

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

Report #8: Saskatchewan Mixedgrass Prairie
Prairie Habitat Monitoring Project

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ABSTRACT

This report presents data for 25 transects in 18 physiographic units in the Saskatchewan Mixedgrass Prairie. Two additional units have been sampled (one transect each) in the Alberta portions of those units. Collectively these 20 units account for just over two thirds (67.8 percent) 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 very close to the level of occurrence of most of those categories within the Saskatchewan Mixedgrass Prairie.

For the ecoregion sample as a whole:

(a) The distribution of sampling on various soil parent materials and surface forms covers all but fluvial landforms. Eleven of the sampled physiographic units are on morainal material, 12 are on lacustrine and two on eolian terrain.

(b) Wetland area averages 6.8 percent of the total land area of sampled physiographic units. This is higher than that recorded for any of the Alberta grassland ecoregions but lower than that recorded for Saskatchewan or Alberta Parklands.

(c) An overwhelming proportion of wetland area (85.5 percent) and wetland numbers (91.4 percent) are temporary or seasonal in

nature. Almost half of wetland area and numbers are cultivated.

(d) Only 7.4 percent of the wetland area and 1.6 percent of wetland numbers are classed as permanent water (natural, fresh open water). These figures are only slightly less than the averages recorded for Saskatchewan Parkland.

(e) Almost one third of the wetland area is not subjected to any human use. Grazing occurs on only 15.6 percent of the wetland area, the second lowest level to date.

(f) Annual crops occupy 86.4 percent of the total upland area. This is the highest level of cropping recorded to date. Native cover occupies 10.1 percent of the upland, only one third of the level recorded for Alberta Mixedgrass Prairie.

(g) Grazing occurs on 7.2 percent of the uplands compared to 27.8 percent in Alberta Mixedgrass Prairie.

(h) One physiographic unit, the Missouri Coteau, is rated as having the best habitat for waterfowl production in the sampled portion of the morainal portion of the ecoregion. Significantly it retains its level one rating when rated using criteria levels for Alberta Mixedgrass Prairie, and both Alberta and Saskatchewan Parklands. Three other units are rated as level three's and two of those retain that rating when compared against parkland criteria levels. All other sampled morainal Mixedgrass Prairie units are bottom-rated as fours although five of them, along with three other units, do show improved rating when rated using Alberta Mixedgrass Prairie criteria levels. Lack of semi-permanent or permanent wetlands throughout the ecoregion is a significant factor in the

low rating as waterfowl production habitat which is given to most morainal units.

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

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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 1992). In this report only methodology relating specifically to the Saskatchewan Mixedgrass Prairie will be discussed.

A. Delineation of Physiographic Units

Changes in unit boundaries from those delineated by Adams (1985) - All physiographic units in Saskatchewan Mixedgrass Prairie have been remapped and most now have some significantly different boundaries from those delineated by Adams.

Creation and deletion of physiographic units - In Saskatchewan Mixedgrass Prairie ten physiographic units have either been created or deleted. Six of these are new units created on the basis of obvious differences in topography and/or soil parent material.

These units and their original status in Adams (1985) are as follows:

Snakebite Plain (2.77) - originally part of Kindersley Plain (2.68);

Saskatchewan-Qu'Appelle River Plain (2.78) - originally part of Tuxford Plain (2.59) and Brightwater Creek Plain (2.74);

Caron Plain (2.79) - originally part of Regina Plain (2.58) and Missouri Coteau (2.55);

Avonlea Plain (2.80) - originally part of Long Creek Plain (2.59);

Coteau Slope (2.81) - originally part of Long Creek Plain (2.59);

Arm River Plain (2.82) - originally part of Upper Qu'Appelle Plain (2.75).

Initially I placed this unit in the Saskatchewan Parkland as #4.87 (Millar 1989b) but, following parkland boundary surveys in 1991, decided that it more properly belonged in the Mixedgrass Prairie.

Four units have been deleted and all are stream valleys to which Adams, in a deviation from his usual procedure, assigned habitat subregion status. They are as follows: Conglomerate Creek Valley (2.44), Swift Current Creek Valley (2.45), Pinto-Lynthorpe Creek Valley (2.50) and Willow Bunch - Big Muddy Valley (2.53). The areas of these valleys have been included in the figure for river and stream valleys.

B. Sampling Network

Eleven of the 25 transects located in the Saskatchewan Mixedgrass Prairie are the product of transect splitting. This has involved one split into two sub-units of the same mixedgrass unit, four splits into two mixedgrass units and one split between mixedgrass and parkland.

Data from transects located in the Alberta portions of units 2.01 and 2.33 are also included in parts of this report. In the case of unit 2.33 (Oyen Upland South) the transect data used is from the Oyen transect in Oyen Upland North (4.94) in Alberta Parkland. These two units were originally considered one unit by Adams and are similar in topography and land use, differing only in the presence of aspen groves in Oyen Upland North. This vegetational difference must be taken into account in applying the data to Oyen Upland South.

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

Minimum rating values for Saskatchewan Mixedgrass Prairie - For each of seven habitat factors one point is given if the value for the unit exceeds a designated minimum. Minimums, with one exception, 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 Mixedgrass Prairie are as follows:

1. Total wetland area - 6.3 percent of total land area.
2. Grassy wetland cover - 45 percent of total wetland area.
3. Bulrush/cattail cover - 5.2 percent of total wetland area.
4. Natural fresh open water wetlands - 10 percent of total wetland area (one aberrantly large value [Table 22] was not included in calculating this minimum).
5. Unused wetlands - 35 percent of total wetland area.
6. Shrubby and grassy upland cover - 16 percent of total upland area.
7. Unused uplands - 4.4 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:

<u>Number of Points Given the Unit</u>	<u>Rating</u>
6 - 7	1
4 - 5	2
2 - 3	3
0 - 1	4

IV. Results and Discussion

A. General Information on the Saskatchewan Mixedgrass Prairie

1. Ecoregion Area and Distribution of Sampled Units

The total area occupied by the Saskatchewan Mixedgrass Prairie is calculated to be approximately 9,949,600 hectares (Table 1),

based on the boundaries of physiographic units lying wholly or predominantly within the ecoregion. The area calculated in this manner will differ somewhat from the area of the ecoregion when calculated on the basis of surveyed and redefined vegetation boundaries. A comparison of these values still needs to be made.

Twenty physiographic units which have been sampled with habitat monitoring transects, including two which have been sampled in the Alberta portions of the units, account for just over two thirds (67.8 percent) of the total area of the ecoregion (Table 1) while unsampled units cover 24.4 percent of the area. Major river and stream valleys as well as lakes and urban areas larger than 500 hectares have been excluded from the area of physiographic units and collectively comprise 7.8 percent of the total area of the ecoregion.

2. Distribution of Landforms in the Ecoregion

The distribution of various landforms in Saskatchewan Mixedgrass Prairie is summarized in Table 2. Morainal terrain occupies just under half (47.3 percent) of the total area of physiographic units in the ecoregion and 74.1 percent of that area is in units currently being sampled in this study. Less than half (43.7 percent) of the morainal area is made up of knob and kettle surface form, undulating ground moraine accounts for 23.5 percent and hummocky terrain 20.1 percent. Most (87.1 percent) of the knob and kettle terrain is in units which have been sampled while 85.4 percent of the undulating and 57.8 of the hummocky landforms have been sampled. Small areas of rolling moraine have not been

sampled.

Just over two fifths (41.6 percent) of the land in physiographic units is on predominantly lacustrine parent material. Most (86.4 percent) of this area is in units which have been sampled. Almost all (95.4 percent) of the lacustrine terrain has undulating topography and most (87.0 percent) of that is in units which have been sampled.

The remaining 11.1 percent of land in physiographic units is on a variety of eolian and fluvial landforms. Almost half (46.7 percent) of the eolian terrain is in units which have been sampled but none of the fluvial units has been sampled.

The distribution of habitat sampling between various parent material and landform categories is also shown in Table 2. For all morainal and lacustrine categories, except rolling morainal, the relationship between distribution of sampling effort and distribution of the category is very close. For example, knob and kettle terrain accounts for 20.7 percent of the total land area in physiographic units and 22.8 percent of our sampling effort is in that landform. Hummocky moraine and undulating ground moraine occur on 9.5 and 11.1 percent, respectively, of the total area in physiographic units and 11.3 and 11.6 percent, respectively, of our sampling is in those landforms. Undulating lacustrine terrain occurs on 39.7 percent of the total area in physiographic units and an identical percent of our sampling is in that landform. Sampling for all morainal categories collectively amounts to 49.7 percent of our total effort while those same categories occupy 47.3 percent of

the total land area in physiographic units in the ecoregion. Lacustrine landforms are also collectively sampled at only a marginally higher (43.7 percent) level than their occurrence (41.6 percent) in the landscape. Eolian categories have collectively been sampled at slightly more (6.6 percent) than the level of their presence (5.3 percent) in the ecoregion and fluvial units have not been sampled at all.

3. Location and Landform Character of Individual Physiographic Units

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

This report presents baseline habitat data for 25 sample sites in 18 physiographic units. In addition, partial data are also presented for two units which have been sampled in the Alberta portions of those units. Individual units and transects located in them are listed in Table 3. Collectively these 20 units comprise an area of approximately 6,743,400 hectares (Table 5) or about 67.8 percent of the total Saskatchewan Mixedgrass Prairie Ecoregion.

Origin of soil parent material and surface form for the 20 units are summarized in Table 3. Eleven of the units are entirely or predominantly of morainal origin. Eight are on lacustrine and one on eolian material. Five of the morainal units have predominantly knob and kettle landform, two are on undulating ground moraine, three are on hummocky material and one is on dissected morainal terrain. Seven of the lacustrine units are on

undulating and one is on dissected terrain. The one eolian unit has a dissected landform.

The 22 physiographic units in Saskatchewan Mixedgrass Prairie which have not been sampled to date are summarized in Table 4 as to their soil parent material, surface form and area. Eight of them are entirely or predominantly morainal in nature and six are on lacustrine material. Of the remaining eight, five are of fluvial origin and three are eolian.

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 0.2 percent of the Kindersley Plain to a high of 2.2 percent of the Mantario Plain. Overall sample size for the 20 units is 0.6 percent which is at the low end of the range of 0.6 to 1.1 percent recorded for all the other ecoregions reported on to date.

Fourteen of the 20 units contain sufficiently well-defined variations in surface form, including density and size distribution of wetlands, and soil parent material that they can be divided into two or more sub-units. In the Saskatchewan Mixedgrass Prairie this situation is most extreme in the Big Stick Lake Plain which has been divided into 11 sub-units. 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 substantial additional sampling in other significant sub-units.

Also, some of the existing transects do straddle sub-unit boundaries.

B. Sample Results

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 25 individual transects in Saskatchewan Mixedgrass Prairie there is a ten-fold variation (1.9 to 18.9) in the percent of total land area occupied by wetlands (Table 6). The highest value (18.9 percent) is due to the presence of one large partially drained lake-marsh complex. However, almost as high a wetland value (16.2 percent) occurs with a high density of smaller wetlands at Dummer in the Missouri Coteau.

i. Landform character and wetland area - Eleven of the 25 transects in Saskatchewan Mixedgrass Prairie are located on morainal terrain and in these total wetland area ranges from 4.1 to 16.2 percent. The range of wetland area on transects in knob and kettle moraine is appreciably higher (7.3 to 16.2 percent) than it is in transects on hummocky and undulating moraine (4.1 to 8.5 percent). In contrast, no obvious difference in wetland area between these two landforms was noted in Alberta Mixedgrass Prairie (Millar 1992b). The range in wetland area on the 12 lacustrine transects is the most extreme at 1.9 to 18.9 percent and on the two eolian transects it is 2.7 and 3.4 percent.

For the sampled portion of the ecoregion as a whole the percent of land area occupied by wetlands averages 6.8 which is higher than that recorded for any of the three Alberta grassland ecoregions (4.0 to 4.4 percent, Millar 1992b, 1992c and 1992d) but less than that recorded for either Saskatchewan or Alberta Parklands (9.5 and 9.9 percent, respectively, Millar 1989b, 1992a).

ii. Variability in wetland area between samples within the same physiographic unit - Seven of the 18 physiographic units sampled in the Saskatchewan Mixedgrass Prairie contain two transects. Four of these transect pairs have both members located in either an undivided unit or the same sub-unit of a physiographic unit which is divided into two or more sub-units. The expectation in such situations is that transects within the same relatively homogeneous sub-unit should have more comparable habitat values than those located in different sub-units. This does not hold true for Saskatchewan Mixedgrass Prairie. Differences in wetland area between members of transect pairs ranges from 1.0 to 7.1 percent for pairs located within the same sub-units and 0.7 to 11.9 percent for pairs with members located in different sub-units. Three out of four of the former values are larger than two out of three of the latter values. The maximum difference of 11.9 percent at Shamrock West is associated with the presence of the large partially drained lake-marsh complex referred to earlier.

iii. 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 0.3 percent at Swift Current to 17.8 percent at Shamrock West (Table 6) where 94 percent of the total wetland area (primarily the large lake-marsh complex) is cultivated. The percent of total land area in cultivated wetlands at Shamrock West is almost double the second highest value of 9.2 percent at Riceton but at Riceton 98 percent of the total wetland area is cultivated. In six of the 25 transects cultivated wetlands occupy less than one percent of the total landscape and in 16 of 25 they occupy less than two percent.

Differences between transects in the same physiographic unit, in percent of total land area occupied by cultivated wetlands, range from 0.1 to 13.5 percent.

For the ecoregion as a whole, total land area occupied by cultivated wetlands averages 3.2 percent. This is well above the range of 0.7 to 1.8 recorded for all other 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. Cultivated, grassy and shrub or tree cover are considered collectively as the cover types most indicative of temporary or seasonal water conditions and this group dominates (65.3 to 99.8

percent of total wetland area) in all transects but one. In that transect (Scotsguard) 52.9 percent of wetland area is predominantly large natural fresh open water wetlands with some bulrush cattail and artificial open water. In 15 of the 24 transects where the temporary or seasonal wetland cover group was dominant those cover categories accounted for more than 90 percent of the total wetland area. As expected, the level of dominance by the cultivated/grassy/wooded cover group is higher in Saskatchewan Mixedgrass Prairie than in either Saskatchewan or Alberta Parklands. It is also slightly higher than in Alberta Mixedgrass Prairie but lower than in Alberta Fescue Prairie or Alberta Shortgrass Prairie.

The percent of wetland area that is cultivated in the 25 transects varies from 4.5 percent on knob and kettle terrain at Ceylon to 99.4 percent on undulating lacustrine terrain at Cabri Lake. It is the dominant cover class in 11 transects. The percentage of cultivated wetland area varies widely between transects within the same landform category. Four of the five lowest (less than 10 percent of wetland area) cultivation values are associated with knob and kettle morainal landform. The fifth occurs on dissected eolian terrain.

Grass (including sedges and forbs) is the dominant cover class in 13 of 25 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 Saskatchewan and Alberta Parkland.

Shrub and tree cover is of only limited to rare occurrence in wetlands in the grassland ecoregions and part of that is low buckbrush. In the mixedgrass sample covered in this report willow and buckbrush are recorded in wetlands on 15 transects but in only one (Goodwater) do they cover more than one percent of the total wetland area.

Bulrush and cattail (deep marsh vegetation) are completely absent from nine transects and achieve a maximum level of 13.8 percent at Carmichael.

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

Natural fresh open water is relatively limited in its occurrence. It is completely absent from 12 transects and in ten of the 13 transects where it is present it occupies from a trace to 8.1 percent of the total wetland area. Large semi-permanent to permanent wetlands or small lakes were recorded on three transects, Dummer, Eston and Scotsguard, and on those sites natural fresh open water occupied 26.7, 28.3 and 49.5 percent, respectively, of the total wetland area. Large wetlands were not found to be associated with one particular landform as the three transects occur, respectively, on knob and kettle morainal, undulating lacustrine and undulating morainal landforms.

In this report open running water in streams and rivers has

not been grouped with natural fresh open water in ponds as in some previous reports but is recorded as "other".

