areas of primary concern and that elected officials are equipped with current, factual information as a basis for directing land management policy. The recent initiation of the North American Waterfowl Management Plan will most certainly



increase the demand for habitat monitoring information.

Effective measurement of habitat change is dependent upon the availability of a baseline record of current conditions against which future observations can be compared. The establishment of such a baseline record is therefore an essential first step in the development of a habitat monitoring program and the determination of habitat trends. The data presented in this report represents one segment of a more comprehensive effort to establish this baseline record, expanding on the results of earlier pilot studies (Millar 1986).

### III. Methods

Most of the methods employed in this project have already been described in detail in Report #1 of this series (Millar 1987). Changes in methodology developed since that time have been summarized in Report #4 (Millar 1992a). In this report only methodology relating specifically to the Saskatchewan Shortgrass Prairie will be discussed.

#### A. Delineation of Physiographic Units

Boundary changes from those delineated by Adams (1985) - These have affected all of the physiographic units in the mapped area to a greater or less degree. The Sage Creek Plain (1.02) in particular has been reduced in size.

Redefinition of physiographic units - In Saskatchewan Shortgrass Prairie no physiographic units have been redefined.

#### B. Sampling Network

None of the transects discussed in this report are the product

of transect splitting.

C. Rating of Sampled Morainal Physiographic Units as Waterfowl Production Habitat

Minimum rating values for Saskatchewan Shortgrass Prairie - For each of seven habitat factors one point is given if the value for the unit exceeds a designated minimum. Minimums have arbitrarily been established at approximately half the maximum observed level for each factor within the ecoregion. No attempt has been made to assign greater importance to one factor over another, except that a unit is downgraded by one level if it loses points for both semi-permanent (bulrush/cattail) and permanent (natural, fresh open water) wetlands which are considered critical for brood production. The minimum rating values for Saskatchewan Shortgrass Prairie are as follows:

1. Total wetland area - 2.1 percent of total land area
2. Grassy wetland cover - 45 percent of total wetland area
3. Bulrush/cattail cover - 0.5 percent of total wetland area
4. Open water wetlands - 1.8 percent of total wetland area
5. Unused wetlands - 22 percent of total wetland area
6. Shrubby and grassy upland cover - 42 percent of total upland area.
7. Unused uplands - 1.3 percent of total upland area.

Rating Scale

The possible point range of zero to seven has arbitrarily been divided into four categories on the following basis:

Number of Points Given the Unit

Rating

6 - 7

1

4 - 5

2

2 - 3

3

0 - 1

4

#### IV. Results and Discussion

##### A. General Information on Saskatchewan Shortgrass Prairie

###### 1. Ecoregion Area and Distribution of Sampled Units

The total area occupied by the Saskatchewan Shortgrass Prairie is calculated to be approximately 1,721,900 hectares (Table 1), based on the boundaries of physiographic units lying wholly or predominantly within the ecoregion. The area calculated in this fashion will differ somewhat from the area of the ecoregion when calculated on surveyed and redefined vegetation boundaries. A comparison of these values still needs to be made.

Five physiographic units which have been sampled with habitat monitoring transects, including one sampled in the Alberta portion of the unit, account for just over four fifths (83.1 percent) of the total area of the ecoregion (Table 1) while unsampled units cover only 7.6 percent of the area. Major river and stream valleys as well as lakes have been excluded from the area of physiographic units and collectively comprise 9.3 percent of the total area of the ecoregion. This is the second highest value recorded for these landscape features in any of the ecoregions reported on to date.

###### 2. Distribution of Landforms in the Ecoregion

The distribution of various landforms in Saskatchewan Shortgrass Prairie is summarized in Table 2. All of the physiographic units are morainal in origin and 91.6 percent of their total area is currently being sampled in this study. Just over one third (35.5 percent) of the total area in physiographic units is undulating ground moraine and 100 percent of that is in

units which have been sampled. Just under one third (32.4 percent) of the area is rolling terrain and all of that is in one unit which has been sampled. Slightly less than one quarter (23.7 percent) of the area has a predominantly dissected landform and all of that has been sampled. The remaining 8.4 percent of the area in physiographic units is knob and kettle and hummocky terrain and none of that has been sampled.

The distribution of habitat sampling between various morainal landform categories is also shown in Table 2. The relationship between distribution of sampling effort and the occurrence of each category in the ecoregion is quite variable. For the predominantly undulating ground moraine the relationship is quite close with that category occupying 35.5 percent of the total land area in physiographic units and 40 percent of our sampling being located in that landform. Another 40 percent of our sampling effort is on dissected terrain which occupies only 23.7 percent of the total land area in physiographic units. The final one fifth of our sampling is on rolling terrain which occupies 32.4 percent of the total land area. Both knob and kettle and hummocky terrain are not sampled at all.

### 3. Location and Landform Character of Individual Physiographic Units

Figure 1 shows the location of all physiographic units in Saskatchewan Shortgrass Prairie, including both those covered in this report and units which have not been sampled at all.

This report presents baseline habitat data for four sample

sites in four physiographic units. In addition, partial data are also presented for one unit (Lodge Benchland) which has been sampled in the Alberta portion of the unit. Individual units and transects located in them are listed in Table 3. Collectively these five units comprise an area of approximately 1,431,500 hectares (Table 1) or about 83.1 percent of the total Saskatchewan Shortgrass Prairie Ecoregion.

Origins of parent soil material and surface form for the five sampled units are summarized in Table 3. All of the units are entirely or predominantly of morainal origin. Two of the units are predominantly undulating ground moraine, two have predominantly dissected surface form and one rolling surface form.

The two physiographic units in Saskatchewan Shortgrass Prairie which have not been sampled to date are summarized in Table 4 as to their parent soil material, surface form and area. Both of them are predominantly morainal in origin.

#### 4. Size of Monitoring Samples in Relation to Physiographic Units

The relative sizes of monitoring samples covered in this report and the physiographic units in which they occur are presented in Table 5. Samples range from a low of 0.3 percent of the Wood Mountain Plateau (1.08) to a high of 1.0 percent of the entire Lodge Benchland (1.04), including the Alberta portion of the unit. Overall sample size for the five units is 0.6 percent of the portions of the units occurring in Saskatchewan and 0.5 percent of the total area of all units, including the portions of 1.02 and

1.04 occurring in Alberta.

All of the units contain sufficiently well-defined variations in surface form, including density and size distribution of wetlands, and parent soil material that they can be divided into two or more sub-units. In the Saskatchewan Shortgrass Prairie this situation is most extreme in the Lodge Benchland which has been divided into eight sub-units. However, only two of these extend into Saskatchewan. Also, only one sub-unit of the Sage Creek Plain extends into Saskatchewan. Ideally, transects should be related to the sub-units in which they occur rather than to the unit as a whole. However, if this were to be done there should be additional sampling in other significant sub-units. Also, in the Lodge Benchland and Frenchman River Plain the transects do straddle sub-unit boundaries.

#### B. Sample Results

Baseline habitat data for the Lodge Benchland (1.04) are provided from the Manyberries transect in the Alberta portion of that unit and were discussed in detail in the report on Alberta Shortgrass Prairie (Millar 1992d). In this report reference to data from this unit will be limited to the section on extrapolation of sampling results. Full discussion of sampling results in this section will be limited to the data from four transects in units 1.02, 1.07, 1.08 and 1.09. Since there is only one transect located in each physiographic unit there can be no discussion of variability in habitat conditions between transects within the same unit.

1. Wetlands

- a. Percent of Total Land Area Occupied by Wetlands

The first step in assessing variability in baseline habitat conditions between various physiographic units has been to determine the relative amounts of wetlands and uplands in the landscape. Within the four individual transects in Saskatchewan Shortgrass Prairie there is a 10-fold variation (0.4 to 4.0) in the percent of total land area occupied by wetlands (Table 6).

- i. Landform character and wetland area - Two of the four transects in Saskatchewan Shortgrass Prairie are located on undulating ground moraine and these possess the two highest (4.0 and 1.6) percentages of wetland area. The one transect on rolling morainal terrain has a wetland area (1.4 percent) almost equal to the lowest wetland area observed on undulating terrain. Dissected morainal landform has the lowest percentage of wetland area (0.4).

For the sampled portion of the ecoregion as a whole the percent of land area occupied by wetlands averages 1.9 which is the lowest level recorded for any of the ecoregions reported on to date and less than half the next lowest level recorded.