The range in area of artificial open water (0.1 to 9.9 percent) is less than that recorded for Alberta Mixedgrass Prairie (0.2 to 14.6 percent, Millar 1992b) or Saskatchewan Parkland (0.0 to 13.4 percent, Millar 1989b) but greater than that observed for Alberta Parkland (0.0 to 5.7 percent, Millar 1992a). In 15 of the 25 transects artificial open water occupies less than one percent of the total wetland area and this is almost entirely in the form of small dugouts. On the other hand, the four largest values (4.2 to 9.9 percent) are due primarily to the presence of reservoirs on watercourses, gravel pit excavations (Milden) and a natural wetland with water levels elevated due to damming by a road grade (Tichfield).

Saline open water is present on only five transects and in significant amounts on three of those, Gravelbourg East (28.8 percent), Golden Prairie (23.0 percent) and Thunder Creek (22.4 percent). However, based on personal observations, this cover class is more widely distributed outside the sample sites.

Other cover classes are recorded on almost half (12) of the transects and account for a trace to 5.5 percent of the wetland area. In almost all cases the cover classes are indicative of disturbance situations. However, the second highest value (1.7 percent) is generated by the presence of a stream.

The percent of total wetland area in various cover classes varies widely between transects within the same physiographic unit.

Of the 30 data pairs (i.e., those cover classes which were represented in both transects) 18 or 60 percent have differences of less than five percent of the total wetland area while in the remaining 12 or 40 percent the differences are greater and run as high as 42 percent. Eleven (91.7 percent) of the large differences are associated with the three most common cover types but only four (22.2 percent) of the small differences are associated with this group. This is to be expected since the potential for large differences is greater where larger percentages of wetland area are involved. On the other hand, almost four fifths of small differences are associated with the more poorly represented cover classes. Interestingly, proportionally more of the large differences are associated with transect pairs located in undivided units or in the same sub-units than with those whose members are located in different sub-units. This suggests that the homogeneity in distribution of wetland cover types is no greater within physiographic sub-units than it is between sub-units.

For the ecoregion sample as a whole 98 percent of the total wetland area falls into five cover classes: cultivated - 46.5 percent, grass - 38.8 percent, natural fresh open water - 7.4 percent, saline open water - 3.3 percent and bulrush/cattail - 2.0 percent. The identity and order of these cover classes is substantially different than that recorded for any previous ecoregion. The cultivated class becomes the overall dominant category for the first time and occupies almost three times the percent of wetland area it did in Alberta Mixedgrass Prairie.

Grass drops to second place and is well below the level recorded for all previously reported ecoregions. Natural fresh open water ranks third and at 7.4 percent is slightly more than three times as widely distributed as it was in Alberta Mixedgrass Prairie (2.4 percent). Its occurrence is almost equal to that reported for Saskatchewan Parkland (8.2 percent, Millar 1989b) but less than half that reported for Alberta Parkland (18.5 percent, Millar 1992a). Saline open water occupies fourth place as it did in Alberta Mixedgrass Prairie but bulrush/cattail drops from third to fifth.

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 1.6 per quarter

section at Wiseton to 15.9 at Marquis Central. Highest wetland densities are clearly associated with morainal landforms (range 4.0 to 15.9) and within that group are highest in knob and kettle terrain (range 9.8 to 14.9). Densities on lacustrine parent material range from 1.9 to 6.3 and on the two eolian transects densities are 3.4 and 3.5. The maximum density of 15.9 at Marquis Central is higher than that recorded for any of the Alberta grassland ecoregions but less than half the maximum density reported in Saskatchewan Parkland (37.1 percent, Millar 1988) and well below the maximum in Alberta Parkland (23.5 percent, Millar 1992a).

The difference in wetland density between transects within the same physiographic unit ranges from 0.1 on undulating eolian landform in the Rush Lake Creek Plain to 7.0 on the undulating morainal landform of the Long Creek Plain. In four of the seven transect pairs the difference in density is 1.0 or less.

For the entire ecoregion sample the average density is 6.8 wetlands per quarter section. This compares to 5.9, 7.6 and 4.3 for the Alberta Mixedgrass, Fescue and Shortgrass Prairies, respectively, (Millar 1992b, 1992c and 1992d) and 16.1 and 13.6 for Saskatchewan and Alberta Parklands, respectively, (Millar 1989b, 1992a).

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.

The three cover classes characteristic of temporary or seasonal wetlands, i.e., cultivation, grasses (including sedges) and woody vegetation collectively dominate (79.1 to 96.7 percent) the numbers of wetlands in all 25 transects (Table 8). Within these three cover classes grasses dominate in nine transects and cultivation in 15 with the two classes equally represented in one transect. Interestingly, woody vegetation appears in the record of wetland numbers in only half as many transects (8) as it does in the data on wetland area (15). This is the reverse of the situation observed in Alberta Mixedgrass Prairie and seems to result from the fact that eight "trace" records occur in the Saskatchewan wetland area data compared to none in the Alberta data.

With few exceptions representation of all other cover classes is at a very low level. Natural fresh open water is absent from 12 transects and never exceeds 8.6 percent. Bulrush/cattail are also absent from 12 transects and achieve a maximum of 8.9 percent at Mildred. Transitional open water is totally absent from all transects.

Artificial open water wetlands are present in all 25 transects and account for 1.4 to 14.0 percent of total wetland numbers. Saline open water wetlands were recorded on only five transects and in those account for 0.6 to 5.3 percent of total wetland numbers. From 0.3 to 5.1 percent of total wetlands fall into the "other" category in 11 transects.

The variability in percent of total wetland numbers in various

cover classes between different transects within the same physiographic unit is slightly greater (up to 47 percent of total wetland numbers) than that discussed earlier for wetland area. The proportions of small and large differences are similar with 14 or 52 percent of the 27 data pairs having large differences. Thirteen of the large differences are associated with the three most common cover types and eight of the small differences are similarly associated. When the small and large differences in percent of wetland numbers are matched against the corresponding values for wetland area those values coincide (i.e., small/small, large/large) in 21 cases and do not coincide in six cases. Approximately equal proportions of large differences are associated with transect pairs located in undivided units or in the same sub-unit and with pairs whose members are located in different sub-units.

For the ecoregion sample as a whole 91.4 percent of the wetlands are dominated by grass (46.6 percent), cultivation (44.5 percent) and shrubs and trees (0.3 percent). Of the remaining wetlands, 1.6 percent are dominated by natural fresh open water, 5.1 percent by artificial open water, 0.9 percent by bulrush/cattail and one percent by all other categories together. Percentages of wetland numbers are approximately equal for grass and cultivated cover classes and this represents a marked drop in the dominance of grass from that observed in Alberta Mixedgrass Prairie and all other ecoregions reported on to date except Alberta Fescue Prairie. Figures for other cover categories do not differ markedly from those recorded for Alberta Mixedgrass Prairie but it

should be noted that the bulrush/cattail, natural fresh open water and artificial open water values are not inflated by the effects of irrigation as they were in Alberta (Millar 1992b). Natural fresh open water wetlands are marginally less common than they are in Saskatchewan Parkland (2.2 percent, Millar 1989b) and account for just under one third of the percent of total wetlands that they did in Alberta Parkland (5.4 percent, Millar 1992a). The percent of artificial open water wetlands in the total wetland population is more than double in Saskatchewan Mixedgrass Prairie what it was in Saskatchewan Parkland (2.2 percent) and is almost equal to that recorded for Alberta Parkland (5.4 percent).

e) Area of Wetlands in Various Land Use Activity Classes

Utilization of wetlands in the 25 transects falls into five major land use categories - no use, abandoned cultivation, annual crops, haying and grazing. Collectively these five activity classes occur on 96.0 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 0.2 percent at Portreeve to 69.4 percent at Scotsguard. The minimal no use value at Portreeve is associated with a very high (99.4 percent) level of utilization for cropping and temporarily abandoned cultivation.

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 20.7 for the 25 transects covered in this report.

The amount of wetland area being used for crop production ranges from 4.5 percent at Ceylon to 99.4 percent at Cabri Lake.

Haying of wetlands occurs in 13 of the 25 transects and on a trace to 31.0 percent of the total wetland area in those transects. Maximum extent of haying in Saskatchewan Mixedgrass Prairie exceeds that recorded in any of the ecoregions reported on to date, being one and a half times the maximum recorded for Alberta Parkland (Millar 1992a), eight times the maximum in Alberta Mixedgrass Prairie (Millar 1992b), and even greater differences for Alberta Fescue and Shortgrass Prairie. Haying occurs much less often on lacustrine landforms (two of 11 transects) than it does on either morainal (10 of 12 transects) or eolian (two of two transects) terrain.

Grazing of wetlands occur in 19 of the 25 transects and on 0.7 to 55.7 percent of the wetland area in those transects. The level of grazing is considerably lower in Saskatchewan Mixedgrass Prairie than in Alberta Mixedgrass Prairie. In only six of the 19 transects does grazing occur on more than 30 percent of the wetland area and in only one of those does it occur on more than 50 percent

of the wetland area. As in other ecoregions, high haying and grazing values do not seem to go hand in hand though one would expect to see a high degree of association between them.

Other land use activities on wetlands are recorded in 23 of 25 transects and in no instance do those activities exceed four percent of the wetland area. The most common "other" activities include roads, farm site activities and waste disposal.

The frequency of substantial differences in land use activities on wetlands in different transects within the same physiographic unit is somewhat greater than that observed for cover and wetland area data (42 percent) and equal to that recorded for cover and wetland numbers data. Large differences (over five and up to 44.5 percent of the total wetland area) occur in 52 percent of the 31 data pairs. In contrast to the situation observed with wetland cover, proportionately more large differences are associated with data pairs whose members occur in different sub-units than with those pairs in undivided units or the same sub-unit (56 and 44 percent, respectively).

For the ecoregion sample as a whole, virtually all of the total wetland area (99.1 percent) falls into the five identified land use categories, no use, abandoned cultivation, annual crops, haying and grazing. Almost one third (30.3 percent) of the wetland area is unused compared to 16.8 percent for Alberta Mixedgrass Prairie, 24.3 percent for Alberta Fescue Prairie, 0.7 percent for Alberta Shortgrass Prairie, 47.3 percent for Alberta Parkland and 59.5 percent for Saskatchewan Parkland. Abandoned cultivation at

4.2 percent is more common in Saskatchewan Mixedgrass Prairie than in any of the other ecoregions reported on to date. The same is true for cropping (46.8 percent) which is over one and a half times the next highest levels observed in Alberta Shortgrass and Fescue Prairies. The 2.2 percent average level for haying is the highest recorded for any grassland ecoregions but lower than levels in either Saskatchewan Parkland (5.1 percent) or Alberta Parkland (3.5 percent). Grazing at 15.6 percent is the second lowest level reported to date for that activity with only Saskatchewan Parkland having a lower value (11.1 percent). It is less than one quarter the maximum level observed in Alberta Shortgrass Prairie.

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 attempt 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 in Saskatchewan Mixedgrass Prairie ranges from a low of 17.4 at Success to a high of 42.5 at Golden Prairie (Table 10). In contrast to the situation observed in Alberta Mixedgrass Prairie (Millar 1992b) where the highest rates of impaction (outside of irrigated areas) occurred on lacustrine terrain, the average rate of impaction in Saskatchewan Mixedgrass Prairie is slightly lower in lacustrine transects than in morainal transects. However, individual values in the two groups overlap almost completely.

Differences in the rate of impaction between transects in the same physiographic unit are generally quite low, ranging from 0.2 to 15.6 and averaging 6.2 percent of total wetlands.

For the entire ecoregion sample the average impaction level is 27.5 percent. This is well below the averages of 35.6 and 34.9 percent recorded for Alberta Mixedgrass and Shortgrass Prairie, respectively, (Millar 1992b and 1992d) but comparable to the level in Alberta Mixedgrass Prairie when irrigated transects are omitted. The Saskatchewan Mixedgrass Prairie average is slightly higher than those observed for Alberta Fescue Prairie and Alberta and Saskatchewan Parklands (22.4, 26.5 and 26.9 percent, respectively, Millar 1992c, 1992a and 1989b).

h) Distribution of Streams

The presence 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 Mixedgrass Prairie.

No streams were recorded in 18 of the 25 transects and in the remaining seven the percent of quarter sections containing streams ranges from 8.3 to Neidpath and Wiseton to 37.5 at Swift Current. Six of the seven transects containing streams are located in lacustrine or eolian terrain and only one is on morainal material.

In the seven physiographic units containing two transects there is no consistency in the presence or absence of streams in both transects within the same unit.

In the total ecoregion sample 4.0 percent of all quarter sections contain stream segments. This is lower than the average recorded for any of the ecoregions reported on to date except Alberta Shortgrass Prairie where no streams are present in the single transect in that ecoregion (Millar 1992d).

3. 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 25 Saskatchewan Mixedgrass Prairie transects 98.2 to 99.8 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 25 transects occupying 66.7 to 98.4 percent of the total upland area. A comparable level of dominance in cropping occurs in the Alberta Fescue Prairie and Alberta and Saskatchewan Parkland samples but in Alberta Mixedgrass and Shortgrass Prairie native grass plays a large role in many transects. Cabri Lake is the most intensively cultivated transect in the ecoregion with 98.4 percent of its uplands in crop as well as 99.4 percent of its wetland area.

Native grass occupies from 0.2 percent of total upland area at Cabri Lake to 29.4 percent at Dummer.

Woody vegetation, as is to be expected in a grassland ecoregion, is a minor element in the landscape. Low shrubs (buckbrush) are present in 23 transects where they occupy from a trace to 4.2 percent of the upland area while tall shrubs occur in 19 transects and on a trace to 0.4 percent of the uplands. Native trees are also recorded in 19 transects and on a trace to 0.3 percent of the uplands.

Total native cover occupies from 0.2 to 31.5 percent of total upland area in the 25 transects. In nine transects it occupies more than 10 percent of the upland area and in four it exceeds 20 percent.

Planted grasses and forbs are found on 0.2 to 8.1 percent of the uplands. This range is markedly lower than that observed for the Alberta Mixedgrass Prairie and reflects the fact that none of the Saskatchewan Mixedgrass Prairie transects are located in irrigated areas.

Planted trees and shrubs are a minor but consistent part of the landscape, accounting for 0.7 percent or less of the upland area in 24 transects. In the 25th transect (Milden) they occupy 2.6 percent of the landscape.

Variability in upland cover values between transects within the same physiographic unit is very low and this is likely due to the extreme dominance of annual crops in most transects. Only six of the 49 data pairs for individual cover classes have large differences (in excess of five percent of total upland area). Five of those are associated with annual crops and one with native grass. Only two large differences exceed 8.7 percent and they are both in the same transect pair. Members of that pair are located in different sub-units and have marked differences in the occurrence of native grass and cultivation. Except for that instance, however, there is no obvious difference between pairs in the same or different sub-units in terms of the occurrence of large differences.

For the ecoregion sample as a whole 86.4 percent of the total upland cover is annual crops and summerfallow. This is the highest level of cropping recorded for any ecoregion reported on to date and is almost half again higher than the average observed for Alberta Mixedgrass Prairie (60.8 percent, Millar 1992b). Total native cover accounts for 10.1 percent of the upland area compared to 29.6 percent in Alberta Mixedgrass Prairie. Almost all of that amount (9.2 percent) is native grass. Planted grasses and forbs cover 2.3 percent of the uplands and planted trees and shrubs 0.4

percent. "Other" cover classes, primarily man-made surfaces and bare soil other than cropland, occupy 0.8 percent of the uplands.

Cabri Lake is the most intensively cultivated transect in Saskatchewan Mixedgrass Prairie (98.4 percent of upland area and 99.4 percent of wetland area) and it now supersedes Loreburn in Saskatchewan Parkland as the most intensively cultivated transect 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 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 0.2 to 13.6 percent of upland area. Land which has been abandoned from other uses never amounts to more than 1.7 percent of the total upland area in any transect.

Forage production occurs on a trace to 4.8 percent of the upland area in 16 of 25 transects. Grazing occurs in 20 transects on 0.1 to 25.4 percent of the uplands. Land use activities which are associated with native vegetation and/or planted grasses and forbs collectively never occupy more than 31.4 percent of the total upland area in any transect.