- ii. Cultivated wetlands - The amount of land occupied by cultivated wetlands is of particular interest because this is a part of the landscape which, depending on surface water conditions at the time of surveys, cannot always be interpreted from air photos as being wetland. Classification may shift back and forth between wetland and cropland (upland) categories in terms of cover and land use.



The percent of total land area occupied by cultivated wetlands in the transects covered in this report ranges from a trace at Fife Lake to 1.5 percent at Climax (Table 6) where 37.5 percent of the total wetland area is cultivated. In three of the four transects cultivated wetlands occupy 0.3 percent or less of the total landscape.

For the ecoregion as a whole, total land area occupied by cultivated wetlands averages 0.5 percent. This is the lowest level recorded for any of the ecoregions reported on to date.

b) Area of Wetlands in Various Cover Classes

The percent of total wetland area in various cover classes is summarized for all transects and physiographic units in Table 7. Shrub and tree cover are totally absent from wetlands in the Saskatchewan Shortgrass Prairie sample and so for this ecoregion cultivated and grassy cover are considered collectively as the cover types most indicative of temporary or seasonal water conditions. This group dominates (89.3 to 98.1 percent of total wetland area) in all four transects. The level of dominance by the cultivated/grassy cover group for the ecoregion as a whole (96.8) is the highest recorded for any of the ecoregions reported on to date.

The percent of wetland area that is cultivated in the four transects varies from 6.4 percent on rolling morainal terrain at Kildeer to 37.8 percent on undulating ground moraine at Climax. The three lowest cultivation levels all occur on transects in which there is a high level of grazing.

Grass (including sedges and forbs) is the dominant cover class in all four transects. While both wet meadow and shallow marsh vegetation are included in the class, ground truthing surveys have confirmed that the majority of the area involved is shallow marsh. However, the proportion of wet meadow vegetation is higher than that recorded for parkland ecoregions.

Bulrush and cattail (deep marsh vegetation) are recorded on only two transects and only in very minor (1.1 percent and a trace) amounts.

Transitional open water, which can only be identified from ground surveys, is totally absent from all transects, suggesting that none of the Saskatchewan Shortgrass Ecoregion has experienced above-normal water levels in recent years.

Natural fresh open water is very limited in its occurrence. It is absent from one transect, present as a trace in two transects and attains a maximum of 3.6 percent at Fife Lake. In this report open running water has not been grouped with natural open water in ponds.

The range in area of artificial open water (1.5 to 7.1 percent) is the narrowest (5.6 percent) recorded for any of the ecoregions reported on to date and the maximum percent ties with Alberta Fescue and Shortgrass Prairies as the second lowest maximum recorded.

Saline open water is absent from all four transects. Other cover classes are recorded on three transects and never account for more than 0.4 percent of the total wetland area.

For the ecoregion sample as a whole 99.2 percent of the total wetland area falls into three cover classes: grass - 70.8 percent, cultivated - 26.0 and artificial open water - 2.4 percent. The narrowness of cover type distribution recorded for Saskatchewan Shortgrass Prairie is matched only by that recorded for Alberta Shortgrass Prairie (Millar 1992d).

c) Wetland Density

Wetland density figures can be used to a limited extent to draw certain inferences about the character of the wetlands under study but must be interpreted with caution. A high wetland density, for example, can be taken as a reliable indicator that most of the wetlands present are small and hence not likely to be very permanent in nature. A low density, on the other hand, may be indicative of a variety of conditions and hence is not a reliable indicator by itself of either wetland size or permanence. It may, for example, result from the presence of small numbers of either small temporary wetlands, a mixture of a variety of sizes of wetlands of variable permanence or a few very large permanent wetlands.

The mean wetland densities per quarter section for all transects covered in this report and for the ecoregion sample as a whole are listed in Table 8. Densities range from 1.8 per quarter section at Consul to 6.0 at Climax. The highest and lowest densities are both located on undulating morainal terrain. The maximum density of 6.0 at Climax is the second lowest maximum density recorded for any of the ecoregions reported on to date and

is less than one sixth of the greatest maximum density (37.1) recorded for Saskatchewan Parkland (Millar 1988).

For the entire ecoregion sample the average density is 3.2 wetlands per quarter section, the lowest level recorded for any ecoregion reported on to date.

#### d) Numbers of Wetlands in Various Cover Classes

In this report each wetland has been categorized according to the one cover class which dominates the central and deepest portion of the basin.

Two cover classes characteristic of temporary or seasonal wetlands, i.e., cultivation and grasses, collectively dominate (76.5 to 92.3 percent) the numbers of wetlands in all four transects (Table 8). Within these cover classes grasses dominate in all transects.

With the exception of artificial open water, representation of all other cover classes is at a very low level. At that, artificial open water attains double digit values on only two transects. Willows and trees, transitional open water and saline open water are totally absent from all transects.

For the ecoregion sample as a whole 97.5 percent of the wetlands are dominated by grass (55.1 percent), cultivation (32.8 percent) and artificial open water (9.6 percent).

#### e) Area of Wetlands in Various Land Use Activity Classes

Utilization of wetlands in the four transects falls into four major land use categories - no use, abandoned cultivation, annual crops and grazing. Collectively these four activity classes occur

on 96.6 to 100 percent of the total wetland area (Table 9).

The percent of total wetland area that is not being subjected to any obvious or regular human activity ranges from 1.1 percent at Kildeer to 43.8 percent at Climax. The minimum no use value at Kildeer is associated with a very high (92.5 percent) level of utilization for grazing.

The abandoned cultivation land use activity class is a transitory category that is assigned to wetlands which are in a state of flux between being used for annual crops and reverting to an unused condition. This category most frequently occurs when higher water levels flood out previously cultivated basins and persist long enough to permit the establishment of disturbed wetland vegetation. Since development of the abandoned cultivation class is related to local precipitation conditions, its presence can be expected to be erratic within and between transects. The percent of the total wetland area in this category ranges from zero to 10.4 for the four transects covered in this report.

The amount of wetland area being used for crop production ranges from 6.4 percent at Kildeer to 37.8 percent at Climax.

Haying is virtually nonexistent on Saskatchewan Shortgrass transects. It was recorded on only one of four transects and there on only 0.4 percent of the total wetland area.

Grazing of wetlands occurs in all four transects and on 12.7 to 92.5 percent of the wetland area. In three of the four transects grazing occurs on more than 50 percent of the wetland area.

Other land use activities on wetlands are recorded in two of four transects. Maximum "other" usage is 3.4 percent at Fife Lake where a large artificial wetland is a sewage lagoon. At Climax "other" uses are related to farmstead activities and roads.

For the ecoregion sample as a whole, 96.0 percent of the total wetland area falls into three land use categories, no use, annual crops and grazing. One quarter (26 percent) of the wetland area is unused and a similar amount is devoted to cropping. Just under half (44 percent) of the total wetland area is grazed. The distribution of these three land use activities most closely parallels the pattern recorded for Alberta Fescue Prairie (Millar 1992c).

f) Wetland Size Distribution

Variations in the size distribution of wetlands amongst transects and physiographic units will not be discussed in this report because the total areas of wetlands lying only partially within quarter section sample units cannot be easily generated and analysed within the program set up for the quarter section units. Any attempts to determine wetland size distribution within quarter sections would therefore lack a true representation of larger wetlands. Future manual digitizing of wetlands extending across two or more quarter sections would make it possible to calculate accurate size distribution figures.

g) Wetlands Affected by One or More Permanent Impacts

Enough material has been generated on the nature and distribution of permanent, human-induced impacts on wetlands in the

monitoring samples to provide the basis for a full-scale study on that subject alone. For the present, however, discussion of the effects of impacts on wetlands will be limited to an evaluation of the extent to which individual wetlands have been affected by one or more such impacts. It should be emphasized here that in this study cultivation is not considered a permanent impact. The percent of wetlands affected by one or more permanent impacts ranges from a low of 33.3 at Fife Lake to a high of 47.6 at Kildeer (Table 10).

For the entire ecoregion sample the average impactation level is 37.5 percent. This is the highest rate of impactation observed in any of the ecoregions reported on to date.

#### h) Distribution of Streams

The distribution of stream segments in the data samples has been summarized (Table 11) to provide an indication of the relative importance of this type of water body in different physiographic units of the Saskatchewan Shortgrass Prairie.

No streams are recorded in one of the four transects (Climax) and in the remaining three the percent of quarter sections containing streams ranges from 8.3 at Consul to 25.0 at Kildeer.