A minor but consistent part of the uplands is devoted to

farmsteads (0.1 to 3.3 percent) and to roads and railways (0.3 to 4.5 percent) in all transects. Other land uses collectively occupy zero to 1.5 percent of the uplands.

Variability in land use activity values between transects within the same physiographic unit is basically the same as that observed for upland cover with only seven large differences recorded in the 50 data pairs. Only one of the large differences exceeds 8.7 percent. Four of the large differences are associated with production of annual crops, two with grazing and one with unused land. Proportionately more large differences are associated with pairs whose members are located in undivided units or the same sub-unit than with pairs whose members are located in different sub-units.

For the ecoregion sample as a whole, land use activities occur in descending order of occurrence as follows: annual crop production (86.4 percent), grazing (7.2 percent), idle (no use and abandoned - 2.7 percent), roads and railways (1.8 percent), forage production (0.9 percent), farmsteads (0.8 percent) and other uses (0.2 percent). Differences between Alberta and Saskatchewan Mixedgrass Prairie in the levels of various land use activities are due primarily to the much higher (one and one half times) use of land for production of annual crops in Saskatchewan.

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 in relation to the number of transects in which the cover type was present is as follows: 13 of 25, six of 25 and zero of six, respectively (Table 14). In the three upland cover classes, i.e., cropland, native grass and native trees, these numbers are nine of 25, 17 of 25 and one of 15 transects, respectively (Table 15). The values of zero and one transects for woody vegetation in these two data sets reflect the minimal occurrence of that cover type in mixedgrass prairie. Both cultivated wetland cover and upland native grass show a high degree of variability with over half the transects in each case having standard errors which exceed the mean. In the case of cultivated wetland cover this represents a marked difference from the results recorded for Alberta Mixedgrass and Fescue Prairies and Alberta and Saskatchewan Parklands where

only a small proportion of the transects have the standard error equal to or exceeding the mean for this cover type.

The greatest extremes in data variability are to be found in upland land use categories (Table 16). The highest level of variability (the standard error equals or exceeds the mean in 18 of 20 transects) occurs with grazing and this is consistent with the pattern observed in all other ecoregions. An intermediate situation (nine of 23 transects) occurs with unused land and for roads and railways the standard error is consistently less than the mean in all transects. This latter situation is to be expected since roads and railways are distributed 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 practises, e.g., grazing or forage production, are markedly different than those of his neighbours. When this happens the data are strongly skewed and cannot be analysed by standard methods.

Examination of standard error and coefficient of variation values obtained when data from two transects within the same physiographic unit are combined suggests a substantial reduction in the resultant variability in situations where the variability in the data differs markedly between members of a transect pair. In 13 cases where the standard error equalled or exceeded the mean for one member of a transect pair but not the other combining the data brought the standard error below the mean for the physiographic

unit in nine of those cases.

When data for the entire ecoregion sample are analysed collectively the standard error is below the mean for eight of the nine categories in Tables 14 to 16. As with previously reported ecoregions, grazing continues to show a high degree of variability in its distribution.

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 the Saskatchewan Mixedgrass Prairie the top unit in terms of total quantity of wetland habitat is the Missouri Coteau (2.55). It is

the fourth largest unit and ranks first in all of the following wetland qualities which contribute to good waterfowl habitat: (a) area and numbers of semi-permanent and permanent wetlands for secure brood rearing habitat, (b) area and numbers of grassy (seasonal) wetlands for additional breeding pair habitat, and (c) a proportion of undisturbed wetlands to ensure adequate escape cover.

Extrapolated wetland data for the entire sampled portion of the Saskatchewan Mixedgrass 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 lower than that produced in the physiographic unit

analysis by just 5.1 percent. Five of the eight cover class values are also lower, three by less than 6.5 percent and one by 13.1 percent. The extreme deviation of 21.2 percent involves natural fresh open water. Two cover classes are higher by 3.7 and 22.0 percent. Both, however, involve only a very small land area. Values for one cover class are identical.

The pattern for wetland numbers is somewhat different. The ecoregion analysis of total wetland numbers is higher than the physiographic unit analysis by 2.1 percent. Four of eight cover class values are higher by 2.3, 5.4, 10.4 and 17.6 percent and four are lower by 4.3, 4.8, 6.1 and 13.2 percent.

The ecoregion analysis of wetland area devoted to various land use activities produces lower values in four of the six categories by 0.4 to 18.1 percent and higher values in two categories by 21.9 and 48.4 percent. Both of the latter involve small land areas.

3. Uplands

Estimated areas of upland cover and land use activity classes are presented in Tables 20 and 21. Amongst the 20 physiographic units covered in this report, the Missouri Coteau (2.55) ranks fifth 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 Mixedgrass Prairie have been summarized in the same

way 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 higher by 1.2 to 31.1 percent and four are lower by 4.8 to 98 percent than those produced in the physiographic unit analysis. Highest deviations, both positive and negative, are associated with cover types which involve minor land areas.

A similar situation exists with upland land use data where four ecoregion estimates are higher and four lower than the physiographic unit summation. The range in size of the differences (+1.2 to +12.4 and -0.7 to -12.7 percent) is lower than that observed for upland cover classes. The double digit differences all involve minor land use categories which occupy from 0.2 to 2.5 percent of the total upland area.

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.

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

On the basis of the habitat rating analysis described in the Methods Section one sampled morainal unit, Missouri Coteau (2.55) receives top rating as a waterfowl production area relative to

other sampled units in the Saskatchewan Mixedgrass Prairie (Table 22). Three units, Missouri Coteau South (2.56), Shaunavon Plain (2.46) and Lower Wood River Plain (2.51) are given a three rating and the remaining seven morainal units are rated as fours. Five of the latter, together with Missouri Coteau South have been downgraded by one level for losing points for both semi-permanent and permanent wetlands.

When Saskatchewan Mixedgrass Prairie units are rated using Alberta Mixedgrass minimum rating values the ratings of eight of the 11 units go up. This is due primarily to the lower minimum rating values in Alberta for bulrush/cattail and natural fresh open water. The assumption from these results is that in general the quality of wetland habitat in Saskatchewan Mixedgrass Prairie is higher than it is in Alberta Mixedgrass Prairie.

When Saskatchewan Mixedgrass Prairie units are rated using Alberta Parkland minimum rating values all ratings remain unchanged and when Saskatchewan Parkland values are used the rating drops for only one unit. In both of the above rating exercises downgrading due to loss of points for both bulrush/cattail and natural fresh open water reduces the rating of a number of units (five and seven out of 11, respectively).

It is significant that throughout all of the rating exercises Missouri Coteau (2.55) retains its number one rating as waterfowl habitat. It is also interesting to note that the Saskatchewan portion of Oyen Upland South (2.33) receives a lower rating than its Alberta counterpart when either Alberta or Saskatchewan

Mixedgrass minimum rating values are used.

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 ground truthing surveys. The date of baseline aerial photography of 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 60 to 64 months (Table 23). Recorded changes are as small as the cultivation of a single wetland and as extreme as the breaking of most 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 of the 25 transects in Saskatchewan Mixedgrass Prairie and the percent of quarter sections affected in individual transects ranges from 4.2 at Cabri Lake to 83.3 at Wiseton. Interestingly, both the lowest and highest levels of change are associated with intensively cultivated lacustrine transects. The high level of change at Wiseton is due entirely to road construction. Differences in percent of affected quarters recorded for transects within the same

physiographic unit are highly variable.

The average percent of quarter sections affected by cover/land use changes and the mean length of time in months between the taking of aerial photos and completion of ground truthing surveys for the ecoregions report on to date are as follows:

Ecoregion	Average Percent of Quarter Sections Affected by Change	Mean Length of Time Between Photography and Ground Truthing
Saskatchewan Parkland	27.0	23.7
Alberta Parkland	47.1	40.1
Alberta Mixedgrass Prairie	34.6	55.3
Alberta Fescue Prairie	30.0	54.2
Alberta Shortgrass Prairie	8.3	63.0
Saskatchewan Mixedgrass Prairie	30.6	62.2

Assuming that the percent of quarter sections affected by cover/land use changes can be expected to increase along with the length of time involved between the date of baseline photography and ground truthing surveys, it appears that in the last five years Saskatchewan Mixedgrass Prairie has been experiencing the second lowest rate of habitat change after Alberta Shortgrass Prairie. However, because the Alberta Shortgrass Prairie sample contains only one transect, it is difficult to assess the accuracy of the observed difference in habitat change between these two ecoregions.

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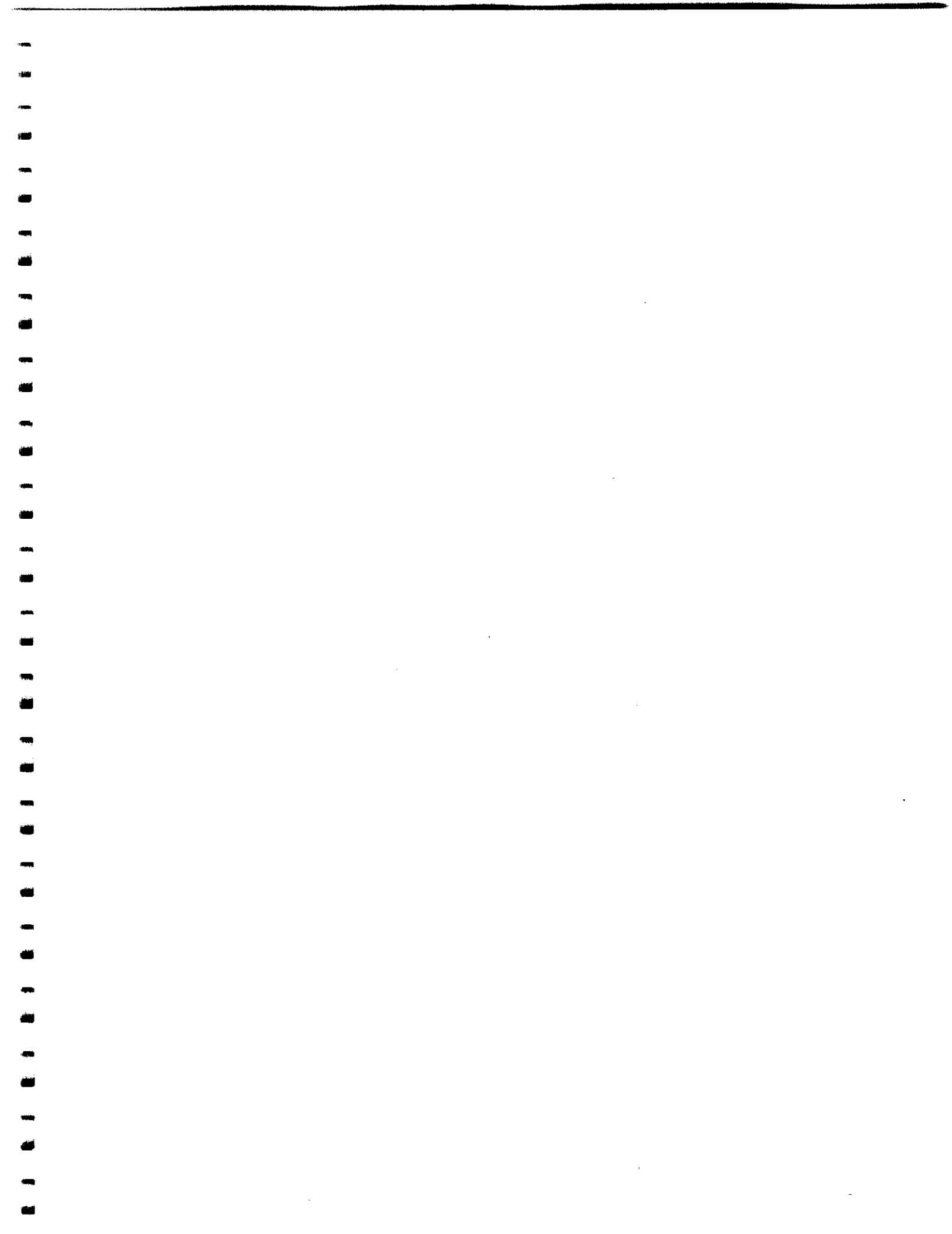


Figure 1. Distribution of Habitat Sampling in Saskatchewan
Mixedgrass Prairie



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

	Area		
	No. of Units	In Hectares ¹	As Percentage of Entire Ecoregion
Sampled Physiographic Units	20 ²	6,743,400	67.8
Unsampled Physiographic Units	22	2,430,800	24.4
Areas Not Included in Physiographic Units			
- River and Stream Valleys	-	565,300	5.7
- Lakes ³	-	184,200	1.8
- Urban Areas ³	-	25,900	0.3
Total Saskatchewan Mixedgrass Prairie Ecoregion	42	9,949,600	100

1. To the nearest 100 hectares.
2. Including two units, totalling 397,000 hectares or 4.0 percent of the Saskatchewan Mixedgrass Prairie, which are sampled in the Alberta portions of those units.
3. Larger than 500 hectares.

Table 2. Distribution of Landforms in Saskatchewan Mixedgrass Prairie

Origin of Parent Material ¹	Surface Form ¹	Area in Hectares ²			Percent of Sampling Effort in Landform Category
		Sampled Units ³	Unsampled Units ³	Total ⁴	
Morainal	Knob & Kettle	1,650,100 ⁵ (87.1)	245,300 (12.9)	1,895,400 (20.7)	22.8
	Hummocky	504,200 (57.8)	367,500 (42.2)	871,700 (9.5)	11.3
	Undulating	869,400 (85.4)	148,200 (14.6)	1,017,600 (11.1)	11.6
	Rolling	-	310,500 (100)	310,500 (3.4)	0.0
	Dissected	189,800 ⁵ (78.7)	51,400 (21.3)	241,200 (2.6)	4.0
Total Morainal		3,213,500 (74.1)	1,122,900 (25.9)	4,336,400 (47.3)	49.7
Lacustrine	Undulating	3,169,200 (87.0)	473,000 (13.0)	3,642,200 (39.7)	39.7
	Dissected	132,100 (74.5)	45,300 (25.5)	177,400 (1.9)	4.0
Total Lacustrine		3,301,300 (86.4)	518,300 (13.6)	3,819,600 (41.6)	43.7

Table 2. Distribution of Landforms in Saskatchewan Mixedgrass Prairie (Continued)

Origin of Parent Material ¹	Surface Form ¹	Area in Hectares ²		Percent of Sampling Effort in Landform Category
		Sampled Units ³	Unsampled Units ³	
Eolian	Hummocky	-	260,600 (100)	260,600 (2.8)
	Dissected	228,600 (100)	-	228,600 (2.5)
Total Eolian		228,600 (46.7)	260,600 (53.3)	489,200 (5.3)
Fluvial	Hummocky	-	96,400 (100)	96,400 (1.1)
	Undulating	-	432,600 (100)	432,600 (4.7)
Total Fluvial		-	529,000 (100)	529,000 (5.8)
Total for Ecoregion		6,743,400 (73.5)	2,430,800 (26.5)	9,174,200 (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 sampled in the Alberta portion of that unit.