In the total ecoregion sample 12.5 percent of all quarter sections contain stream segments. This is the second highest average occurrence of streams after that recorded for Alberta Parkland (14.5 percent, Millar 1992a).

## 2. Uplands

### a) Distribution of Upland Cover Classes

Upland cover data have been analysed on the basis of seven classes, four native and three planted, plus a catch-all category for all other classes. In the four Saskatchewan Shortgrass Prairie transects 99.2 to 99.9+ percent of the upland cover falls into these seven classes (Table 12).

Annual crops and summerfallow are the single most common upland cover class in all of the transects, occupying 51.4 to 90.7 percent of the upland area. Climax is the most intensively cultivated transect in the ecoregion with 90.7 percent of its uplands in crop as well as 37.8 percent of its wetland area.

Native grass occupies 6.0 to 32.7 percent of the uplands.

Shrubs and trees, as is to be expected in a grassland situation, are a very minor element in the landscape. Low shrubs (buckbrush) are present in all four transects and occupy from a trace to 6.6 percent of the upland area while tall shrubs occur as a trace in three transects. Native trees are recorded as a trace in all four transects.

Total native cover occupies from 6.0 to 38.0 percent of total upland area in the four transects. In three transects it occupies more than 10 percent of the upland area and in two it exceeds 30 percent.

Planted grasses and forbs are found on 1.8 to 12.3 percent of the uplands. Two transects have values in excess of 10 percent of the upland area.

Planted trees and shrubs are a minor part of the landscape, accounting for 0.7 percent or less of the upland area in any



transect.

For the ecoregion sample as a whole 69.0 percent of the total upland cover is annual crops and summerfallow. This is the fourth highest average value for this cover class reported to date. Total native cover accounts for 23.4 percent of the upland area, again, the fourth highest level reported to date. Almost all of that amount (21.4 percent) is native grass. Planted grasses and forbs cover 6.9 percent of the uplands, the second highest level recorded to date. Climax is the most intensively cultivated transect in Saskatchewan Shortgrass Prairie (90.7 percent of upland area and 37.8 percent of wetland area). This is well below the record level recorded in this study.

b) Distribution of Upland Land Use Activity Classes

Upland land use data have been separated into seven classes plus an eighth catch-all category for all the other minor land uses (Table 13).

Annual crop production is the predominant land use activity in all of the transects covered in this report. The same values and comments given in the preceding section on upland cover for the cultivated cover class also apply here.

Idle (unused plus abandoned) land accounts for 0.7 to 2.9 percent of upland area. Land which has been abandoned from other uses never amounts to more than 0.4 percent of the total upland area in any transect.

Forage production occurs on a trace to 2.5 percent of the upland area in three of four transects. Grazing occurs in all

transects on 2.6 to 42.3 percent of the uplands.

Land use activities which are associated with native vegetation and/or planted grasses and forbs collectively occupy 5.2 to 45.3 percent of the total upland area in the four transects.

A minor but consistent part of the uplands is devoted to farmsteads (a trace to 1.6 percent) and to roads and railways (2.0 to 3.0 percent) in all transects. Other land uses collectively occupy a trace to 0.2 percent of the uplands.

For the ecoregion sample as a whole, land use activities occur in descending order of importance as follows: annual crop production (69.0 percent), grazing (25.5 percent), roads and railways (2.5 percent), idle (no use and abandoned - 1.5 percent), forage and farmsteads (0.7 percent each) and other uses (0.1 percent). Saskatchewan Shortgrass Prairie has the fourth highest level of upland in crop production and the third highest level of grazing amongst the ecoregions reported on to date.

### C. Extrapolation of Sampling Results

#### 1. Data Variability

One of the objectives of this baseline habitat study has been to generate estimates of current habitat values for individual physiographic units by extrapolating the sample results obtained in this study to the entire unit. Application of standard statistical procedures to the sample data has, however, shown there to be such a high degree of variability in the data that the mean values generated cannot be considered to provide a consistently accurate estimate of conditions beyond the samples themselves for all

habitat factors in all transects. Examples of the variability in the data are illustrated for some major wetland cover, upland cover and upland land use classes in Tables 14 to 16, respectively.

Some indications of the degree of variability in the data can be obtained by comparing the different sets of data. For the three wetland cover classes, cultivated, grass and willows, the number of transects in which the standard error equals or exceeds the mean is very low (zero of four, one of four and zero of zero, respectively - Table 14). In the three upland cover classes, cropland, native grass and native trees, these numbers rise to three of four, four of four and zero of two transects, respectively (Table 15), suggesting a greater amount of variability in the extent of upland cover. In both cases the zero values for woody vegetation reflect the absence or minimal presence of that cover type in the Saskatchewan Shortgrass Prairie.

The greatest extremes in data variability are to be found in upland land use categories (Table 16). In one of four of the transects the standard error exceeds the mean for unused land. For grazing this situation occurs in four of four transects. This confirms general observations that the occurrence of grazing is very irregular in most areas and the occurrence of unused land is less irregular. At the other extreme, the standard error for roads and railways is consistently and strongly less than the mean in all transects. This is to be expected since this land use occurs with great uniformity across the country.

A very common situation which contributes significantly to the

variability in habitat data is the presence within a sample of one or more quarter sections operated by a landowner whose land use practices, e.g., grazing, are markedly different than those of his neighbours. When this happens the data are strongly skewed and cannot be analysed by standard methods.

When data for the entire ecoregion sample are analysed collectively the degree of variability is reduced but the predominant pattern shown by individual transects still shows through.

Although the shortcomings of using limited habitat data from this project to generate estimated habitat values for entire physiographic units have been identified, those extrapolated estimates are still useful. Certain broad conclusions can be drawn from the more obvious data extremes and the figures can be used to compare the results obtained from this study with those of other studies such as agricultural surveys and Ducks Unlimited's Habitat Inventory. The combination of accurate ground truth data from the Prairie Habitat Monitoring Project with a total habitat inventory from Thematic Mapper imagery in the Ducks Unlimited program still appears to offer the best possibility for obtaining the most accurate assessment of current habitat conditions.

## 2. Wetlands

The estimated area of wetland cover classes, the number of wetlands in each cover class and the area of each wetland land use activity class in each physiographic unit are presented in Tables 17 to 19, respectively.

Within the group of physiographic units sampled in Saskatchewan Mixedgrass Prairie the top unit in terms of total estimated quantity of wetland habitat is the Frenchman River Plain (1.07). It is the second largest unit and ranks first in several wetland qualities which contribute to good waterfowl habitat. These include: (a) large areas and numbers of grassy (seasonal) wetlands for breeding pair habitat, and (b) a good proportion of undisturbed wetlands to ensure adequate escape cover. This unit is, however, lacking in semi-permanent and permanent wetlands which are essential for successful brood rearing.

Extrapolated wetland data for the entire sampled portion of Saskatchewan Shortgrass Prairie have been summarized in two ways. First, extrapolated wetland values for individual physiographic units have been added together to provide total values (physiographic unit analysis or summation). Second, the entire ecoregion sample has been analysed as a single unit and the resultant wetland values have been extrapolated to generate totals for the sampled portion of the ecoregion (ecoregion analysis). The physiographic unit analysis is considered to provide the most accurate estimate of wetland conditions in the ecoregion because it takes into account variations in the contribution of individual units to ecoregion totals in relation to both their size and wetland qualities. The relative closeness of values generated through the ecoregion analysis to those from the physiographic unit analysis is examined to determine the extent to which these two approaches produce acceptably comparable habitat estimates for the

sampled portion of the ecoregion.

The total wetland area estimate generated in the ecoregion analysis is higher than that produced in the physiographic unit analysis by just 1.6 percent. Three cover classes are absent from the sample and of the six present two have ecoregion values which are higher, one by 6.3 and one by 33.3 percent. The latter value involves only a minute amount of land area. One cover class has an ecoregion value which is lower by 0.5 percent and three cover classes have identical values in both analyses.

The ecoregion analysis of total wetland numbers is also higher than the physiographic unit analysis but only by 0.3 percent. One of six cover classes has a higher ecoregion value by 3.7 percent. Three cover classes are exactly the same and two are lower by 3.0 and 26.7 percent. The latter value involves just over one percent of the total land area.

The ecoregion analysis of wetland area devoted to various land use activities produces higher values in two of the six categories by 3.0 and 9.7 percent, a lower value in one category by 3.4 percent and identical values in three categories.