Table 3. Physiographic Units Covered in This Report

Landform Character ^{1,2}				
Unit Number	Name	Origin of Parent Material	Surface Form	Transect ³
2.13	Bigstick Lake Plain	Lacustrine * Fluvial	Undulating * Hummocky	Carmichael Portreeve
2.14	Schuler Upland	Morainal * Fluvial	Hummocky * Undulating	Golden Prairie
2.46	Shaunavon Plain	Morainal	Undulating * Dissected	Scotsguard
2.47	Rush Lake Creek Plain	Eolian * Morainal	Dissected	Neidpath Swift Current (16)
2.51	Lower Wood River Plain	Morainal	Hummocky * Knob & Kettle	Gravelbourg West (22)
2.52	Notukeu Creek Plain	Lacustrine * Morainal	Undulating	Gravelbourg East (22) Shamrock West (14)
2.55	Missouri Coteau	Morainal	Knob & Kettle * Hummocky	Dummer Thunder Creek
2.56	Missouri Coteau South	Morainal	Knob & Kettle * Dissected	Ceylon
2.57	Long Creek Plain	Morainal	Undulating * Dissected	Fillmore West (22) Goodwater
2.58	Regina Plain	Lacustrine (Fluvial)	Undulating	Grand Coulee Riceton
2.59	Tuxford Plain	Lacustrine* Morainal	Undulating	Marquis East/West
2.60	Eyebrow Hills Upland	Morainal	Hummocky	Marquis Central (22)

Table 3. Physiographic Units Covered in This Report (Continued)

Unit Number	Name	Landform Character ^{1,2}			Transect ³
		Origin of Parent Material	Surface Form		
2.62	Shamrock Upland	Morainal	Knob & Kettle		Shamrock East (18)
2.64	Antelope Lake Plain	Lacustrine * Fluvial	Dissected * Hummocky		Success
2.67	Mantario Plain	Lacustrine	Undulating		Cabri Lake
2.68	Kindersley Plain	Lacustrine	Undulating * Blanket		Eston
2.71	Eagle Creek Plain	Lacustrine * Fluvial	Undulating		Milden Wiseton (12)
2.72	Coteau Hills	Morainal * Lacustrine	Knob & Kettle * Hummocky		Tichfield
2.01	Cypress Hills Benchland	Morainal	Dissected * Rolling * Blanket Veneer		Sampled in Alberta
2.33	Oyen Upland South	Morainal	Knob & Kettle		Sampled in Alberta

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 most transects is 24 quarter sections. Where the sample size varies from 24 it is shown in parentheses.

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

Unit Number	Name	Landform Character ^{1,2}			Area in ³ Hectares
		Origin of Parent Material	Surface Form		
2.12	Medicine Hat Plain	Morainal	Dissected		51,400 ⁴
2.15	Middle Sand Hills South	Eolian * Fluvial	Hummocky * Undulating		50,300 ⁴
2.16	Middle Sand Hills	Fluvial * Eolian	Hummocky * Undulating		800 ⁴
2.34	Sibbald Plain	Lacustrine * Fluvial	Undulating * Hummocky		49,700 ⁴
2.48	Bridge Creek Upland	Morainal	Hummocky		97,600
2.49	Wood River Plain	Morainal	Rolling * Dissected		310,500
2.54	Amulet Hills	Morainal * Lacustrine	Knob & Kettle * Undulating		120,300
2.61	Old Wives Lake Basin	Fluvial * Lacustrine	Hummocky * Undulating		95,600
2.63	Prairie View Hills	Morainal	Hummocky * Knob & Kettle		269,900
2.65	Bigstick Lake Sand Hills	Eolian	Hummocky		70,500
2.66	Great Sand Hills	Eolian	Hummocky		139,800
2.69	Tramping Lake Plain	Lacustrine	Undulating		161,100
2.70	Bad Hills Upland	Morainal	Knob & Kettle		125,000
2.73	Lucky Lake Plain	Lacustrine	Undulating * Hummocky		53,900
2.74	Brightwater Creek Plain	Lacustrine * Morainal	Undulating		150,300

Table 4. Physiographic Units in Saskatchewan Mixedgrass Prairie Which Have Not Been Sampled (Continued)

Unit Number	Name	Landform Character ^{1,2}			Area in ³ Hectares
		Origin of Parent Material	Surface Form		
2.75	Upper Qu'Appelle Plain	Fluvial * Morainal	Undulating		210,300
2.77	Snakebite Plain	Lacustrine	Dissected * Knob & Kettle		45,300
2.78	Saskatchewan - Qu'Appelle Rivers Plain	Fluvial * Lacustrine	Undulating		143,100
2.79	Caron Plain	Fluvial * Lacustrine	Undulating		79,200
2.80	Avonlea Plain	Morainal * Fluvial	Undulating		65,700
2.81	Coteau Slope	Morainal	Undulating		82,500
2.82	Arm River Plain	Lacustrine (Fluvial)	Undulating		58,000
				TOTAL	2,430,800

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. To the nearest 100 hectares.
4. Saskatchewan portion of the unit only.

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

Unit Number	Unit ¹ Name	Area in Hectares			Percentage that Sample is of Unit Area
		Unit ²	Sample	Unit Area	
2.13	Bigstick Lake Plain	(48)	3166	790,600 ³	0.4
2.14	Schuler Upland	(24)	1594	231,800 ³	0.7
2.46	Shaunavon Plain	(24)	1581	223,900	0.7
2.47	Rush Lake Creek Plain	(40)	2672	228,600	1.2
2.51	Lower Wood River Plain	(22)	1447	118,600	1.2
2.52	Notukeu Creek Plain	(36)	2379	425,200	0.6
2.55	Missouri Coteau	(48)	3169	631,100	0.5
2.56	Missouri Coteau South	(24)	1577	433,100	0.4
2.57	Long Creek Plain	(46)	3050	645,500	0.5
2.58	Regina Plain	(48)	3160	623,500	0.5
2.59	Tuxford Plain	(24)	1600	109,400	1.5
2.60	Eyebrow Hills Upland	(22)	1458	153,800	0.9
2.62	Shamrock Upland	(18)	1200	60,400	2.0
2.64	Antelope Lake Plain	(24)	1588	132,100	1.2
2.67	Mantario Plain	(24)	1592	72,100	2.2

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

Unit Number	Name ¹	Area in Hectares		Percentage that Sample is of Unit Area
		Unit ²	Sample	
2.68	Kindersley Plain (24)	679,700	1586	0.2
2.71	Eagle Creek Plain (36)	468,700	2379	0.5
2.72	Coteau Hills (24)	318,300	1581	0.5
.....
2.01	Cypress Hills Benchland(24)	189,800 ^{3,4}	1582 ⁶	0.4 ⁷
2.33	Oyen Upland South (24)	207,200 ^{3,5}	1605 ⁶	0.3 ⁷
Total for Ecoregion	Excluding 2.01 & 2.33 Including only Sask. Portions of 2.01 & 2.33 Including all of 2.01 and 2.33	6,346,400	36,779	0.6
		6,743,400	39,966	0.6
		7,217,700	39,966	0.6

1. Figures in parentheses are the numbers of quarter sections in the sample.
2. To nearest 100 hectares.
3. Saskatchewan portion of the unit only.
4. Total unit area, including Alberta portion, is 355,600 hectares.
5. Total unit area, including Alberta portion, is 515,700 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 ¹	Sample Size (in ha)	Percent of Total Sample ²			Uplands
			Total	Uncultivated	Cultivated	
	<u>(Morainal - K&K)</u>					
2.55	Dummer	1581	16.2	15.1	1.1	83.8
	Thunder Creek	1588	9.1	8.6	0.5	90.9
		(3169)	(12.6)	(11.8)	(0.8)	(87.4)
2.56	Ceylon	1577	8.8	8.4	0.4	91.2
2.62	Shamrock East	1200	6.5	5.9	0.6	93.5
2.72	Tichfield	1581	7.3	5.4	1.9	92.7
	<u>(Morainal -H)</u>					
2.14	Golden Prairie	1594	4.1	3.1	1.0	95.9
2.51	Gravelbourg West	1447	4.7	2.8	1.9	95.3
2.60	Marquis Central	1458	6.2	2.8	3.4	93.8
	<u>(Morainal - U)</u>					
2.46	Scotsguard	1581	4.9	3.5	1.4	95.1
2.57	Fillmore West	1481	8.5	4.7	3.8	91.5
	Goodwater	1569	4.8	4.0	0.8	95.2
		(3050)	(6.6)	(4.4)	(2.2)	(93.4)
	<u>(Lacustrine - U)</u>					
2.13	Carmichael	1583	4.8	3.0	1.8	95.2
	Portreeve	1583	7.5	1.6	5.9	92.5
		(3166)	(6.2)	(2.3)	(3.9)	(93.8)
2.52	Gravelbourg East	1445	7.0	2.7	4.3	93.0
	Shamrock West	934	18.9	1.1	17.8	81.1
		(2379)	(11.7)	(2.1)	(9.6)	(88.3)
2.58	Grand Coulee	1584	5.7	0.9	4.8	94.3
	Riceton	1576	9.3	0.1	9.2	90.7
		(3160)	(7.5)	(0.5)	(7.0)	(92.5)
2.59	Marquis East/West	1600	9.0	0.9	8.1	91.0
2.67	Gabri Lake	1592	5.2	T ³	5.2	94.8
2.68	Eston	1586	6.9	3.5	3.4	93.1
2.71	Milden	1588	2.9	1.2	1.7	97.1
	Wiseton	791	1.9	0.1	1.8	98.1
		2379)	(2.6)	(0.9)	(1.7)	(97.4)

Table 6. Land Area Occupied by Wetlands and Uplands (Continued)

Physio- graphic Unit	Transect ¹	Sample Size (in ha)	Percent of Total Sample ²			
			Total	Wetlands Uncultivated	Cultivated	Uplands
	<u>(Lacustrine - D)</u>					
2.64	Success	1588	4.2	2.8	1.4	95.8
	<u>(Eolian - D)</u>					
2.47	Neidpath	1610	3.4	2.8	0.6	96.6
	Swift Current	1062	2.7	2.4	0.3	97.3
		(2672)	(3.1)	(2.7)	(0.4)	(96.9)
Ecoregion Sample		36779	6.8	3.6	3.2	93.2

1. Transects are grouped by landform (parent material and surface form). Letters identifying surface forms in this and subsequent tables are as follows: K&K - Knob and Kettle, H - Hummocky, U - Undulating, D - Dissected.
2. Figures in parentheses are composite values for two or more transects occurring in the same physiographic unit.
3. T = trace - less than 0.05 percent.

Table 7. Distribution of Wetland Area in Various Cover Classes

Physio-graphic Unit	Transect ¹	Total Wetland Area in Sample (in ha) ²	Percent of Total Wetland Area in Cover Class ²											
			Trans-						Artif-					
			Cultiv-ated	Willows and Trees	Grasses and Sedges	Bulrush/Cattail	itional Open Water	Natural Open Water	icial Open Water	Saline Open Water	Other	T ³		
<u>(Morainal - K & K)</u>														
2.55	Dummer	256	6.8	0.3	61.7	3.1	0.0	26.7	0.3	1.1	0.3	1.1	0.3	0.3
	Thunder Creek	144 (400)	5.3 (6.2)	T (0.2)	60.0 (61.1)	3.3 (3.1)	0.0 (0.0)	8.1 (20.0)	0.5 (0.4)	22.4 (8.9)	0.5 (0.1)	22.4 (8.9)	0.3 (0.1)	0.3 (0.1)
2.56	Ceylon	139	4.5	0.3	90.5	0.9	0.0	3.3	0.5	0.0	0.0	0.0	0.0	0.0
2.62	Shamrock East	78	9.0	0.2	81.8	2.3	0.0	5.5	0.5	0.0	0.0	0.0	0.0	0.7
2.72	Tichfield	116	26.4	1.0	60.7	0.6	0.0	4.2	7.1	0.0	0.0	0.0	0.0	T
<u>(Morainal - H)</u>														
2.14	Golden Prairie	65	32.4	T	43.5	0.0	0.0	0.0	0.7	23.0	0.7	23.0	0.4	0.4
2.51	Gravelbourg West	68	39.9	0.0	41.8	10.3	0.0	5.1	2.9	0.0	0.0	0.0	0.0	0.0
2.60	Marquis Central	91	55.1	T	42.0	0.0	0.0	1.7	1.2	0.0	0.0	0.0	0.0	0.0
<u>(Morainal - U)</u>														
2.46	Scotsguard	78	27.7	0.0	19.1	2.5	0.0	49.5	0.9	0.0	0.0	0.0	0.3	0.3
2.57	Fillmore West	125	44.8	0.2	46.3	1.2	0.0	6.3	1.2	0.0	0.0	0.0	0.0	0.0
	Goodwater	75 (200)	16.4 (34.0)	1.3 (0.7)	80.1 (59.1)	0.0 (0.7)	0.0 (0.0)	0.0 (3.9)	1.6 (1.4)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.6 (0.2)	0.6 (0.2)
<u>(Lacustrine - U)</u>														
2.13	Carmichael	77	36.9	0.6	40.3	13.8	0.0	4.7	0.6	2.8	0.6	2.8	0.3	0.3
	Portreeve	118 (195)	78.9 (62.4)	0.0 (0.2)	20.9 (28.5)	0.0 (5.4)	0.0 (0.0)	0.0 (2.0)	0.2 (0.2)	0.0 (1.2)	0.2 (0.1)	0.0 (1.2)	0.0 (0.1)	0.0 (0.1)

Table 7. Distribution of Wetland Area in Various Cover Classes (Continued)

Physio- graphic Unit	Transect ¹	Total Wetland Area in Sample ² (in ha)	Percent of Total Wetland Area in Cover Class ²										
			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>(Lacustrine - U, cont'd)</u>													
2.52	Gravelbourg East	101	62.1	0.0	7.0	0.0	0.0	0.0	0.0	0.0	0.4	28.8	1.7
	Shamrock West	177 (278)	94.0 (82.4)	T (T)	5.8 (6.2)	T (T)	0.0	0.0	0.0	0.0	0.1 (0.2)	0.0 (10.5)	0.1 (0.7)
2.58	Grand Coulee	90	84.8	0.0	12.5	0.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0
	Riceton	147 (237)	98.0 (92.9)	T (T)	1.3 (5.7)	0.0 (0.0)	0.0	0.0	0.0	0.0	0.7 (1.4)	0.0 (0.0)	0.0 (0.0)
2.59	Marquis East/West	144	89.7	T	6.8	0.2	0.0	0.0	0.0	0.0	2.0	0.0	1.3
2.67	Cabri Lake	83	99.4	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
2.68	Eston	110	48.5	0.0	18.0	4.6	0.0	0.0	0.0	28.3	0.6	0.0	0.0
2.71	Milden	46	58.8	T	31.2	4.2	0.0	0.0	0.0	1.1	4.2	0.0	0.5
	Wiseton	15 (61)	92.1 (66.9)	0.0 (0.1)	0.8 (23.7)	0.8 (3.0)	0.0	0.0	0.0	0.0	0.8 (3.6)	0.0 (0.0)	5.5 (1.5)
<u>(Lacustrine - D)</u>													
2.64	Success	67	33.2	0.0	57.2	6.8	0.0	0.0	0.0	2.1	0.7	0.0	0.0
<u>(Eolian - D)</u>													
2.47	Neidpath	55	16.3	T	78.4	0.0	0.0	0.0	0.0	0.0	5.3	0.0	0.0
	Swift Current	29 (84)	9.3 (13.9)	0.0 (T)	78.0 (78.4)	2.8 (1.0)	0.0	0.0	0.0	0.0	9.9 (6.7)	0.0 (0.0)	0.0 (0.0)
<u>Ecoregion Sample</u>													
		2494	46.5	0.2	38.8	2.0	0.0	0.0	0.0	7.4	1.3	3.3	0.5

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

2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.