### 3. Uplands

Estimated areas of upland cover and land use activity classes are presented in Tables 20 and 21. Amongst the five physiographic units covered in this report, the Wood Mountain Plateau (1.08) ranks first in total upland area and first in both estimated amounts of upland nesting cover in the form of native vegetation plus planted grassy cover and the amount of upland in land uses

which are conducive to the perpetuation of nesting cover, i.e., idle land, forage production and grazing.

Extrapolated upland data for the entire sampled portion of the Saskatchewan Shortgrass Prairie have been summarized in the same ways as previously described for wetland data. The two analyses generate virtually identical values for total upland area. Four individual cover class estimates generated in the ecoregion analysis are lower by 1.4 to 26.1 percent (three by 4.7 percent or less) and two are higher by 0.1 and 1.5 percent than those produced in the physiographic unit analysis. Two cover classes representing traces of upland area have identical values.

A similar situation exists with upland land use data where five ecoregion estimates are lower and three higher than the physiographic unit summation. All but two of the differences are very minor. The two extreme differences of -27.5 and +100 percent both involve very minor land use categories, respectively, forage and "other".

These results, together with the corresponding data for wetlands, suggest that comparable estimates of the quantities of the major cover and land use classes present in the sampled portion of the Saskatchewan Mixedgrass Prairie can be obtained by extrapolating the data of physiographic units either individually or collectively. Results for minor habitat categories are quite variable. Overall the results obtained from the ecoregion and physiographic unit analyses are closer for Saskatchewan Shortgrass Prairie than for other ecoregions reported on to date.

#### 4. Rating of Sampled Morainal Physiographic Units as Waterfowl Production Habitat

On the basis of the habitat rating analysis described in the Methods Section the best sampled morainal unit, the Poplar River Plain (1.09) receives a two rating as a waterfowl production area relative to other sampled units in the Saskatchewan Shortgrass Prairie (Table 22). The Frenchman River Plain (1.07) and Wood Mountain Plateau (1.08) are given a three rating and Lodge Benchland (1.04) and Sage Creek Plain (1.02) are bottom-rated as fours. Of these latter four units all but the Wood Mountain Plateau have been downgraded for losing points for both semi-permanent and permanent wetlands.

When Saskatchewan Shortgrass Prairie morainal units are rated using minimum rating values for other ecoregions including Alberta and Saskatchewan Mixedgrass Prairie and Alberta and Saskatchewan Parkland the ratings for all units are consistently at the four level except for Wood Mountain Plateau and Poplar River Plain which rate as threes when Alberta Mixedgrass rating values are used. I believe the level four ratings reflect the relative value of Saskatchewan Shortgrass Prairie morainal units as waterfowl production habitat in relation to other ecoregions in the settled portions of the Prairie Provinces.

#### D. Cover/Land Use Changes Since May 1985

Cover/land use change is an ongoing process and formal efforts to measure this were originally scheduled to be conducted at five-year intervals as part of this project. It is possible, however,



to obtain a very crude idea of the extent to which change is occurring in the interim by determining the number of quarter sections which have experienced some change in the interval between the taking of baseline aerial photography and the completion of the ground truthing surveys. The date of baseline aerial photography for all transects covered in this report was May 1985. The interval between that date and the completion of the ground truthing surveys for these transects has varied from 62 to 63 months (Table 23). Recorded changes are as small as the cultivation of a single wetland and as extreme as the breaking of a large portion of an entire quarter section. Frequently the changes have been associated with road construction. Temporary interruptions of cultivation in wetlands or uplands are not counted as changes.

Cover/land use changes have occurred on all four transects and the percent of quarter sections affected ranges from 16.7 at Climax to a high of 33.3 at Fife Lake. The extent to which quarter sections in the Saskatchewan Shortgrass Prairie have been affected by land use/cover change is the second lowest (24.0 percent) recorded amongst the ecoregions reported on to date, exceeded only by the Alberta Shortgrass Prairie. This is in spite of the fact that the average time interval between the taking of aerial photos and the completion of ground truthing surveys is as long as that for any other ecoregion. This suggests that in the last few years agricultural change has been proceeding at a slower pace in the Saskatchewan Shortgrass Prairie than it has in the ecoregions further north.

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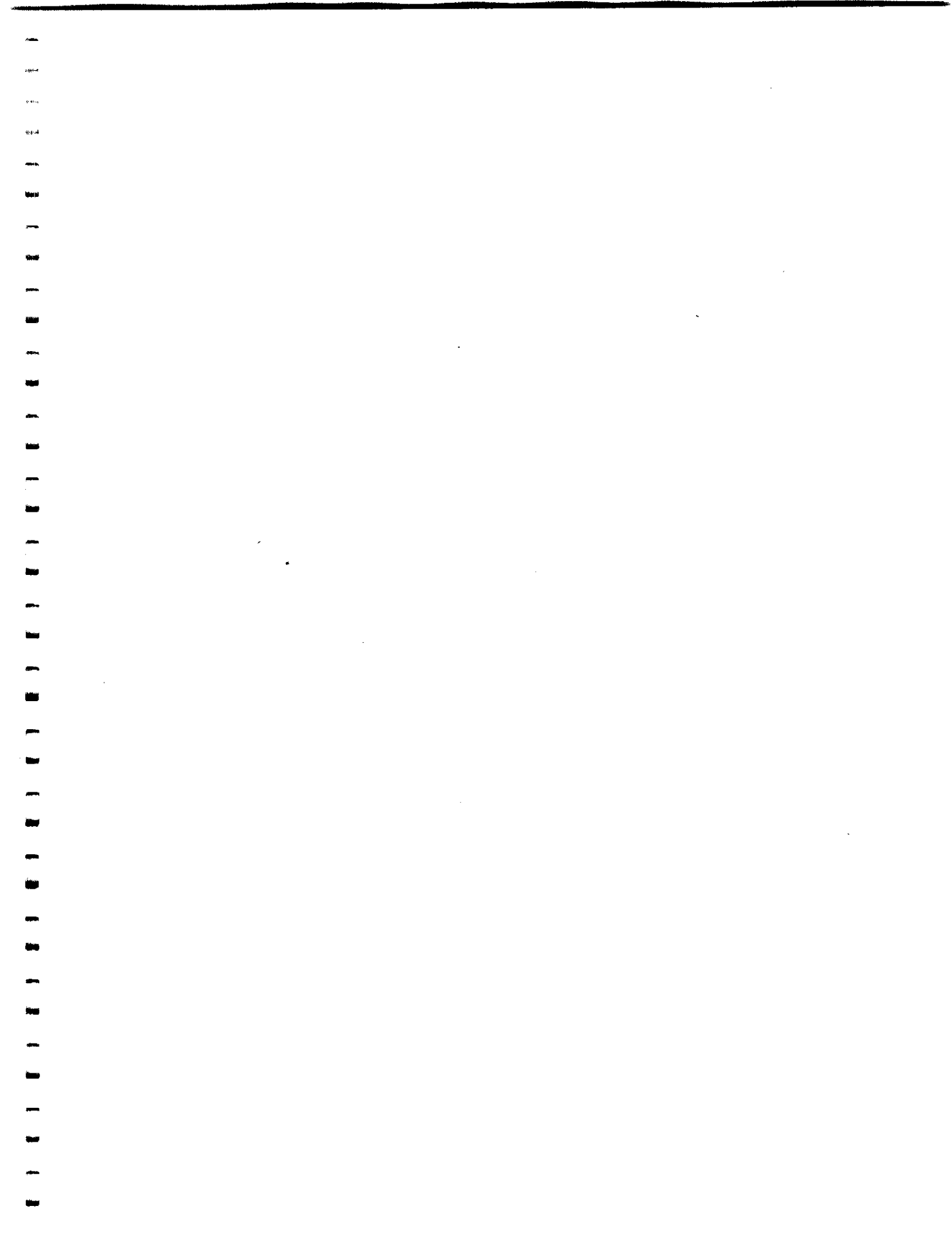