3. T = trace - less than 0.05 percent.

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

Physio-graphic Transect ¹ Unit	Total Number of Wetlands in Sample	Mean Density Per Quarter Section	Percent of Total Wetland Numbers in Cover Class ²									
			Culti- vated Trees	Willows and Sedges	Grasses and Cattails	trans- itional Open Water	Natural Open Water	Artif- icial Open Water	Saline Open Water	Other		
<u>(Morainal - K&K)</u>												
2.55 Dummer	328	13.7	15.5	0.6	71.7	0.9	0.0	8.6	2.1	0.6	0.0	0.0
Thunder Creek	353 (681)	14.7 (14.2)	20.7 (18.2)	0.3 (0.4)	73.7 (72.8)	0.5 (0.7)	0.0 (0.0)	2.3 (5.3)	1.4 (1.8)	0.8 (0.7)	0.3 (0.1)	0.0
2.56 Ceylon	234	9.8	12.0	0.0	82.1	0.4	0.0	1.2	4.3	0.0	0.0	0.0
2.62 Shamrock East	237	13.2	25.2	1.3	68.7	0.5	0.0	1.3	2.5	0.0	0.5	0.5
2.72 Tichfield	358	14.9	34.3	0.3	62.1	0.3	0.0	0.5	2.2	0.0	0.3	0.3
<u>(Morainal - H)</u>												
2.14 Golden Prairie	95	4.0	44.2	0.0	44.2	0.0	0.0	0.0	5.3	5.3	1.0	1.0
2.51 Gravelbourg West	143	6.5	56.6	0.0	30.8	1.4	0.0	1.4	9.8	0.0	0.0	0.0
2.60 Marquis Central	350	15.9	77.1	0.0	19.2	0.0	0.0	0.6	3.1	0.0	0.0	0.0
<u>(Morainal - U)</u>												
2.46 Scotsguard	135	5.6	61.6	0.0	31.9	1.4	0.0	1.4	3.7	0.0	0.0	0.0
2.57 Fillmore West	109	5.0	50.4	0.0	36.7	0.0	0.0	1.8	11.1	0.0	0.0	0.0
Goodwater	289 (398)	12.0 (8.7)	26.6 (33.2)	0.0 (0.0)	65.4 (57.5)	0.0 (0.0)	0.0 (0.0)	0.0 (0.5)	4.2 (6.0)	0.0 (0.0)	3.8 (2.8)	0.0
<u>(Lacustrine - U)</u>												
2.13 Carmichael	117	4.9	29.2	0.8	50.5	2.5	0.0	5.1	9.5	0.8	1.6	1.6
Portreeve	46 (163)	1.9 (3.4)	76.0 (42.5)	0.0 (0.6)	15.1 (40.7)	0.0 (1.8)	0.0 (0.0)	0.0 (3.5)	8.9 (9.1)	0.0 (0.6)	0.0 (1.2)	0.0

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

Physio-graphic Unit	Total ² Number of Wetlands in Sample	Mean Density ² Per Quarter Section	Percent of Total Wetland Numbers in Cover Class ²									
			Culti-vated Trees	Willows and Sedges	Grasses and Cattail	Bulrush	Artif-icial	Natural	Trans-itional	Open Water	Saline	Open Water
<u>(Lacustrine - U)</u>												
<u>(Cont'd)</u>												
2.52 Gravelbourg East	96	4.4	83.3	0.0	8.2	0.0	0.0	0.0	0.0	4.1	1.2	3.2
Shamrock West	49 (145)	3.5 (4.0)	79.7 (81.8)	2.0 (0.7)	14.3 (10.4)	2.0 (0.7)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	2.0 (3.5)	0.0 (0.7)	0.0 (2.2)
2.58 Grand Coulee	104	4.3	76.0	0.0	14.3	0.0	0.0	0.0	0.0	9.7	0.0	0.0
Riceton	122 (226)	5.1 (4.7)	86.9 (81.8)	0.0 (0.0)	4.1 (8.9)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	9.0 (9.3)	0.0 (0.0)	0.0 (0.0)
2.59 Marquis East/West	151	6.3	74.3	0.6	9.9	0.6	0.0	0.0	0.0	14.0	0.0	0.6
2.67 Cabri Lake	55	2.3	93.0	0.0	1.7	0.0	0.0	0.0	0.0	5.3	0.0	0.0
2.68 Eston	52	2.2	75.0	0.0	7.9	0.0	0.0	0.0	0.0	13.4	0.0	0.0
2.71 Milden	114	4.8	45.8	1.6	34.3	8.9	0.0	0.0	0.0	7.0	0.0	1.7
Wiseton	19 (133)	1.6 (3.7)	74.0 (49.3)	0.0 (1.6)	5.1 (29.9)	5.1 (8.4)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	10.7 (7.6)	0.0 (0.0)	5.1 (2.4)
<u>(Lacustrine -D)</u>												
2.64 Success	110	4.6	53.7	0.0	36.5	2.6	0.0	0.0	0.0	4.6	0.0	1.7
<u>(Eolian -D)</u>												
2.47 Neidpath	83	3.5	39.8	0.0	48.1	0.0	0.0	0.0	0.0	12.1	0.0	0.0
Swift Current	55 (138)	3.4 (3.5)	29.1 (35.6)	0.0 (0.0)	63.6 (54.3)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	7.3 (10.1)	0.0 (0.0)	0.0 (0.0)
Ecoregion Sample	3804	6.8	44.5	0.3	46.6	0.9	0.0	0.0	0.0	5.1	0.3	0.7

1. Grouped by landform (parent soil material and surface form).
 2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.

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

Physio-graphic Unit	Transect ¹	Total Wetland Area in Sample ² (in ha)	Percent of Total Wetland Area in Land Use Activity Class ²							
			No Use	Abandoned Cultivation	Annual Crop	Haying	Grazing	Other		
<u>(Morainal - K&K)</u>										
2.55	Dummer	256	55.6	1.2	6.8	0.3	36.0	0.1		
	Thunder Creek	144 (400)	69.1 (60.5)	2.7 (1.8)	5.3 (6.2)	T ³ (0.2)	22.6 (31.2)	0.3 (0.1)		
2.56	Ceylon	139	43.8	0.5	4.5	5.2	46.0	T		
2.62	Shamrock East	78	23.9	4.8	9.0	31.0	31.3	T		
2.72	Tichfield	116	44.5	8.3	26.3	T	19.5	1.4		
<u>(Morainal - H)</u>										
2.14	Golden Prairie	65	43.9	3.0	32.3	0.0	20.8	0.0		
2.51	Gravelbourg West	68	49.5	3.2	39.9	2.9	2.9	1.6		
2.60	Marquis Central	91	28.8	12.3	55.0	0.0	3.4	0.5		
<u>(Morainal - U)</u>										
2.46	Scotsguard	78	69.4	0.6	27.9	T	1.5	0.6		
2.57	Fillmore West	125	16.1	4.2	44.7	1.4	31.6	2.0		
	Goodwater	75 (200)	44.4 (26.8)	2.9 (3.9)	16.3 (34.0)	1.9 (1.6)	33.6 (32.3)	0.9 (1.4)		
<u>(Lacustrine - U)</u>										
2.13	Carmichael	77	36.6	0.3	36.9	5.0	20.9	0.3		
	Portreeve	118 (195)	0.2 (14.5)	20.7 (12.5)	78.7 (62.4)	0.0 (2.0)	0.0 (8.4)	0.4 (0.2)		

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

Physio-graphic Unit	Transect ¹	Total Wetland Area in Sample ² (in ha)	Percent of Total Wetland Area in Land Use Activity Class ²						
			No Use	Abandoned Cultivation	Annual Crop	Mowing	Grazing	Other	
<u>(Lacustrine - U, cont'd)</u>									
2.52	Gravelbourg East	101	37.0	0.9	62.1	0.0	0.0	0.0	0.0
	Shamrock West	177 (278)	2.1 (14.7)	0.1 (0.4)	94.0 (82.4)	0.0 (0.0)	1.8 (1.2)	2.0 (1.3)	
2.58	Grand Coulee	90	1.3	0.5	84.8	0.0	9.4	4.0	
	Riceton	147 (237)	0.5 (0.8)	0.0 (0.2)	98.2 (93.1)	0.0 (0.0)	0.0 (3.7)	1.3 (2.2)	
2.59	Marquis East/West	144	5.2	3.5	89.6	0.0	0.7	1.0	
2.67	Cabri Lake	83	0.3	0.0	99.4	0.0	0.0	0.3	
2.68	Eston	110	38.3	13.1	48.6	0.0	0.0	T	
2.71	Milden	46	24.9	13.2	58.7	0.5	1.6	1.1	
	Wiseton	15 (61)	7.1 (20.8)	0.0 (9.5)	92.1 (67.2)	0.0 (0.3)	0.0 (1.2)	0.8 (1.0)	
<u>(Lacustrine - D)</u>									
2.64	Success	67	23.6	16.8	33.2	0.0	25.3	1.1	
<u>(Eolian - D)</u>									
2.47	Neidpath	55	50.0	1.3	16.3	22.4	9.2	0.8	
	Swift Current	29 (84)	31.2 (43.7)	1.1 (1.0)	9.3 (13.9)	2.7 (15.4)	55.7 (25.5)	T (0.5)	
Ecoregion Sample			30.3	4.2	46.8	2.2	15.6	0.9	

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

2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.

3. T = trace - less than 0.05 percent

Table 10. Wetlands Affected by One or More Permanent Impacts

Physio- graphic Unit	Transect ¹	Mean Number of Wetlands/Quarter ²		Percent of Wetlands Impacted
		Total	Affected by One or More Impacts	
	<u>(Morainal - K & K)</u>			
2.55	Dummer	13.7	4.0	29.2
	Thunder Creek	14.7	2.8	19.0
		(14.2)	(3.4)	(23.9)
2.56	Ceylon	9.8	3.4	34.7
2.62	Shamrock East	13.2	3.4	25.8
2.72	Tichfield	15.0	3.3	22.0
	<u>(Morainal - H)</u>			
2.14	Golden Prairie	4.0	1.7	42.5
2.51	Gravelbourg West	6.6	2.4	36.4
2.60	Marquis Central	15.9	3.1	19.5
	<u>(Morainal - U)</u>			
2.46	Scotsguard	5.6	1.7	30.4
2.57	Fillmore West	5.0	2.0	40.0
	Goodwater	12.0	3.8	31.7
		(8.7)	(2.9)	(33.3)
	<u>(Lacustrine - U)</u>			
2.13	Carmichael	4.9	1.3	26.5
	Portreeve	1.9	0.8	42.1
		(3.4)	(1.1)	(32.4)
2.52	Gravelbourg East	4.4	1.0	22.7
	Shamrock West	3.5	0.8	22.9
		(4.0)	(0.9)	(22.5)
2.58	Grand Coulee	4.4	1.0	22.7
	Riceton	5.1	1.1	21.6
		(4.7)	(1.1)	(23.4)
2.59	Marquis East/West	6.3	2.1	33.3
2.67	Cabri Lake	2.3	0.7	30.4
2.68	Eston	2.2	0.7	31.8
2.71	Milden	4.8	1.8	37.5
	Wiseton	1.6	0.5	31.3
		(3.7)	(1.3)	(35.1)

Table 10. Wetlands Affected by One or More Permanent Impacts (Continued)

Physio- graphic Unit	Transect ¹	Mean Number of Wetlands/Quarter ²		Percent of Wetlands Impacted
		Total	Affected by One or More Impacts	
2.64	(Lacustrine - D) Success	4.6	0.8	17.4
2.47	(Eolian - D) Neidpath	3.5	1.0	28.6
	Swift Current	3.6	1.1	30.6
		(3.5)	(1.0)	(28.6)
Ecoregion Sample		6.9	1.9	27.5

1. Grouped by landform (parent material and surface form).
2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.

Table 11. Occurrence of Streams in Data Samples

Physio- graphic Unit	Transect ¹	Number of Quarters ² In Sample ²	Number of Quarters Containing Streams ²	Percent of Quarters Containing Streams ²
	<u>(Morainal - K&K)</u>			
2.55	Dummer	24	0	0.0
	Thunder Creek	24	0	0.0
		(48)	(0)	(0.0)
2.56	Ceylon	24	0	0.0
2.62	Shamrock East	18	0	0.0
2.72	Tichfield	24	0	0.0
	<u>(Morainal - H)</u>			
2.14	Golden Prairie	24	0	0.0
2.51	Gravelbourg West	22	0	0.0
2.60	Marquis Central	22	0	0.0
	<u>(Morainal - U)</u>			
2.46	Scotsguard	24	0	0.0
2.57	Fillmore West	22	0	0.0
	Goodwater	24	4	16.7
		(46)	(4)	(8.7)
	<u>Lacustrine -U)</u>			
2.13	Carmichael	24	3	12.5
	Portreeve	24	0	0.0
		(48)	(3)	(6.3)
2.52	Gravelbourg East	22	3	13.6
	Shamrock West	14	0	0.0
		(36)	(3)	(8.3)
2.58	Grand Coulee	24	0	0.0
	Riceton	24	0	0.0
		(48)	(0)	(0.0)
2.59	Marquis East/West	24	0	0.0
2.67	Cabri Lake	24	0	0.0
2.68	Eston	24	0	0.0
2.71	Milden	24	3	12.5
	Wiseton	12	1	8.3
		(36)	(4)	(11.1)

Table 11. Occurrence of Streams in Data Samples (Continued)

Physio- graphic Unit	Transect ¹	Number of Quarters In Sample ²	Number of Quarters Containing Streams ²	Percent of Quarters Containing Streams ²
2.64	<u>(Lacustrine - D)</u> Success	24	0	0.0
2.47	<u>(Eolian -D)</u> Neidpath	24	2	8.3
	Swift Current	16	6	37.5
		(40)	(8)	(20.0)
Ecoregion Sample		556	22	4.0

1. Grouped by landform (parent material and surface form).
2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.

Table 12. Distribution of Upland Cover Classes

Physio-graphic Unit	Transect ¹	Percent of Total Upland in Cover ²										
		Native					Planted					
		Total Upland Area (in ha)	Grass	Low Shrub	Tall Shrub	Trees	Total	Annual Crops ³	Perennial Grass & Forbs	Trees & Shrubs	Other	
<u>(Morainal - K&K)</u>												
2.55	Dummer	1,325	29.4	2.0	T ⁴	0.1	31.5	67.4	0.2	0.1	0.8	
	Thunder Creek	1,444	26.9	1.3	0.2	T	28.4	66.7	3.6	0.6	0.7	
		(2,769)	(28.1)	(1.7)	(0.1)	(T)	(29.9)	(67.1)	(2.0)	(0.3)	(0.7)	
2.56	Ceylon	1,439	22.8	2.5	0.1	T	25.4	73.4	0.7	0.2	0.3	
2.62	Shamrock East	1,122	23.0	2.4	T	T	25.4	70.1	3.2	0.1	1.2	
2.72	Tichfield	1,465	10.7	1.5	0.4	0.3	12.9	84.9	1.5	0.5	0.2	
<u>(Morainal - H)</u>												
2.14	Golden Prairie	1,529	9.0	T	T	T	9.0	89.0	1.6	0.1	0.3	
2.51	Gravelbourg West	1,379	2.9	0.1	0.0	0.0	3.0	94.7	1.0	0.6	0.7	
2.60	Marquis Central	1,368	2.8	T	0.1	T	2.9	96.1	0.4	0.3	0.3	
<u>(Morainal - U)</u>												
2.46	Scotsguard	1,503	2.9	T	T	T	2.9	92.7	2.3	0.7	1.4	
2.57	Fillmore West	1,355	11.8	0.6	T	0.0	12.4	85.7	1.0	0.2	0.7	
	Goodwater	1,494	13.1	4.2	0.1	T	17.4	77.7	2.6	0.5	1.8	
		(2,849)	(12.5)	(2.5)	(0.1)	(T)	(15.1)	(81.5)	(1.8)	(0.4)	(1.2)	
<u>(Lacustrine - U)</u>												
2.13	Carmichael	1,506	21.7	1.2	0.1	0.1	23.1	67.2	8.1	0.3	1.3	
	Portreeve	1,465	1.1	T	0.0	T	1.1	97.8	0.2	0.3	0.6	
		(2,971)	(11.6)	(0.6)	(0.1)	(T)	(12.3)	(82.3)	(4.2)	(0.3)	(0.9)	

Table 12. Distribution of Upland Cover Classes (Continued)

Physio-graphic Unit	Transect ¹	Total Upland Area (in ha)	Percent of Total Upland in Cover ²									
			Native					Planted				
			Grass	Low Shrub	Tall Shrub	Trees	Total	Annual Crops ³	Perennial Grass & Forbs	Trees & Shrubs	Other	
<u>(Lacustrine - U, Cont'd)</u>												
2.52	Gravelbourg East	1,344	0.9	0.1	0.1	0.3	1.4	97.6	0.5	T	0.5	
	Shamrock West	757	1.6	0.0	T	T	1.6	95.8	1.7	0.2	0.7	
		(2,101)	(1.1)	(0.1)	(0.1)	(0.2)	(1.5)	(97.0)	(0.9)	(0.1)	(0.5)	
2.58	Grand Coulee	1,494	1.2	T	0.0	0.0	1.2	97.3	0.4	0.3	0.8	
	Riceton	1,428	1.6	T	0.0	0.0	1.6	97.2	0.4	0.2	0.6	
		(2,922)	(1.4)	(T)	(T)	(0.0)	(1.4)	(97.3)	(0.4)	(0.2)	(0.7)	
2.59	Marquis East/West)	1,456	3.7	T	T	T	3.7	94.4	0.3	0.5	1.1	
2.67	Cabri Lake	1,508	0.2	0.0	0.0	0.0	0.2	98.4	1.0	0.1	0.3	
2.68	Eston	1,476	6.2	0.6	T	T	6.8	92.0	0.7	0.2	0.3	
2.71	Milden	1,543	5.8	0.3	0.1	T	6.2	85.5	4.7	2.6	1.0	
	Wiseton	776	2.4	0.1	0.0	0.0	2.5	94.2	2.7	0.3	0.3	
		(2,319)	(4.7)	(0.2)	(0.1)	(T)	(5.0)	(88.5)	(4.0)	(1.8)	(0.7)	
<u>(Lacustrine - D)</u>												
2.64	Success	1,521	6.8	0.5	T	T	7.3	84.0	6.8	0.5	1.4	
<u>(Eolian - D)</u>												
2.47	Neidpath	1,555	8.8	0.7	T	T	9.5	83.7	5.7	0.4	0.7	
	Swift Current	1,033	10.7	1.5	T	T	12.2	78.3	7.8	0.6	1.1	
		(2,588)	(9.6)	(1.0)	(T)	(T)	(10.6)	(81.5)	(6.5)	(0.5)	(0.9)	
Ecoregion Sample		34,285	9.2	0.8	0.1	T	10.1	86.4	2.3	0.4	0.8	

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

2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.