Figure 1. Distribution of Habitat Sampling in Saskatchewan Shortgrass Prairie

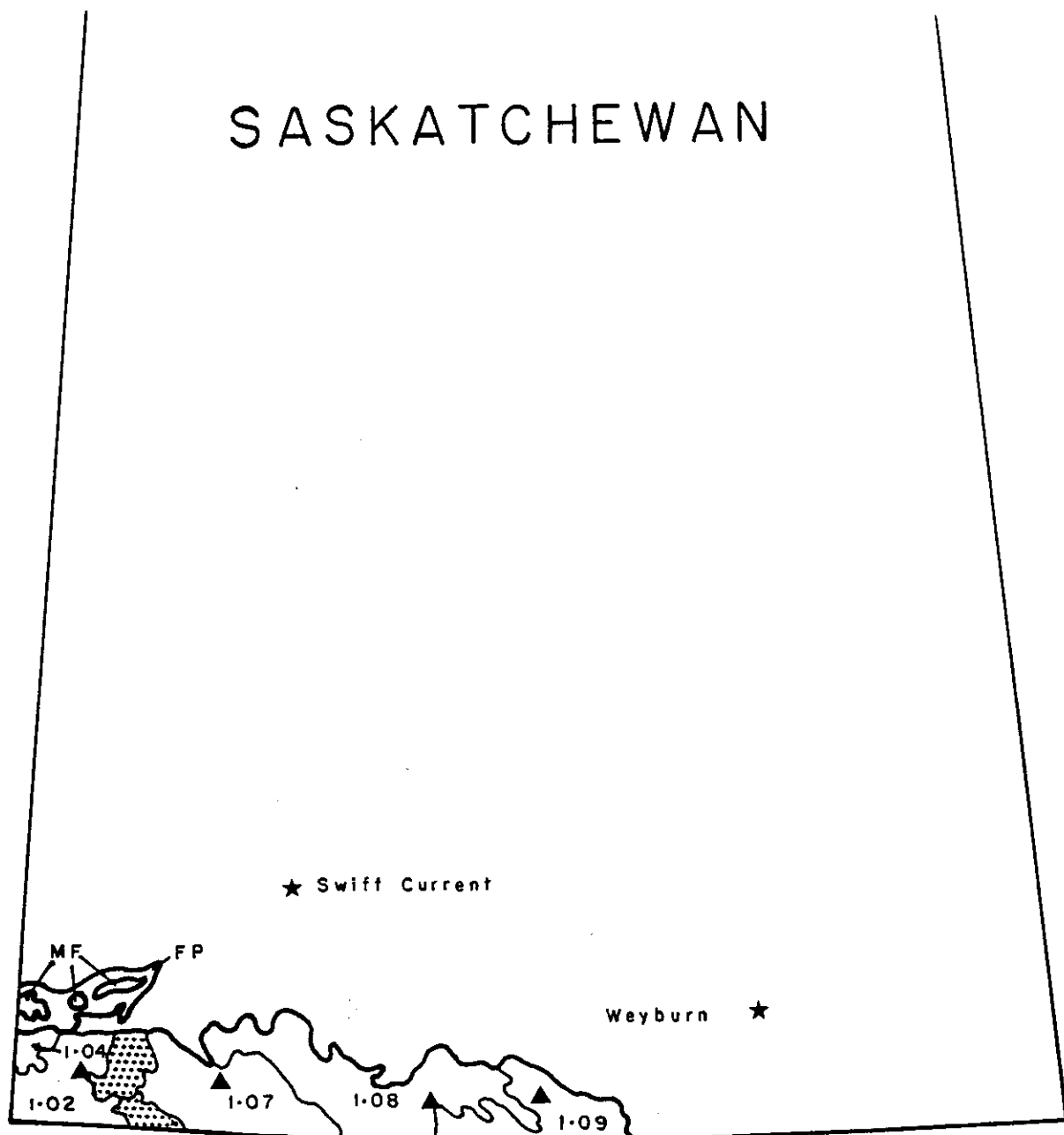


Table 1. Distribution of Habitat Sampling Relative to the Entire Saskatchewan Shortgrass Prairie

	Area		
	No. of Units	In Hectares <sup>1</sup>	As Percentage of Entire Ecoregion
Sampled Physiographic Units	5 <sup>2</sup>	1,431,500	83.1
Unsampled Physiographic Units	2	130,400	7.6
Areas Not Included in Physiographic Units			
- River and Stream Valleys	-	154,100	9.0
- Lakes <sup>3</sup>	-	5,900	0.3
- Urban Areas <sup>3</sup>	-	0	0.0
Total Saskatchewan Shortgrass Prairie Ecoregion	7	1,721,900	100

1. To the nearest 100 hectares.
2. Including one unit, totalling 43,700 hectares or 2.5 percent of Saskatchewan Shortgrass Prairie, which is sampled in the Alberta portion of that unit.
3. Larger than 500 hectares.

Table 2. Distribution of Landforms in Saskatchewan Shortgrass Prairie

Origin of Parent Material <sup>1</sup>	Surface Form <sup>1</sup>	Area in Hectares <sup>2</sup>			Percent of Sampling Effort in Landform Category
		Sampled Units <sup>3</sup>	Unsampled Units <sup>3</sup>	Total <sup>4</sup>	
Morainal	Undulating	555,100 (100)	-	555,100 (35.5)	40.0
	Rolling	505,600 (100)	-	505,600 (32.4)	20.0
	Dissected	370,800 <sup>5</sup> (100)	-	370,800 (23.7)	40.0
	Knob & Kettle	-	87,300 (100)	87,300 (5.6)	0.0
	Hummocky	-	43,100 (100)	43,100 (2.8)	0.0
Total Morainal		1,431,500 (91.7)	130,400 (8.3)	1,561,900 (100)	100
Total for Ecoregion		1,431,500 (91.7)	130,400 (8.3)	1,561,900 (100)	100

1. Listed by primary category only.

2. To the nearest 100 hectares.

3. Figure in parentheses is the percent the indicated area is of the total area of that landform category.

4. Figure in parentheses is the percent each landform category is of the total area in physiographic units in the ecoregion.

5. Including one unit in the Alberta portion of that unit.

Table 3. Physiographic Units Covered in This Report

Unit Number	Name	Landform Character <sup>1,2</sup>			Transect <sup>3</sup>
		Origin of Parent Material	Surface Form		
1.02	Sage Creek Plain	Morainal * Fluvial	Undulating		Consul
1.04	Lodge Benchland	Morainal	Dissected * Hummocky * Blanket Veneer		Sampled in Alberta
1.07	Frenchman River Plain	Morainal * Fluvial	Undulating		Climax
1.08	Wood Mountain Plateau	Morainal (Undifferentiated)	Rolling * Dissected * Undulating		Kildeer
1.09	Poplar River Plain	Morainal (Undifferentiated)	Dissected * Rolling		Fife Lake

1. Based primarily on data from "A Regional Map Base for a Migratory Bird Habitat Inventory Prairie Provinces" G.D. Adams, revised Oct. 25, 1985.

2. Secondary categories following \* are a significant component while those in parentheses are of minor importance.

3. The sample size in all transects is 24 quarter sections.



Table 4. Physiographic Units in Saskatchewan Shortgrass Prairie Which Have Not Been Sampled

Unit Number	Name	Landform Character <sup>1,2</sup>		Area in <sup>3</sup> Hectares
		Origin of Parent Material	Surface Form	
1.05	Outlaw Coulee Upland	Morainal	Knob & Kettle	87,300
1.06	Boundary Plateau	Morainal (Fluvial)	Hummocky (Level)	43,100
TOTAL				130,400

1. Based primarily on data from "A Regional Map Base for a Migratory Bird Habitat Inventory Prairie Provinces", G.D. Adams, revised Oct. 25, 1985.

2. Secondary categories enclosed in parentheses are of minor importance.

3. To the nearest 100 hectares.

Table 5. Size of Monitoring Samples in Relation to Physiographic Units

Unit Number	Name <sup>1</sup>	Area in Hectares		Percentage that Sample is of Unit Area
		Unit <sup>2</sup>	Sample	
1.02	Sage Creek Plain (24)	216,700 <sup>3,4</sup>	1,579	0.5 <sup>7</sup>
1.04	Lodge Benchland (24)	43,700 <sup>3,5</sup>	1,583 <sup>6</sup>	1.0 <sup>7</sup>
1.07	Frenchman River Plain (24)	338,400	1,588	0.5
1.08	Wood Mountain Plateau (24)	505,600	1,573	0.3
1.09	Poplar River Plain (24)	327,100	1,594	0.5
Total for Ecoregion	Excluding 1.04 Including only Sask. portions of 1.02 & 1.04 Including all of 1.02 and 1.04	1,387,800	6,334	0.5
		1,431,500	7,917	0.6
		1,649,700	7,917	0.5

1. Figures in parentheses are the numbers of quarter sections in the samples.
2. To the nearest 100 hectares.
3. Saskatchewan portion of the unit only.
4. Total unit area, including Alberta portion, is 313,100 hectares.
5. Total unit area, including Alberta portion, is 165,500 hectares.
6. Unit sample is in Alberta.
7. Percentage of entire unit, including Alberta portion.

Table 6. Land Area Occupied by Wetlands and Uplands

Physio- graphic Unit	Transect <sup>1</sup>	Sample Size (in ha)	Percent of Total Sample			
			Total	Wetlands Uncultivated	Cultivated	Uplands
	<u>(Morainal - U)</u>					
1.02	Consul	1,579	1.6	1.3	0.3	98.4
1.07	Climax	1,588	4.0	2.5	1.5	96.0
	<u>(Morainal - M)</u>					
1.08	Kildeer	1,573	1.4	1.3	0.1	98.6
	<u>(Morainal - D)</u>					
1.09	Fife Lake	1,594	0.4	0.4	T <sup>2</sup>	99.6
Ecoregion Sample		6,334	1.9	1.4	0.5	98.1

1. Transects are grouped by landform (parent soil material and surface form). Letters identifying surface forms in this and subsequent tables are as follows: U - Undulating, M - Rolling, D - Dissected.

2. T = trace = less than 0.05 percent.

Table 7. Distribution of Wetland Area in Various Cover Classes

Physio- graphic Unit	Transect <sup>1</sup>	Total Wetland Area in Sample (in ha)	Percent of Total Wetland Area in Cover Class										
			Cultiv- ated	Willows and Trees	Grasses and Sedges	Bulrush/ Cattail	Trans- itional Open Water	Natural Open Water	Artif- icial Open Water	Saline Open Water	Other		
	<u>(Morainal - U)</u>												
1.02	Consul	25	18.1	0.0	78.1	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0
1.07	Climax	64	37.8	0.0	60.3	0.0	0.0	0.0	T <sup>2</sup>	1.5	0.0	0.0	0.4
	<u>(Morainal - M)</u>												
1.08	Kildeer	22	6.4	0.0	89.3	1.1	0.0	0.0	T	3.2	0.0	0.0	T
	<u>(Morainal - D)</u>												
1.09	Fife Lake	7	7.1	0.0	82.2	T	0.0	0.0	3.6	7.1	0.0	0.0	T
Ecoregion Sample		118	26.0	0.0	70.8	0.2	0.0	0.0	0.3	2.4	0.0	0.0	0.3

1. Grouped by landform (parent soil material and surface form).

2. T = trace = less than 0.05 percent.

Table 8. Wetland Density/Distribution of Wetland Numbers in Various Cover Classes

Physio- graphic Unit	Total Number of Wetlands in Sample	Mean Density Per Quarter Section	Percent of Total Wetland Numbers in Cover Class										
			Culti- vated	Willows and Trees	Grasses and Sedges	Bulrush and Cattail	Trans- itional Water	Natural Open Water	Artif- icial Open Water	Saline Open Water	Other		
<u>(Morainal - U)</u>													
1.02	44	1.8	31.7	0.0	52.5	0.0	0.0	0.0	0.0	0.0	15.8	0.0	0.0
1.07	145	6.0	45.5	0.0	46.8	0.0	0.0	0.0	0.7	7.0	0.0	0.0	0.0
<u>(Morainal - M)</u>													
1.08	51	2.1	19.7	0.0	56.8	0.0	0.0	0.0	0.0	0.0	15.5	0.0	8.0
<u>(Morainal - D)</u>													
1.09	71	3.0	16.9	0.0	71.8	1.4	0.0	0.0	1.4	7.1	0.0	0.0	1.4
Ecoregion Sample	311	3.2	32.8	0.0	55.1	0.3	0.0	0.0	0.6	9.6	0.0	0.0	1.6

1. Grouped by landform (parent soil material and surface form).

Table 9. Distribution of Wetland Area in Various Land Use Activity Classes

Physio-graphic Unit	Transect <sup>1</sup>	Total Wetland Area in Sample (in ha)	Percent of Total Wetland Area in Land Use Activity Class					
			No Use	Abandoned Cultivation	Annual Crop	Haying	Grazing	Other
	<u>(Morainial - U)</u>							
1.02	Consul	25	4.8	0.0	18.1	0.0	77.1	0.0
1.07	Climax	64	43.8	3.0	37.8	0.4	12.7	2.3
	<u>(Morainial - M)</u>							
1.08	Kildeer	22	1.1	0.0	6.4	0.0	92.5	0.0
	<u>(Morainial - D)</u>							
1.09	Fife Lake	7	24.1	10.4	6.9	0.0	55.2	3.4
Ecoregion Sample		118	26.0	2.5	26.0	0.2	44.0	1.3

1. Grouped by landform ( parent soil material and surface form).

Table 10. Wetlands Affected by One or More Permanent Impacts

Physio- graphic Unit	Transect <sup>1</sup>	Mean Number of Wetlands/Quarter		Percent of Wetlands Impacted
		Total	Affected by One or More Impacts	
	<u>(Morainal - U)</u>			
1.02	Consul	1.8	0.7	38.9
1.07	Climax	6.0	2.4	40.0
	<u>(Morainal - M)</u>			
1.08	Kildeer	2.1	1.0	47.6
	<u>(Morainal - D)</u>			
1.09	Fife Lake	3.0	1.0	33.3
Ecoregion Sample		3.2	1.2	37.5

1. Grouped by landform (parent soil material and surface form).

Table 11. Occurrence of Streams in Data Samples

Physio- graphic Unit	Transect <sup>1</sup>	Number of Quarters In Sample	Number of Quarters Containing Streams	Percent of Quarters Containing Streams
	<u>(Morainal - U)</u>			
1.02	Consul	24	2	8.3
1.07	Climax	24	0	0.0
	<u>(Morainal - M)</u>			
1.08	Kildeer	24	6	25.0
	<u>(Morainal - D)</u>			
1.09	Fife Lake	24	4	16.7
Ecoregion Sample		96	12	12.5

1. Grouped by landform (parent soil material and surface form).



Table 12. Distribution of Upland Cover Classes

Physio-graphic Unit	Trausect <sup>1</sup>	Total Upland Area (in ha)	Percent of Total Upland in Cover									
			Native					Planted				
			Grass	Low Shrub	Tall Shrub	Trees	Total	Annual <sup>2</sup> Crops	Perennial Grass & Forbs	Trees & Shrubs	Other	
<u>(Morainal - U)</u>												
1.02	Consul	1,554	32.7	T <sup>3</sup>	0.0	T	32.7	54.8	12.3	0.2	T	
1.07	Climax	1,524	6.0	T	T	6.0	90.7	1.8	0.7	0.8		
<u>(Morainal - M)</u>												
1.08	Kildeer	1,550	31.4	6.6	T	T	38.0	51.4	10.4	T	0.2	
<u>(Morainal - U)</u>												
1.09	Fife Lake	1,587	15.3	1.2	T	T	16.5	79.3	3.1	0.5	0.6	
Ecoregion Sample			6,215	21.4	2.0	T	23.4	69.0	6.9	0.3	0.4	

1. Grouped by landform (parent soil material and surface form).

2. Includes summerfallow.

3. T = trace = less than 0.05 percent.

Table 13. Distribution of Upland Land Use Activity Classes

Physio- graphic Unit	Transect <sup>1</sup>	Total Upland Area (in ha)	Percent of Total Upland Area in Land Use Activity							
			Unused	Abandoned	Annual Crops <sup>2</sup>	Forage	Grazing steads	Farm- Roads & Railways	Other	
	<u>(Morainal - U)</u>									
1.02	Consul	1,554	0.5	0.3	54.8	0.3	41.4	T <sup>3</sup>	2.7	T
1.07	Climax	1,524	2.6	0.3	90.7	T	2.6	1.6	2.2	T
	<u>(Morainal - M)</u>									
1.08	Kildeer	1,550	0.5	0.2	51.4	2.5	42.3	0.1	3.0	T
	<u>(Morainal - D)</u>									
1.09	Fife Lake	1,587	1.4	0.4	79.3	0.0	15.5	1.2	2.0	0.2
Ecoregion Sample		6,215	1.2	0.3	69.0	0.7	25.5	0.7	2.5	0.1

1. Grouped by landform (parent soil material and surface form).
2. Includes summerfallow.
3. T = trace = less than 0.05 percent.