3. Includes summerfallow.

4. T = trace = less than 0.05 percent.

Table 13. Distribution of Upland Land Use Activity Classes

Physio-graphic Unit	Transect ¹	Percent of Total Upland Area in Land Use Activity ²								
		Total Upland Area (in ha) ²	Unused	Abandoned	Annual Crops ³	Forage	Grazing	Farmsteads	Roads & Railways	Other
<u>(Morainal - K&K)</u>										
2.55	Dummer	1,325	5.0	0.1	67.4	T	25.4	0.7	1.4	T
	Thunder Creek	1,444	12.2	1.4	66.7	T	17.8	0.3	1.3	0.3
		(2,769)	(8.8)	(0.8)	(67.0)	(T)	(21.4)	(0.5)	(1.3)	(0.2)
2.56	Ceylon	1,439	2.5	0.7	73.4	0.3	22.0	0.1	1.0	T
2.62	Shamrock East	1,122	1.7	0.3	70.2	0.9	24.3	0.4	2.2	T
2.72	Tichfield	1,465	4.2	0.3	84.9	0.3	7.8	0.4	2.1	T
<u>(Morainal - H)</u>										
2.14	Golden Prairie	1,529	1.6	0.2	89.0	0.0	7.1	0.4	1.7	T
2.51	Gravelbourg West	1,379	1.2	0.2	94.7	0.0	1.5	1.4	1.0	T
2.60	Marquis Central	1,368	0.6	0.6	96.1	0.0	0.2	0.5	2.0	0.0
<u>(Morainal - U)</u>										
2.46	Scotsguard	1,503	0.8	0.1	92.8	1.1	1.2	1.2	2.5	0.3
2.57	Fillmore West	1,355	0.6	0.2	85.7	0.2	9.9	1.1	2.0	0.3
	Goodwater	1,494	1.3	0.8	77.8	0.9	15.1	1.0	2.7	0.4
		(2,849)	(1.0)	(0.5)	(81.5)	(0.6)	(12.6)	(1.1)	(2.4)	(0.3)
<u>(Lacustrine - U)</u>										
2.13	Carmichael	1,506	2.6	0.6	67.2	4.8	18.7	0.6	4.5	1.0
	Portreeve	1,465	0.1	0.4	97.8	T	0.0	0.7	1.0	T
		(2,971)	(1.4)	(0.5)	(82.3)	(2.4)	(9.5)	(0.6)	(2.8)	(0.5)

Table 13. Distribution of Upland Land Use Activity Classes (Continued)

Physio-graphic Unit	Transect ¹	Total Upland Area (in ha) ²	Percent of Total Upland Area in Land Use Activity ²							
			Unused	Abandoned	Annual Crops ³	Forage	Grazing	Farmsteads	Roads & Railways	Other
<u>(Lacustrine -U, Cont'd)</u>										
2.52	Gravelbourg East	1,344	1.4	T	97.6	0.0	0.1	0.6	0.3	T
	Shamrock West	757	0.6	0.1	95.8	0.1	0.5	0.5	2.1	0.3
		(2,101)	(1.1)	(0.1)	(97.0)	(T)	(0.2)	(0.6)	(0.9)	(0.1)
2.58	Grand Coulee	1,494	0.1	0.1	97.3	0.1	0.0	1.0	1.2	0.2
	Riceton	1,428	0.3	0.4	97.3	0.0	0.0	0.4	1.6	T
		(2,922)	(0.2)	(0.2)	(97.3)	(T)	(0.0)	(0.8)	(1.4)	(0.1)
2.59	Marquis East/West	1,456	0.1	1.1	94.4	0.0	0.5	1.0	2.7	0.2
2.67	Cabri Lake	1,508	0.0	0.4	98.5	0.0	0.0	0.4	0.7	T
2.68	Eston	1,476	4.4	T	92.0	0.0	1.4	0.9	1.3	T
2.71	Milden	1,543	1.9	1.7	85.6	4.2	1.4	3.3	1.9	T
	Wiseton	776	3.4	0.2	94.3	0.0	0.0	0.7	1.4	T
		(2,319)	(2.4)	(1.2)	(88.5)	(2.8)	(0.9)	(2.4)	(1.8)	(T)
<u>(Lacustrine - D)</u>										
2.64	Success	1,521	2.8	1.5	83.9	2.0	5.7	0.5	2.1	1.5
<u>(Eolian -D)</u>										
2.47	Neidpath	1,555	3.0	0.7	83.7	2.0	6.9	0.8	2.9	T
	Swift Current	1,033	1.8	0.2	78.2	3.9	11.7	1.3	2.6	0.3
		(2,588)	(2.5)	(0.5)	(81.5)	(2.8)	(8.8)	(1.0)	(2.8)	(0.1)
Ecoregion Sample		34,285	2.2	0.5	86.4	0.9	7.2	0.8	1.8	0.2

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

2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.

3. Includes summerfallow.

4. T = trace = less than 0.05 percent

Table 14. Examples of Variability in Wetland Cover Data

Physio-graphic Unit	Transect ¹	Area in Hectares Per Quarter Section											
		Cultivated ²					Grass ²					Willows ²	
		Mean	S.E. ³	C.V. ⁴	Mean	S.E.	C.V.	Mean	S.E.	C.V.	Mean	S.E.	C.V.
2.55	<u>(Morainal - K&K)</u> Dummer Thunder Creek	0.7	1.2	8.2	6.6	1.8	1.4	5.5	1.8	1.4	1.4	0.0	0.2
		0.3	0.1	0.7	3.6	1.3	1.8	0.0	0.0	1.8	0.0	0.0	0.0
		(0.5)	(0.4)	(5.9)	(5.1)	(1.4)	(1.9)	(T)	(T)	(1.9)	(T)	(T)	(0.2)
2.56	Ceylon	0.3	0.1	1.4	5.2	1.7	1.6	T	0.0	0.0	0.0	0.3	
2.62	Shamrock East	0.4	T	0.4	3.6	0.6	0.7	0.0	0.0	0.0	0.0	0.0	
2.72	Tichfield	1.3	1.5	6.0	2.9	0.8	1.3	0.1	0.1	1.3	T	0.6	
2.14	<u>(Morainal - H)</u> Golden Prairie	0.7	0.2	1.8	1.2	0.6	2.3	0.0	0.0	0.0	0.0	0.1	
		1.2	0.5	1.9	1.3	0.4	1.5	0.0	0.0	0.0	0.0	0.0	
2.51	Gravelbourg West	2.3	0.3	0.6	1.7	0.6	1.6	0.0	0.0	0.0	0.0	T	
2.46	<u>(Morainal - U)</u> Scotsguard	0.9	0.4	1.9	0.6	0.2	1.3	0.0	0.0	0.0	0.0	0.0	
		2.6	4.3	8.0	2.6	5.7	10.2	T	0.0	0.0	0.0	0.3	
2.57	Fillmore West Goodwater	0.5	0.3	2.9	2.5	0.8	1.5	T	0.0	0.0	0.0	0.5	
		(1.5)	(1.7)	(7.6)	(2.6)	(2.1)	(5.6)	(T)	(T)	(T)	(T)	(0.4)	
2.13	<u>Lacustrine - U)</u> Carmichael Portreeve	1.2	4.6	19.2	1.3	0.7	2.5	T	0.0	0.0	0.0	0.4	
		3.9	10.5	13.2	1.0	2.2	10.5	0.0	0.0	0.0	0.0	0.0	
		(2.5)	(5.5)	(15.0)	(1.2)	(1.0)	(5.9)	(T)	(T)	(T)	(T)	(0.4)	

Table 14. Examples of Variability in Wetland Cover Data (Continued)

Physio-graphic Unit	Transect ¹	Area in Hectares Per Quarter Section											
		Cultivated ²					Grass ²					Willows ²	
		Mean	S.E. ³	C.V. ⁴	Mean	S.E.	C.V.	Mean	S.E.	C.V.	Mean	S.E.	C.V.
<u>(Lacustrine - U, Cont'd)</u>													
2.52	Gravelbourg East	2.9	5.0	8.2	0.3	0.1	1.4	0.0	0.0	0.0	0.0	0.0	
	Shamrock West	11.9 (6.4)	119.1 (33.3)	37.5 (31.4)	0.7 (0.5)	0.5 (0.2)	2.6 (2.1)	0.0 (T)	0.0 (T)	0.0 (T)	0.0 (T)	0.0 (T)	
2.58	Grand Coulee	3.2	3.3	5.1	0.5	0.7	7.3	0.0	0.0	0.0	0.0	0.0	
	Riceton	6.0 (4.6)	9.3 (4.7)	7.6 (7.0)	0.1 (0.3)	T (0.3)	1.2 (6.4)	0.0 (T)	0.0 (T)	0.0 (T)	0.0 (T)	0.0 (T)	
2.59	Marquis East/West	5.4	32.0	29.1	0.4	0.1	1.5	0.0	0.0	0.0	0.0	0.1	
2.67	Cabri Lake	3.5	3.4	4.8	T	0.0	0.1	0.0	0.0	0.0	0.0	0.0	
2.68	Eston	2.2	1.6	3.4	0.8	1.2	7.3	0.0	0.0	0.0	0.0	0.0	
2.71	Milden	1.1	1.1	4.9	0.6	0.5	3.9	0.0	0.0	0.0	0.0	T	
	Wiseton	1.2 (1.1)	1.6 (0.9)	4.7 (4.7)	T (0.4)	0.0 (0.3)	0.1 (4.0)	0.0 (T)	0.0 (T)	0.0 (T)	0.0 (T)	0.0 (T)	
<u>(Lacustrine -D)</u>													
2.64	Success	0.9	1.0	5.2	1.6	1.5	4.7	0.0	0.0	0.0	0.0	0.0	
<u>(Folian - D)</u>													
2.47	Neidpath	0.4	0.1	1.1	1.8	5.2	14.2	0.0	0.0	0.0	0.0	0.1	
	Swift Current	0.2 (0.3)	T (0.1)	0.6 (1.0)	1.4 (1.6)	2.1 (2.9)	5.9 (11.1)	0.0 (T)	0.0 (T)	0.0 (T)	0.0 (0.1)	0.0 (0.1)	
Ecoregion Sample		2.1	1.3	15.2	1.7	0.3	4.7	T	T	T	T	0.4	

1. Grouped by landform (parent soil material and surface form).
 2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.
 3. S.E. = Standard Error
 4. C.V. = Coefficient of Variation
 5. T = trace = less than 0.05 percent.

Table 15. Examples of Variability in Upland Cover Data

Physio-graphic Unit	Transect ¹	Area in Hectares Per Quarter Section																			
		Cropland ²					Native Grass ²					Native Trees ²									
		Mean	S.E. ³	C.V. ⁴	Mean	S.E.	C.V.	Mean	S.E.	C.V.	Mean	S.E.	C.V.								
	(Morainal - K&K)																				
2.55	Dummer	37.2	76.3	10.0	16.2	60.8	18.4														
	Thunder Creek	40.1 (38.7)	99.5 (61.2)	12.2 (11.0)	16.2 (16.2)	76.3 (47.4)	23.1 (20.3)														
2.56	Ceylon	44.0	98.6	11.0	13.7	72.3	25.9														
2.62	Shamrock East	43.7	124.5	12.1	14.3	108.5	32.2														
2.72	Tichfield	51.8	35.8	3.4	6.6	23.2	17.3														
	(Morainal - H)																				
2.14	Golden Prairie	56.6	33.6	2.9	5.8	26.3	22.4														
2.51	Gravelbourg West	59.4	7.4	0.6	1.8	2.0	5.3														
2.60	Marquis Central	59.7	2.2	0.2	1.8	0.3	0.9														
	(Morainal - U)																				
2.46	Scotsguard	58.0	33.2	2.8	1.8	2.7	7.3														
2.57	Fillmore West	52.8	75.1	6.7	7.3	43.4	27.9														
	Goodwater	48.4 (50.5)	80.7 (54.8)	8.2 (7.4)	8.2 (7.8)	20.8 (21.7)	12.5 (19.0)														
	(Lacustrine - U)																				
2.13	Carmichael	42.1	79.1	9.2	13.7	50.2	18.0														
	Portreeve	59.7 (50.9)	15.7 (44.1)	1.3 (6.0)	0.7 (7.2)	0.2 (23.6)	1.4 (22.9)														

Table 15. Examples of Variability in Upland Cover Data (Continued)

Physio- graphic Unit	Transect ¹	Area in Hectares Per Quarter Section																		
		Cropland ²			Native Grass ²			Native Trees ²												
		Mean	S.E. ³	C.V. ⁴	Mean	S.E.	C.V.	Mean	S.E.	C.V.										
	(Lacustrine - U, Cont'd)																			
2.52	Gravelbourg East	59.6	21.1	1.7	0.6	0.7	6.4	0.2	0.1	1.9										
	Shamrock West	51.8 (56.6)	137.9 (44.3)	10.0 (4.7)	0.9 (0.7)	0.6 (0.5)	2.7 (4.5)	T (0.1)	0.0 (T)	0.2 (1.8)										
2.58	Grand Coulee	60.6	6.9	0.6	0.8	0.2	1.2	0.0	0.0	0.0										
	Riceton	57.9 (59.2)	10.7 (6.4)	0.9 (0.7)	0.9 (0.9)	0.1 (0.1)	0.7 (0.9)	0.0 (0.0)	0.0 (0.0)	0.0 (0.0)										
2.59	Marquis East/West	57.3	33.7	2.9	2.3	1.1	2.4	0.0	0.0	T										
2.67	Cabri Lake	61.9	4.2	0.3	0.1	0.1	2.3	0.0	0.0	0.0										
2.68	Eston	56.6	27.9	2.4	3.8	9.7	12.5	T	0.0	0.3										
2.71	Milden	55.0	43.3	3.9	3.8	3.6	4.7	T	0.0	0.3										
	Wiseton	60.9 (57.0)	10.8 (26.6)	0.6 (2.8)	1.6 (3.0)	0.3 (2.2)	0.7 (4.3)	0.0 (T)	0.0 (T)	0.0 (0.3)										
2.64	(Lacustrine - D) Success	53.2	29.1	2.7	4.3	7.4	8.4	0.0	0.0	0.1										
2.47	(Eolian - D) Neidpath	54.2	37.9	3.4	5.7	22.2	19.0	T	0.0	0.1										
	Swift Current	50.5 (52.7)	116.0 (46.1)	9.2 (5.5)	6.9 (6.2)	40.4 (20.1)	23.5 (20.5)	0.0 (T)	0.0 (T)	0.0 (0.1)										
Ecoregion Sample		53.7	11.1	4.9	5.7	5.5	23.0	T	T	0.8										

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

2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.

3. S.E. = Standard Error

4. C.V. = Coefficient of Variation

5. T = trace = less than 0.05 percent.

Table 16. Examples of Variability in Upland Land Use Data

Physio-graphic Unit	Transect ¹	Area in Hectares Per Quarter Section											
		Unused ²			Grazing ²			Roads & Railways ²					
		Mean	S.E. ³	C.V. ⁴	Mean	S.E.	C.V.	Mean	S.E.	C.V.			
	(<u>Morainal - K&K</u>)												
2.55	Dummer	2.8	2.4	4.3	14.0	73.4	25.6	0.8	0.1	0.4			
	Thunder Creek	7.3 (5.1)	41.6 (16.0)	27.8 (22.0)	10.7 (12.4)	79.5 (53.3)	36.5 (29.9)	0.8 (0.8)	0.1 (0.1)	0.8 (0.6)			
2.56	Ceylon	1.5	2.3	7.5	13.2	96.5	35.8	0.6	0.1	1.0			
2.62	Shamrock East	1.1	1.9	7.6	15.2	122.9	34.4	1.4	0.3	0.8			
2.72	Tichfield	2.6	3.9	7.4	4.7	30.1	31.1	1.3	0.1	0.4			
	(<u>Morainal - H</u>)												
2.14	Golden Prairie	1.0	0.6	3.0	4.5	28.0	30.4	1.1	0.1	0.5			
2.51	Gravelbourg West	0.8	0.5	3.0	0.9	2.0	10.1	0.6	0.2	1.3			
2.60	Marquis Central	0.4	0.1	1.5	0.1	0.1	2.6	1.3	0.3	1.0			
	(<u>Morainal - U</u>)												
2.46	Scotsguard	0.5	0.1	1.0	0.8	2.0	12.8	1.6	0.1	0.3			
2.57	Fillmore West	0.4	0.1	0.8	6.1	51.6	39.8	1.2	T ⁵	0.2			
	Goodwater	0.8 (0.6)	0.1 (0.1)	0.8 (0.9)	9.4 (7.8)	70.3 (43.0)	36.6 (37.3)	1.7 (1.5)	0.1 (0.1)	0.3 (0.3)			
	(<u>Lacustrine - U</u>)												
2.13	Carmichael	1.7	1.2	3.6	11.7	63.6	26.6	2.8	1.3	2.3			
	Portreeve	0.1 (0.9)	T (0.5)	1.0 (4.2)	0.0 (5.9)	0.0 (27.1)	0.0 (32.0)	0.6 (1.7)	0.3 (0.7)	2.2 (3.0)			

Table 16. Examples of Variability in Upland Land Use Data (Continued)

Physio-graphic Unit	Transect ¹	Area in Hectares Per Quarter Section																		
		Unused ²			Grazing ²			Roads & Railways ²												
		Mean	S.E. ³	C.V. ⁴	Mean	S.E.	C.V.	Mean	S.E.	C.V.										
	(Lacustrine - U, Cont'd)																			
2.52	Gravelbourg East	0.8	1.0	5.8	0.1	T	1.5	0.2	0.1	1.5	0.2	0.1	2.7							
	Shamrock West	0.3	0.2	2.0	0.3	0.3	3.6	1.1	0.7	3.6	0.7	2.5								
		(0.6)	(.76)	(5.1)	(0.1)	(0.1)	(2.9)	(0.5)	(0.3)	(2.9)	(0.3)	(2.8)								
2.58	Grand Coulee	0.1	T	1.0	0.0	0.0	0.0	0.7	0.3	0.0	0.3	1.7								
	Riceton	0.2	0.1	1.8	0.0	0.0	0.0	1.0	0.3	0.0	0.3	1.5								
		(0.1)	(T)	(1.6)	(0.0)	(0.0)	(0.0)	(0.8)	(0.2)	(0.0)	(0.2)	(1.6)								
2.59	Marquis East/West	0.1	0.0	0.2	0.3	0.1	2.0	1.7	0.6	2.0	0.6	1.7								
2.67	Cabri Lake	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2	0.0	0.2	1.5								
2.68	Eston	2.7	10.9	19.6	0.9	3.7	20.7	0.8	0.1	20.7	0.1	0.5								
2.71	Milden	1.2	0.8	3.2	0.9	3.0	16.5	1.2	0.1	16.5	0.1	0.2								
	Wiseton	2.2	8.8	13.9	0.0	0.0	0.0	0.9	T	0.0	T	0.1								
		(1.5)	(2.1)	(8.1)	(0.6)	(1.6)	(16.6)	(1.1)	(T)	(16.6)	(T)	(0.2)								
2.64	(Lacustrine - D) Success	1.8	0.8	2.1	3.6	17.8	24.2	1.3	0.1	24.2	0.1	0.3								
2.47	(Eolian - D) Neidpath	2.0	6.6	16.6	4.5	18.7	20.6	1.9	0.1	20.6	0.1	0.3								
	Swift Current	1.2	2.6	8.8	7.6	63.0	33.3	1.7	0.1	33.3	0.1	0.2								
		(1.6)	(3.7)	(14.4)	(5.7)	(24.3)	(26.9)	(1.8)	(0.1)	(26.9)	(0.1)	(0.3)								
	Ecoregion Sample	1.4	0.8	13.6	4.4	6.6	35.4	1.1	0.1	35.4	0.1	1.2								

1. Grouped by landform (parent soil material and surface form).
 2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.
 3. S.E. = Standard Error
 4. C.V. = Coefficient of Variation
 5. T = trace = less than 0.05 percent
 6. Data missing.

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

Number	Physiographic Unit ¹ Name	Estimated Area in Thousands of Hectares											
		Total Wetland Area	Cult- ivated	Willows and Trees	Grasses and Sedges	Bulrush/ Cattail	Trans- itional		Artif- icial		Saline Open Water	Other	
							Water	Open	Water	Open			
(Morainal - K&K)													
2.55	Missouri Coteau	79.7	4.9	0.2	48.7	2.5	0.0	15.9	0.3	7.1	0.1		
2.56	Missouri Coteau South	38.0	1.7	0.1	34.4	0.3	0.0	1.3	0.2	0.0	0.0		
2.62	Shamrock Upland	3.9	0.4	T ²	3.2	0.1	0.0	0.2	T	0.0	T		
2.72	Coteau Hills	23.3	6.2	0.2	14.2	0.1	0.0	1.0	1.6	0.0	T		
2.33	Oyen Upland South	13.9	0.5	0.5	7.6	0.0	0.0	0.7	T	4.6	0.0		
(Morainal - D)													
2.01	Cypress Hills Benchland	2.8	0.6	0.0	1.6	T	0.0	0.2	0.4	0.0	0.0		
(Morainal - H)													
2.14	Schuler Upland	9.4	3.0	T	4.1	0.0	0.0	0.0	0.1	2.2	T		
2.51	Lower Wood River Plain	5.6	2.2	0.0	2.3	0.6	0.0	0.3	0.2	0.0	0.0		
2.60	Eyebrow Hills Upland	9.6	5.3	T	4.0	0.0	0.0	0.2	0.1	0.0	0.0		
(Morainal - U)													
2.46	Shaunavon Plain	11.0	3.0	0.0	2.1	0.3	0.0	5.5	0.1	0.0	T		
2.57	Long Creek Plain	42.4	14.4	0.3	25.1	0.3	0.0	1.6	0.6	0.0	0.1		
Total Morainal ³		239.6	42.2	1.3	147.3	4.2	0.0	26.9	3.6	13.9	0.2		
Total Morainall ⁴		222.9	41.1	0.8	138.1	4.2	0.0	26.0	3.2	9.3	0.2		

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 2.01 and 2.33 in which the data samples are located in the Alberta portions of the units.

4. Summation of values from individual units excluding 2.01 and 2.33.

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

Physiographic Unit ¹ Number	Name	Estimated Area in Thousands of Hectares												
		Total Wetland Area	Cult- ivated	Willows and Trees	Grasses and Sedges	Bulrush/ Cattail	Trans- itional		Natural		Artif- icial		Saline Open Water	Other
							Open	Water	Open	Water	Open	Water		
<u>(Lacustrine - U)</u>														
2.13	Big Stick Lake Plain	48.8	30.4	0.1	13.9	2.6	0.0	1.0	0.1	0.6	0.1	0.6	0.1	
2.52	Notukeu Creek Plain	49.7	40.9	T	3.1	T	0.0	0.0	0.1	5.2	0.1	5.2	0.4	
2.58	Regina Plain	46.8	43.5	T	2.7	0.0	0.0	0.0	0.6	0.0	0.6	0.0	0.0	
2.59	Tuxford Plain	9.8	8.8	T	0.7	T	0.0	0.0	0.2	0.0	0.2	0.0	0.1	
2.67	Mantario Plain	3.8	3.8	0.0	T	0.0	0.0	0.0	T	0.0	T	0.0	0.0	
2.68	Kindersley Plain	47.2	22.9	0.0	8.5	2.2	0.0	13.3	0.3	0.0	0.3	0.0	0.0	
2.71	Eagle Creek Plain	12.0	8.0	T	2.9	0.4	0.0	0.1	0.4	0.0	0.4	0.0	0.2	
<u>(Lacustrine - D)</u>														
2.64	Antelope Lake Plain	5.6	1.9	0.0	3.2	0.4	0.0	0.1	T	0.0	T	0.0	0.0	
Total Lacustrine		223.7	160.2	0.1	35.0	5.6	0.0	14.5	1.7	5.8	1.7	5.8	0.8	
<u>(Eolian - D)</u>														
2.47	Rush Lake Creek Plain	7.2	1.0	T	5.6	0.1	0.0	0.0	0.5	0.0	0.5	0.0	0.0	
Total Eolian		7.2	1.0	T	5.6	0.1	0.0	0.0	0.5	0.0	0.5	0.0	0.0	
Total for Entire Sampled Portion of Ecoregion		470.5 453.8 430.8	203.4 202.3 200.3	1.4 0.9 0.9	187.9 178.7 167.1	9.9 9.9 8.6	0.0 0.0 0.0	41.4 40.5 31.9	5.8 5.4 5.6	19.7 15.1 14.2	5.8 5.4 5.6	19.7 15.1 14.2	1.0 1.0 2.2	

5. Based on summation of values from individual physiographic units including 2.01 and 2.33.
 6. Based on summation of values from individual physiographic units excluding 2.01 and 2.33.
 7. Based on the analysis of the ecoregion sample as a single unit excluding 2.01 and 2.33.

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

Physiographic Unit Number	Physiographic Unit Name	Total Number of Wetlands	Estimated Number of Wetlands (in Thousands)									
			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 - K&K)</u>												
2.55	Missouri Coteau	135.6	24.7	0.5	98.7	1.0	0.0	7.2	2.4	1.0	0.1	
2.56	Missouri Coteau South	64.3	7.7	0.0	52.7	0.3	0.0	0.8	2.8	0.0	0.0	
2.62	Shamrock Upland	11.9	3.0	0.1	8.2	0.1	0.0	0.1	0.3	0.0	0.1	
2.72	Coteau Hills	72.1	24.7	0.2	44.8	0.2	0.0	0.4	1.6	0.0	0.2	
2.33	Oyen Upland South	75.5	11.6	1.7	59.8	0.0	0.0	0.6	0.9	0.9	0.0	
<u>(Morainal - D)</u>												
2.01	Cypress Hills Benchland	45.8	19.4	0.4	21.6	0.0	0.0	0.4	4.0	0.0	0.0	
<u>(Morainal - H)</u>												
2.14	Schuler Upland	13.8	6.1	0.0	6.1	0.0	0.0	0.0	0.7	0.7	0.2	
2.51	Lower Wood River Plain	11.7	6.6	0.0	3.6	0.2	0.0	0.2	1.1	0.0	0.0	
2.60	Eyebrow Hills Upland	36.9	28.5	0.0	7.1	0.0	0.0	0.2	1.1	0.0	0.0	
<u>(Morainal - U)</u>												
2.46	Shaunavon Plain	19.1	11.7	0.0	6.1	0.3	0.0	0.3	0.7	0.0	0.0	
2.57	Long Creek Plain	84.2	28.0	0.0	48.4	0.0	0.0	0.4	5.0	0.0	2.4	
Total Morainals ²		570.9	172.0	2.9	357.1	2.1	0.0	10.6	20.6	2.6	3.0	
Total Morainals ³		449.6	141.0	0.8	275.7	2.1	0.0	9.6	15.7	1.7	3.0	

1. Grouped by landform (parentsoil material and surface form).

2. Summation of values from individual units including 2.01 and 2.33 in which the data samples are located in the Alberta portions of the units.

3. Summation of values from individual units excluding 2.01 and 2.33.

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

Physiographic Unit ¹ 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>(Lacustrine - U)</u>											
2.13	Big Stick Lake Plain	40.7	17.3	0.2	16.6	0.8	0.0	1.4	3.7	0.2	0.5
2.52	Notukeu Creek Plain	25.9	21.2	0.2	2.7	0.2	0.0	0.0	0.9	0.2	0.5
2.58	Regina Plain	44.6	36.5	0.0	4.0	0.0	0.0	0.0	4.1	0.0	0.0
2.59	Tuxford Plain	10.3	7.6	0.1	1.0	0.1	0.0	0.0	1.4	0.0	0.1
2.67	Mantario Plain	2.5	2.3	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0
2.68	Kindersley Plain	22.3	16.7	0.0	1.8	0.0	0.0	0.8	3.0	0.0	0.0
2.71	Eagle Creek Plain	26.2	12.9	0.4	7.9	2.2	0.0	0.2	2.0	0.0	0.6
<u>(Lacustrine - D)</u>											
2.64	Antelope Lake Plain	9.1	4.9	0.0	3.3	0.2	0.0	0.1	0.4	0.0	0.2
Total Lacustrine		181.6	119.4	0.9	37.4	3.5	0.0	2.5	15.6	0.4	1.9
<u>(Eolian -D)</u>											
2.47	Rush Lake Creek Plain	11.8	4.2	0.0	6.4	0.0	0.0	0.0	1.2	0.0	0.0
Total Eolian		11.8	4.2	0.0	6.4	0.0	0.0	0.0	1.2	0.0	0.0
Total for Entire Sampled Portion of Ecoregion		764.3 643.0 656.4	295.6 264.6 292.1	3.8 1.7 2.0	400.9 319.5 305.9	5.6 5.6 5.9	0.0 0.0 0.0	13.1 12.1 10.5	37.4 32.5 33.4	3.0 2.1 2.0	4.9 4.9 4.6

4. Based on summation of values from individual physiographic units including 2.01 and 2.33.
 5. Based on summation of values from individual physiographic units excluding 2.01 and 2.33.
 6. Based on the analysis of the ecoregion sample as a single unit excluding 2.01 and 2.33.

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

Physiographic Unit Number	Physiographic Unit Name	Estimated Area in Thousands of Hectares						
		Total Wetland Area	No Use	Abandoned Cultivation	Annual Crops	Haying	Grazing	Other
<u>(Morainal - K&K)</u>								
2.55	Missouri Coteau	79.7	48.2	1.4	4.9	0.2	24.9	0.1
2.56	Missouri Coteau South	38.0	16.6	0.2	1.7	2.0	17.5	T ²
2.62	Shamrock Upland	3.9	0.9	0.2	0.4	1.2	1.2	T
2.72	Coteau Hills	23.3	10.4	1.9	6.1	T	4.6	0.3
2.33	Oyen Upland South	13.9	9.1	0.1	0.5	0.1	4.1	0.0
<u>(Morainal -D)</u>								
2.01	Cypress Hills Benchland	2.8	0.1	0.1	0.6	0.1	1.7	0.2
<u>(Morainal - H)</u>								
2.14	Schuler Upland	9.4	4.1	0.3	3.0	0.0	2.0	0.0
2.51	Lower Wood River Plain	5.6	2.7	0.2	2.2	0.2	0.2	0.1
2.60	Eyebrow Hills Upland	9.6	2.8	1.2	5.3	0.0	0.3	T
<u>(Morainal - U)</u>								
2.46	Shaunavon Plain	11.0	7.6	0.1	3.1	T	0.1	0.1
2.57	Long Creek Plain	42.4	11.4	1.6	14.4	0.7	13.7	0.6
Total Morainal ³		239.6	113.9	7.3	42.2	4.5	70.3	1.4
Total Morainall ⁴		222.9	104.7	7.1	41.1	4.3	64.5	1.2

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 2.01 and 2.33 in which the data samples are located in the Alberta portions of the units.