Table 14. Examples of Variability in Wetland Cover Data

Physio- graphic Unit	Transect <sup>1</sup>	Area in Hectares Per Quarter Section													
		Cultivated					Willows								
		Mean	S.E. <sup>2</sup>	C.V. <sup>3</sup>	Mean	S.E.	C.V.	Mean	S.E.	C.V.	C.V.				
	<u>(Morainal - U)</u>														
1.02	Consul	0.19	0.03	0.86	0.82	1.03	6.13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.07	Climax	1.01	0.65	3.18	1.61	0.56	1.69	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	<u>(Morainal - M)</u>														
1.08	Kildeer	0.06	0.01	0.85	0.84	0.72	4.21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	<u>(Morainal - D)</u>														
1.09	Fife Lake	0.02	0.00	0.07	0.23	0.03	0.66	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ecoregion Sample	0.32	0.10	3.10	0.87	0.31	3.44	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1. Grouped by landform (parent soil material and surface form).

2. S.E. = Standard Error

3. C.V. = Coefficient of Variation

Table 15. Examples of Variability in Upland Cover Data

Physio- graphic Unit	Transect <sup>1</sup>	Area in Hectares Per Quarter Section													
		Cropland			Native Grass			Native Trees							
		Mean	S.E. <sup>2</sup>	C.V. <sup>3</sup>	Mean	S.E.	C.V.	Mean	S.E.	C.V.					
	<u>(Morainal - U)</u>														
1.02	Consul	35.50	180.72	24.94	21.15	126.46	29.29	0.00	0.00	0.02					
1.07	Climax	57.56	13.26	1.13	3.84	9.46	12.08	0.01	0.00	0.18					
	<u>(Morainal - M)</u>														
1.08	Kildeer	33.22	127.98	18.88	20.25	84.49	20.44	0.00	0.00	0.03					
	<u>(Morainal - D)</u>														
1.09	Fife Lake	52.39	71.90	6.72	10.14	36.30	17.55	0.01	0.00	0.15					
Ecoregion Sample		44.67	59.05	12.95	13.84	36.45	25.80	6.35e-3	8.98e-5	0.14					

1. Grouped by landform (parent soil material and surface form).

2. S.E. = Standard Error

3. C.V. = Coefficient of Variation

Table 16. Examples of Variability in Upland Land Use Data

Physio- graphic Unit	Transect <sup>1</sup>	Area in Hectares Per Quarter Section											
		Unused			Grazing			Roads & Railways					
		Mean	S.E. <sup>2</sup>	C.V. <sup>3</sup>	Mean	S.E.	C.V.	Mean	S.E.	C.V.			
	(Morainal - U)												
1.02	Consul	0.33	0.21	3.08	26.81	177.16	32.38	1.70	0.12	0.36			
1.07	Climax	1.62	3.56	10.77	1.64	6.34	18.90	1.39	0.11	0.39			
	(Morainal - M)												
1.08	Kildeer	0.31	0.16	2.54	27.36	127.58	22.85	1.94	0.14	0.35			
	(Morainal - D)												
1.09	Fife Lake	0.95	0.43	2.21	10.29	72.65	34.58	1.31	0.19	0.71			
Ecoregion Sample		0.80	0.56	6.81	16.52	58.91	34.93	1.58	0.07	0.46			

1. Grouped by landform (parent soil material and surface form).

2. S.E. = Standard Error

3. C.V. = Coefficient of Variation

Table 17. Estimated Area of Wetland Cover Classes in Physiographic Units

Physiographic Unit <sup>1</sup> Number	Name	Estimated Area in Thousands of Hectares											
		Total Wetland Area	Cult- ivated	Willows and Trees	Grasses and Sedges	Bulrush/ and Cattail	Trans- itional Open Water	Natural Open Water	Artif- icial Open Water	Saline Open Water	Other		
(Morainal - U)													
1.02	Sage Creek Plain	3.4	0.6	0.0	2.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
1.07	Frenchman River Plain	13.6	5.1	0.0	8.2	0.0	0.0	0.0	T <sup>2</sup>	0.2	0.0	0.1	
(Morainal - M)													
1.08	Wood Mountain Plateau	7.2	0.5	0.0	6.4	0.1	0.0	0.0	0.2	0.0	0.0	T	
(Morainal - D)													
1.09	Poplar River Plain	1.4	0.1	0.0	1.2	T	0.0	0.0	0.1	0.0	0.0	T	
1.04	Lodge Benchland	1.8	0.5	0.0	1.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Total Morainal <sup>3</sup>		27.4	6.8	0.0	19.7	0.1	0.0	0.0	T	0.7	0.0	0.1	
Total Morainall <sup>4</sup>		25.6	6.3	0.0	18.5	0.1	0.0	0.0	T	0.6	0.0	0.1	
Total for Entire Sampled A <sup>5</sup>		27.4	6.8	0.0	19.7	0.1	0.0	0.0	T	0.7	0.0	0.1	
Portion of Ecoregion A <sup>6</sup>		25.6	6.3	0.0	18.5	0.1	0.0	0.0	T	0.6	0.0	0.1	
B <sup>7</sup>		26.0	6.7	0.0	18.4	0.1	0.0	0.0	0.1	0.6	0.0	0.1	

1. Grouped by landform (parent soil material and surface form).

2. T = trace = less than 50 hectares.

3. Summation of values from individual units including 1.04 in which the data sample is located in the Alberta portion of the unit.

4. Summation of values from individual units excluding 1.04.

5. Based on summation of values from individual physiographic units including 1.04.

6. Based on summation of values from individual physiographic units excluding 1.04.

7. Based on the analysis of the ecoregion sample as a single unit excluding 1.04.

Table 18. Estimated Numbers of Wetland Cover Classes in Physiographic Units

Physiographic Unit <sup>1</sup> Number	Name	Estimated Number of Wetlands (in Thousands)										
		Total Number of Wetlands	Cult- ivated	Willows and Trees	Grasses and Sedges	Bulrush/ Cattail	Trans- itional Open Water	Natural Open Water	Artif- icial Open Water	Saline Open Water	Other	
<u>(Morainal - U)</u>												
1.02	Sage Creek Plain	6.0	1.9	0.0	3.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.07	Frenchman River Plain	30.9	14.0	0.0	14.5	0.0	0.0	0.2	2.2	0.0	0.0	0.0
<u>(Morainal - M)</u>												
1.08	Wood Mountain Plateau	16.4	3.2	0.0	9.3	0.0	0.0	0.0	2.6	0.0	0.0	1.3
<u>(Morainal - D)</u>												
1.09	Poplar River Plain	14.6	2.5	0.0	10.5	0.2	0.0	0.2	1.0	0.0	0.0	0.2
1.04	Lodge Benchland	2.8	0.3	0.0	2.2	0.0	0.0	0.0	0.3	0.0	0.0	T <sup>2</sup>
Total Morainal <sup>3</sup>		70.7	21.9	0.0	39.7	0.2	0.0	0.4	7.0	0.0	0.0	1.5
Total Morainall <sup>4</sup>		67.9	21.6	0.0	37.5	0.2	0.0	0.4	6.7	0.0	0.0	1.5
Total for Entire Sampled A <sup>5</sup>		70.7	21.9	0.0	39.7	0.2	0.0	0.4	7.0	0.0	0.0	1.5
Portion of Ecoregion A <sup>6</sup>		67.9	21.6	0.0	37.5	0.2	0.0	0.4	6.7	0.0	0.0	1.5
B <sup>7</sup>		68.1	22.4	0.0	37.5	0.2	0.0	0.4	6.5	0.0	0.0	1.1

1. Grouped by landform (parent soil material and surface form).

2. T = trace = less than 50 hectares.

3. Summation of values from individual units including 1.04 in which the data sample is located in the Alberta portion of the unit.