4. Summation of values from individual units excluding 2.01 and 2.33.

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

Physiographic Unit Number	Total Wetland Area	Estimated Area in Thousands of Hectares					
		No Use	Abandoned Cultivation	Annual Crops	Haying	Grazing	Other
<u>(Lacustrine - U)</u>							
2.13	48.8	7.1	6.1	30.4	1.0	4.1	0.1
2.52	49.7	7.3	0.2	40.9	0.0	0.6	0.6
2.58	46.8	0.4	0.1	43.6	0.0	1.7	1.0
2.59	9.8	0.5	0.3	8.8	0.0	0.1	0.1
2.67	3.8	T	0.0	3.8	0.0	0.0	T
2.68	47.2	18.1	6.2	22.9	0.0	0.0	T
2.71	12.0	2.5	1.1	8.1	T	0.2	0.1
<u>(Lacustrine - D)</u>							
2.64	5.6	1.3	0.9	1.9	0.0	1.4	0.1
Total Lacustrine	223.7	37.2	14.9	160.4	1.0	8.1	2.0
<u>(Eolian - D)</u>							
2.47	7.2	3.1	0.1	1.0	1.1	1.8	T
Total Eolian	7.2	3.1	0.1	1.0	1.1	1.8	T
Total for Entire Sampled Portion of Ecoregion	470.5	154.2	22.3	203.6	6.6	80.2	3.4
A ⁵	453.8	145.0	22.1	202.5	6.4	74.4	3.2
A ⁶	430.7	130.5	18.1	201.6	9.5	67.2	3.9
B ⁷							

5. Based on summation of values from individual physiographic units including 2.01 and 2.33.

6. Based on summation of values from individual physiographic units excluding 2.01 and 2.33.

7. Based on the analysis of the ecoregion sample as a single unit excluding 2.01 and 2.33.

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

Physiographic Unit ¹ Number Name		Estimated Area in Thousands of Hectares									
		Native					Planted				
		Total Upland Area	Grass Shrub	Low Shrub	Tall Shrub	Trees	Total	Annual Crops	Perennial Grasses and Forbs	Trees and Shrubs	Other
<u>(Morainal - K&K)</u>											
2.55	Missouri Coteau	551.4	154.9	9.4	0.5	T ²	164.8	370.0	11.0	1.7	3.9
2.56	Missouri Coteau South	395.1	90.0	9.9	0.4	T	100.3	290.0	2.8	0.8	1.2
2.62	Shamrock Upland	56.5	13.0	1.3	T	T	14.3	39.6	1.8	0.1	0.7
2.72	Coteau Hills	295.0	31.6	4.4	1.2	0.9	38.1	250.4	4.4	1.5	0.6
2.33	Oyen Upland South	193.3	83.5	5.4	0.6	0.2	89.7	91.4	10.2	0.4	1.6
<u>(Morainal - D)</u>											
2.01	Cypress Hills Benchland	187.0	33.1	2.4	0.4	0.0	35.9	140.2	9.2	0.2	1.5
<u>(Morainal - H)</u>											
2.14	Schuler Upland	222.4	20.0	T	T	T	20.0	197.9	3.6	0.2	0.7
2.51	Lower Wood River Plain	113.0	3.3	0.1	0.0	0.0	3.4	107.0	1.1	0.7	0.8
2.60	Eyebrow Hills Upland	144.2	4.0	T	0.2	T	4.2	138.6	0.6	0.4	0.4
<u>(Morainal - U)</u>											
2.46	Shaunavon Plain	212.9	6.2	T	T	T	6.2	197.3	4.9	1.5	3.0
2.57	Long Creek Plain	603.1	75.4	15.1	0.6	T	91.1	491.5	10.8	2.4	7.2
Total Morainals ³		2,973.8	515.0	48.0	3.9	1.1	568.0	2,313.9	60.4	9.9	21.6
Total Morainals ⁴		2,593.5	398.4	40.2	2.9	0.9	442.4	2,082.3	41.0	9.3	18.5

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 2.01 and 2.33 in which the data samples are located in the Alberta portions of the units.

4. Summation of values from individual units excluding 2.01 and 2.33.

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

Physiographic Unit ¹ Number	Estimated Area in Thousands of Hectares										
	Native					Planted					
	Total Upland Area	Grass	Low Shrub	Tall Shrub	Trees	Total	Annual Crops	Perennial Grasses and Forbs	Trees and Shrubs	Other	
<u>(Lacustrine - U)</u>											
2.13	Big Stick Lake Plain	741.8	86.0	4.5	0.7	T	91.2	610.5	31.2	2.2	6.7
2.52	Notukeu Creek Plain	375.5	4.1	0.4	0.4	0.7	5.6	364.2	3.4	0.4	1.9
2.58	Regina Plain	576.7	8.1	T	T	0.0	8.1	561.1	2.3	1.2	4.0
2.59	Tuxford Plain	99.6	3.7	T	T	T	3.7	94.0	0.3	0.5	1.1
2.67	Mantario Plain	68.3	0.1	0.0	0.0	0.0	0.1	67.2	0.7	0.1	0.2
2.68	Kindersley Plain	632.5	39.2	3.8	T	T	43.0	581.9	4.4	1.3	1.9
2.71	Eagle Creek Plain	456.7	21.4	0.9	0.5	T	22.8	404.2	18.3	8.2	3.2
<u>(Lacustrine - D)</u>											
2.64	Antelope Lake Plain	126.5	8.6	0.6	T	T	9.2	106.3	8.6	0.6	1.8
Total Lacustrine		3,077.6	171.2	10.2	1.6	0.7	183.7	2,789.4	69.2	14.5	20.8
<u>(Eolian - D)</u>											
2.47	Rush Lake Creek Plain	221.5	21.3	2.2	T	T	23.5	180.5	14.4	1.1	2.0
Total Eolian		221.5	21.3	2.2	T	T	23.5	180.5	14.4	1.1	2.0
Total for Entire Sampled Portion of Ecoregion		6,272.9	707.5	60.4	5.5	1.8	775.2	5,283.8	144.0	25.5	44.4
A ⁵		5,892.6	590.9	52.6	4.5	1.6	649.6	5,052.2	124.6	24.9	41.3
B ⁷		5,915.6	544.2	47.3	5.9	T	597.4	5,111.1	136.1	23.7	47.3

5. Based on summation of values from individual physiographic units including 2.01 and 2.33.

6. Based on summation of values from individual physiographic units excluding 2.01 and 2.33.

7. Based on the analysis of the ecoregion sample as a single unit excluding 2.01 and 2.33.

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

Physiographic Unit ¹ Number	Physiographic Unit Name	Estimated Area in Thousands of Hectares									
		Total Upland Area	Unused	Abandoned	Annual Crops	Forage	Grazing	Farmsteads	Roads and Railways	Other	Other
<u>(Morainal - K&K)</u>											
2.55	Missouri Coteau	551.4	48.5	4.4	369.4	T ²	118.0	2.8	7.2	1.1	
2.56	Missouri Coteau South	395.1	9.9	2.7	290.0	1.2	86.9	0.4	4.0	T	
2.62	Shamrock Upland	56.5	1.0	0.2	39.6	0.5	13.7	0.2	1.3	T	
2.72	Coteau Hills	295.0	12.4	0.9	250.4	0.9	23.0	1.2	6.2	T	
2.33	Oyen Upland South	193.3	12.0	1.0	91.4	5.4	78.5	1.0	4.0	T	
<u>(Morainal - D)</u>											
2.01	Cypress Hills Benchland	187.0	1.8	0.2	140.0	3.2	32.7	2.0	6.9	0.2	
<u>(Morainal - H)</u>											
2.14	Schuler Upland	222.4	3.6	0.4	197.9	0.0	15.8	0.9	3.8	T	
2.51	Lower Wood River Plain	113.0	1.4	0.2	107.0	0.0	1.7	1.6	1.1	T	
2.60	Eye-brow Hills Upland	144.2	0.9	0.9	138.5	0.0	0.3	0.7	2.9	0.0	
<u>(Morainal - U)</u>											
2.46	Shaunavon Plain	212.9	1.7	0.2	197.6	2.3	2.6	2.6	5.3	0.6	
2.57	Long Creek Plain	603.0	6.0	3.0	491.5	3.6	76.0	6.6	14.5	1.8	
Total Morainals ³		2,973.8	99.2	14.1	2,313.3	17.1	449.2	20.0	57.2	3.7	
Total Morainals ⁴		2,593.5	85.4	12.9	2,081.9	8.5	338.0	17.0	46.3	3.5	

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 2.01 and 2.33 in which the data samples are located in the Alberta portions of the units.

4. Summation of values from individual units excluding 2.01 and 2.33.

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

Physiographic Unit Number	Physiographic Unit Name	Estimated Area in Thousands of Hectares									
		Total Upland Area	Unused	Abandoned	Annual Crops	Forage	Grazing	Farm- steads	Roads and Railways	Other	Other
<u>(Lacustrine - U)</u>											
2.13	Big Stick Lake Plain	741.8	10.4	3.7	610.5	17.8	70.5	4.4	20.8	3.7	
2.52	Notukeu Creek Plain	375.5	4.1	0.4	364.3	T	0.8	2.3	3.2	0.4	
2.58	Regina Plain	576.7	1.2	1.2	561.1	T	0.0	4.6	8.0	0.6	
2.59	Tuxford Plain	99.6	0.1	1.1	94.0	0.0	0.5	1.0	2.7	0.2	
2.67	Mantario Plain	68.3	0.0	0.3	67.2	0.0	0.0	0.3	0.5	T	
2.68	Kindersley Plain	632.5	27.8	T	581.9	0.0	8.9	5.7	8.2	T	
2.71	Eagle Creek Plain	456.7	11.0	5.5	404.2	12.7	4.1	11.0	8.2	T	
<u>(Lacustrine - D)</u>											
2.64	Antelope Lake Plain	126.5	3.5	1.9	106.2	2.5	7.2	0.6	2.7	1.9	
Total Lacustrine		3,077.6	58.1	14.1	2,789.4	33.0	92.0	29.9	54.3	6.8	
<u>(Eolian - D)</u>											
2.47	Rush Lake Creek Plain	221.5	5.6	1.1	180.5	6.2	19.5	2.2	6.2	0.2	
Total Eolian		221.5	5.6	1.1	180.5	6.2	19.5	2.2	6.2	0.2	
Total for Entire Sampled Portion of Ecoregion		6,272.9	162.9	29.3	5,283.2	56.3	560.7	52.1	117.7	10.7	
A ⁵		5892.6	149.1	28.1	5,051.8	47.7	449.5	49.1	106.8	10.5	
A ⁶		5,915.6	130.2	29.6	5,111.1	53.2	425.9	47.3	106.5	11.8	
B ⁷											

5. Based on summation of values from individual physiographic units including 2.01 and 2.33.

6. Based on summation of values from individual physiographic units excluding 2.01 and 2.33.

7. Based on the analysis of the ecoregion sample as a single unit excluding 2.01 and 2.33.

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

Physiographic Unit ¹ Number	Name	Percent of Wetland Area			Percent of Upland Area			Area of Unit in 1000's of Hectares	Rating as Waterfowl Production Habitat ²	
		Wetlands	Grass	Bulrush/Cattail	Natural Fresh Water	That is Unused	In Native and Seeded Grass and Shrub Cover			That is Unused
2.55	Missouri Coteau	12.6	61.1	3.1	20.0	60.5	31.9	8.8	631.1	1 / 1 / 1
2.56	Missouri Coteau South	8.8	90.5	0.9	3.3	43.8	26.1	2.5	433.1	3*/2 /3*/4*
2.72	Coteau Hills	7.3	60.7	0.6	4.2	44.5	14.4	4.2	318.3	4*/1 /4*/4*
2.33	Oyen Upland South ³	6.7	54.7	0.0	5.4	1.9	24.1	1.0	189.8 ⁴	4*/3 /4 /4*
2.57	Long Creek Plain	6.6	59.1	0.7	3.9	26.8	16.9	1.0	645.5	4*/2 /4 /4*
2.62	Shamrock Upland	6.5	81.8	2.3	5.5	23.9	28.6	1.7	60.4	4*/2 /4*/4*
2.60	Eyebrow Hills Upland	6.2	42.0	0.0	1.7	28.8	3.3	0.6	153.8	4 /4*/4 /4
2.46	Shaunavon Plain	4.9	19.1	2.5	49.5	69.4	5.2	0.8	223.9	3 /2 /3 /3
2.51	Lower Wood River Plain	4.7	41.8	10.3	5.1	49.5	4.0	1.2	118.6	3 /2 /3 /3
2.14	Schuler Upland	4.1	43.5	0.0	0.0	43.9	10.6	1.6	231.8	4 /4*/4*/4*
2.01	Cypress Hills Benchland	1.5	56.3	1.0	7.8	65.7	5.7	6.2	207.2 ⁴	4*/2 /4*/4*

1. Physiographic units are arranged in order of diminishing proportion of wetland area in the landscape.

2. Four waterfowl production ratings have been calculated for each unit using the minimum rating values for, sequentially, 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 and natural fresh open water.

3. Sampled in Alberta portion of the unit.

4. Area in Saskatchewan only.

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

Physio- graphic Unit	Transect ¹	Numbers of Quarters ²		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 - K&K)</u>				
2.55	Dummer	24	14	58.3	61
	Thunder Creek	24	8	33.3	62
		(48)	(22)	(45.8)	
2.56	Ceylon	24	13	54.2	60
2.62	Shamrock East	18	9	50.0	61
2.72	Tichfield	24	11	45.8	62
	<u>(Morainial - H)</u>				
2.14	Golden Prairie	24	9	37.5	62
2.51	Gravelbourg West	22	9	40.9	64
2.60	Marquis Central	22	13	59.1	61
	<u>(Morainial - U)</u>				
2.46	Scotsguard	24	5	20.8	62
2.57	Fillmore West	22	4	18.2	60
	Goodwater	24	12	50.0	60
		(46)	(16)	(34.8)	
	<u>(Lacustrine - U)</u>				
2.13	Carmichael	24	11	45.8	63
	Portreeve	24	3	12.5	63
		(48)	(14)	(29.2)	
2.52	Gravelbourg East	22	3	13.6	64
	Shamrock West	14	1	7.1	61
		(36)	(4)	(11.1)	
2.58	Grand Coulee	24	5	20.8	64
	Riceton	24	9	37.5	64
		(48)	(14)	(29.2)	
2.59	Marquis East/West	24	6	25.0	61
2.67	Cabri Lake	24	1	4.2	63
2.68	Eston	24	6	25.0	63
2.71	Milden	24	7	29.2	64
	Wiseton	12	10	83.3	63
		(36)	(17)	(47.2)	

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

Physio- graphic Unit	Transect ¹	Numbers of Quarters ²		Percent of Quarters Affected	Time Interval from May 1985 to Ground Truth Survey (in months)
		In Sample	Affected by Land Use/ Cover Changes		
2.64	(Lacustrine - D) Success	24	5	20.8	63
2.47	(Eolian -D) Neidpath	24	7	29.2	61
	Swift Current	16 (40)	4 (11)	25.0 (27.5)	61
Ecoregion Sample		604	185	30.6	

1. Grouped by landform (parent soil material and surface form).
2. Figures in parentheses are composite values for those transects occurring within one physiographic unit.