4. Summation of values from individual physiographic units excluding 1.04.

5. Based on summation of values from individual physiographic units including 1.04.

6. Based on summation of values from individual physiographic units excluding 1.04.

7. Based on the analysis of the ecoregion sample as a single unit excluding 1.04.

Table 19. Estimated Area of Wetland Use Activity Classes in Physiographic Units

Physiographic Unit <sup>1</sup> Number	Name	Estimated Area in Thousands of Hectares						
		Total Wetland Area	No Use	Abandoned Cultivation	Annual Crops	Haying	Grazing	Other
<u>(Morainal - U)</u>								
1.02	Sage Creek Plain	3.4	0.2	0.0	0.6	0.0	2.6	0.0
1.07	Frenchman River Plain	13.6	6.0	0.4	5.1	0.1	1.7	0.3
<u>(Morainal - M)</u>								
1.08	Wood Mountain Plateau	7.2	0.1	0.0	0.4	0.0	6.7	0.0
<u>(Morainal - D)</u>								
1.09	Poplar River Plain	1.4	0.3	0.2	0.1	0.0	0.8	T <sup>2</sup>
1.04	Lodge Benchland	1.8	T	T	0.5	0.0	1.2	0.1
Total Morainal <sup>3</sup>		27.4	6.6	0.6	6.7	0.1	13.0	0.4
Total Morainall <sup>4</sup>		25.6	6.6	0.6	6.2	0.1	11.8	0.3
Total for Entire Sampled A <sup>5</sup>		27.4	6.6	0.6	6.7	0.1	13.0	0.4
Portion of Ecoregion A <sup>6</sup>		25.6	6.6	0.6	6.2	0.1	11.8	0.3
B <sup>7</sup>		26.0	6.8	0.6	6.8	0.1	11.4	0.3

1. Grouped by landform (parent soil material and surface form).
2. T = trace = less than 50 hectares.
3. Summation of values from individual units including 1.04 in which the data sample is located in the Alberta portion of the unit.
4. Summation of values from individual physiographic units excluding 1.04.
5. Based on summation of values from individual physiographic units including 1.04.
6. Based on summation of values from individual physiographic units excluding 1.04.
7. Based on the analysis of the ecoregion sample as a single unit excluding 1.04.



Table 20. Estimated Area of Upland Cover Classes in Physiographic Units

Physiographic Unit <sup>1</sup> Number	Estimated Area in Thousands of Hectares										
	Native					Planted					
	Total Upland Area	Grass	Shrub	Low Tall Shrub	Trees	Total	Annual Crops	Perennial Grasses and Forbs	Trees and Shrubs	Other	
<u>(Morainal - U)</u>											
1.02	Sage Creek Plain	213.3	69.8	T <sup>2</sup>	0.0	T	69.8	116.9	26.2	0.4	T
1.07	Frenchman River Plain	324.8	19.5	T	T	T	19.5	294.6	5.8	2.3	2.6
<u>(Morainal - M)</u>											
1.08	Wood Mountain Plateau	498.4	156.5	32.9	T	T	189.4	256.2	51.8	T	1.0
<u>(Morainal - D)</u>											
1.09	Poplar River Plain	325.7	49.8	3.9	T	T	53.7	258.3	10.1	1.6	2.0
1.04	Lodge Benchland	41.9	34.5	T	0.0	0.0	34.5	6.7	0.3	0.1	0.3
Total Morainal <sup>3</sup>		1,404.1	330.1	36.8	T	T	366.9	932.7	94.2	4.4	5.9
Total Morainall <sup>4</sup>		1,362.2	295.6	36.8	T	T	332.4	926.0	93.9	4.3	5.6
Total for Entire Sampled A <sup>5</sup>		1,404.1	330.1	36.8	T	T	366.9	932.7	94.2	4.4	5.9
Portion of Ecoregion A <sup>6</sup>		1,362.2	295.6	36.8	T	T	332.4	926.0	93.9	4.3	5.6
B <sup>7</sup>		1,361.8	291.4	27.2	T	T	318.6	939.7	94.0	4.1	5.4

1. Grouped by landform (parent soil material and surface form).
2. T = trace = less than 50 hectares.
3. Summation of values from individual units including 1.04 in which the data sample is located in the Alberta portion of the unit.
4. Summation of values from individual physiographic units excluding 1.04.
5. Based on summation of values from individual physiographic units including 1.04.
6. Based on summation of values from individual physiographic units excluding 1.04.
7. Based on the analysis of the ecoregion sample as a single unit excluding 1.04.

Table 21. Estimated Area of Upland Land Use Activity Classes in Physiographic Units

Physiographic Unit Number	Name	Estimated Area in Thousands of Hectares									
		Total Upland Area	Unused	Abandoned	Annual Crops	Forage	Grazing	Farm- steads	Roads and Railways	Other	
<u>(Morainal - U)</u>											
1.02	Sage Creek Plain	213.3	1.1	0.6	116.9	0.6	88.3	T <sup>2</sup>	5.8	T	
1.07	Frenchman River Plain	324.8	8.4	1.0	294.6	T	8.4	5.2	7.2	T	
<u>(Morainal - M)</u>											
1.08	Wood Mountain Plateau	498.4	2.5	1.0	256.2	12.5	210.8	0.5	14.9	T	
<u>(Morainal - D)</u>											
1.09	Poplar River Plain	325.7	4.6	1.3	258.2	0.0	50.5	3.9	6.5	0.7	
1.04	Lodge Benchland	41.9	0.3	0.2	6.7	0.1	33.5	0.1	1.0	T	
Total Morainal <sup>3</sup>		1,404.1	16.9	4.1	932.6	13.2	391.5	9.7	35.4	0.7	
Total Morainall <sup>4</sup>		1,362.2	16.6	3.9	925.9	13.1	358.0	9.6	34.4	0.7	
Total for Entire Sampled A <sup>5</sup>		1,404.1	16.9	4.1	932.6	13.2	391.5	9.7	35.4	0.7	
Portion of the Ecoregion A <sup>6</sup>		1,362.2	16.6	3.9	925.9	13.1	358.0	9.6	34.4	0.7	
B <sup>7</sup>		1,361.8	16.3	4.1	939.7	9.5	347.2	9.5	34.1	1.4	

1. Grouped by landform (parent soil material and surface form).
2. T = trace = less than 50 hectares.
3. Summation of values from individual units including 1.04 in which the data sample is located in the Alberta portion of the unit.
4. Summation of values from individual physiographic units excluding 1.04.
5. Based on summation of values from individual physiographic units including 1.04.
6. Based on summation of values from individual physiographic units excluding 1.04.
7. Based on the analysis of the ecoregion sample as a single unit excluding 1.04.

Table 22. Rating of Sampled MORAINAL Physiographic Units in Saskatchewan Shortgrass Prairie as Waterfowl Production Habitat

Physiographic Unit <sup>1</sup> Number	Name	Percent of Wetland Area					Percent of Upland Area		Area of Rating as Unit in Waterfowl 1000's of Production Hectares	Rating as Unit in Waterfowl Production Habitat <sup>2</sup>
		In Cover Class		Native and Seeded Grass and Shrub Cover			That is Unused			
Percent of Total Unit Area in Wetlands		Grass	Cattail	Natural Fresh Open Water	That is Unused	In Native and Seeded Grass and Shrub Cover	That is Unused			
1.04	Lodge Benchland	4.2	63.6	0.0	0.7	83.0	0.6	43.7 <sup>4</sup>	4*/4*/4*/4*/4*	
1.07	Frenchman River Plain	4.0	60.3	0.0	T <sup>5</sup>	7.8	2.6	338.4	3*/4*/4*/4*/4*	
1.02	Sage Creek Plain	1.6	78.1	0.0	0.0	45.0	0.5	216.7 <sup>4</sup>	4*/4*/4*/4*/4*	
1.08	Wood Mountain Plateau	1.4	89.3	1.1	T	48.4	0.5	505.6	3 /4*/3 /4*/4*	
1.09	Poplar River Plain	0.4	82.2	T	3.6	19.6	1.4	327.1	2 /4*/3 /4 /4*	

1. Physiographic units are arranged in order of diminishing proportion of wetland area in the landscape.
2. Five waterfowl production ratings have been calculated for each unit using the minimum rating values for, sequentially, Saskatchewan Shortgrass Prairie / Saskatchewan Mixedgrass Prairie / Alberta Mixedgrass Prairie / Alberta Parkland / Saskatchewan Parkland. Asterisks indicate ratings which have been downgraded because of loss of points for both bulrush/cattail natural fresh open water.
3. Sampled in the Alberta portion of the unit.
4. Area in Saskatchewan only.
5. T = trace = less than 0.05 percent.

Table 23. Frequency of Land Use/ Cover Changes Between May 1985 and Time of Ground Truth Survey

Physio-graphic Unit	Transect <sup>1</sup>	Numbers of Quarters <sup>2</sup>		Percent of Quarters Affected	Time Interval from May 1985 to Ground Truth Survey (in months)
		In Sample	Affected by Land Use/ Cover Changes		
	<u>(Morainial - U)</u>				
1.02	Consul	24	5	20.8	62
1.07	Climax	24	4	16.7	63
	<u>(Morainial - M)</u>				
1.08	Kildeer	24	6	25.0	61
	<u>(Morainial - D)</u>				
1.09	Fife Lake	24	8	33.3	61
Ecoregion Sample		96	23	24.0	

1. Grouped by landform (parent soil material and surface form).