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

Report #5: Alberta Mixedgrass Prairie

Prairie Habitat Monitoring Project

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ABSTRACT

This report presents data for 16 transects in 13 physiographic units in the Alberta Mixedgrass Prairie. These units account for just over half of the total area of the ecoregion. Habitat conditions in two units, the Fincastle Plain and Matzhiwin Plain, are atypical of the ecoregion in that they are modified by irrigation.

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 reasonably close to the level of occurrence of most of those categories within the Alberta Mixedgrass Prairie but not as close as it was for Alberta Parkland.

For the ecoregion sample as a whole:

(a) The distribution of sampling on various soil parent materials and landforms is much broader than it was for Alberta Parkland. Six of the sampled physiographic units are on morainal material, four are on lacustrine and three on fluvial terrain.

(b) Wetland area averages 4.4 percent of the total land area of sampled physiographic units. This compares to 9.9 percent recorded for Alberta Parkland.

(c) An overwhelming proportion of wetland numbers (87.7

percent) and wetland area (81.8 percent) are temporary or seasonal in nature.

(d) Only 2.4 percent of the wetland area and 1.5 percent of wetland numbers are classed as permanent water (natural, fresh open water). This is only a fraction of the level recorded for Alberta Parkland.

(e) Less than one fifth of the wetland area is not subjected to any human use. Grazing occurs on 60.5 percent of the wetland area, over one and a half times the amount in Alberta Parkland.

(f) Three fifths (60.9 percent) of the total upland area is in annual crops compared to 63.8 percent in Alberta Parkland. Native cover occurs on 29.6 percent of the upland compared to 28.0 percent in Alberta Parkland.

(g) Grazing occurs on 27.8 percent of the uplands compared to 21.5 percent in Alberta Parkland.

(h) One physiographic unit, the Oyen Upland south, is rated as having the best habitat for waterfowl production in the sampled part of the morainal portion of the ecoregion. However, when it is rated in comparison to Parkland units it only rates as a three. All other sampled morainal Mixedgrass Prairie Units are bottom-rated as fours. 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 all morainal units.

TABLE OF CONTENTS

LIST OF TABLES

## LIST OF FIGURES

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

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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 Alberta Mixedgrass Prairie will be discussed.

### A. Delineation of Physiographic Units

Boundary changes from those delineated by Adams (1984) - These have affected all of the physiographic units in the mapped area to a greater or less degree.

Redefinition of physiographic units - In Alberta Mixedgrass Prairie six physiographic units have been redefined. Four of these, Neutral Upland, Monitor Hills, Coronation Plain and Rumsey Upland, were originally considered mixedgrass prairie units (Nos. 2.35, 2.37, 2.38 and 2.40, respectively) by Adams but have been

transferred to parkland on the basis of a redefinition of the grassland-parkland boundary. Oyen Upland (2.33) has been divided into two units on the basis of the presence of aspen parkland in part of the area. Oyen Upland North (4.94) has been placed in parkland while Oyen Upland South (2.33) remains as part of the Mixedgrass Prairie and retains the original unit designation. Unit 2.05 (formerly Milk River Upland) has been renamed the Upper Milk River Plain and has been significantly reduced in area, losing land to the Verdigris Plain (2.04) and the new Milk River Upland (3.02).

B. Sampling Network

Five of the 16 transects discussed in this report are the product of transect splitting which involves one split into two mixedgrass units, two splits between mixedgrass and parkland and one between mixedgrass and fescue. Data from the Oyen transect in Oyen Upland North (4.94) has also been applied to Oyen Upland South (2.33) because of similarities in topography and land use. The only significant difference which has to be taken into account in applying the data to Oyen Upland South is the presence of aspen and willow in Oyen Upland North.

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

Minimum rating values for Alberta Mixedgrass Prairie - For each of seven habitat factors one point is given if the value for the unit exceeds a designated minimum. Minimums have arbitrarily been established at approximately half the maximum observed level for each factor within the ecoregion. No attempt has been made to

assign greater importance to one factor over another, except that a unit is downgraded by one level if it loses points for both semi-permanent (bulrush/cattail) and permanent (natural, fresh open water) wetlands which are considered critical for brood production. The minimum rating values for Alberta Mixedgrass Prairie are as follows:

1. Total wetland area - 3.3 percent of total land area
2. Grassy wetland cover - 40 percent of total wetland area
3. Bulrush/cattail cover - 0.5 percent of total wetland area
4. Open water wetlands - 3.5 percent of total wetland area
5. Unused wetlands - 33 percent of total wetland area
6. Shrubby and grassy upland cover - 36 percent of total upland area.
7. Unused uplands - 3 percent of total upland area.

Rating Scale

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

| Number of Points Given the Unit | Rating |
|---|---|
| 6 - 7 | 1 |
| 4 - 5 | 2 |
| 2 - 3 | 3 |
| 0 - 1 | 4 |

## IV. Results and Discussion

### A. General Information on Alberta Mixedgrass Prairie

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

The total area occupied by the Alberta Mixedgrass Prairie is calculated to be approximately 6,474,100 hectares (Table 1), based on the boundaries of physiographic units lying wholly or predominantly within the ecoregion. The area calculated in this fashion will differ somewhat from the area of the ecoregion when calculated on surveyed and redefined vegetation boundaries. A comparison of these values still needs to be made.

Thirteen physiographic units which have been sampled with habitat monitoring transects account for just over half (53.7 percent) of the total area of the ecoregion (Table 1) while unsampled units cover 39.5 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 6.8 percent of the total area of the ecoregion.

2. Distribution of Landforms in the Ecoregion

The distribution of various landforms in Alberta Mixedgrass Prairie is summarized in Table 2. Morainal terrain occupies just under two thirds (61.9 percent) of the total area of physiographic units in the ecoregion and 56 percent of that area is in units currently being sampled in this study. Just over half of the morainal area is made up of knob and kettle surface form and undulating ground moraine accounts for another 35 percent. Less than half (44.2 percent) of the knob and kettle terrain is in units which have been sampled while 80 percent of the undulating terrain has been sampled. Almost 10 percent of morainal terrain has a

dissected landform and 45 percent of that is in sampled units. Small areas of rolling and ridged moraine have not been sampled.

Almost a quarter (24.4 percent) of the land in physiographic units is on predominantly lacustrine parent material. Just over half (53.6 percent) of this area is in units which have been sampled. Over two-thirds (67.9 percent) of the lacustrine terrain has undulating topography and almost two-thirds (64.7 percent) of that is in units which have been sampled.

The remaining 13.7 percent of land in physiographic units is on a variety of fluvial and eolian landforms. Almost three quarters (72.2 percent) of this area is in units which have been sampled.

The distribution of habitat sampling between various parent material and landform categories is also shown in Table 2. For the major morainal categories the relationship between distribution of sampling effort and distribution of the category is not nearly as close as it was in the Alberta Parkland (Millar 1992). Knob and kettle terrain accounts for 32.6 percent of the total land area in physiographic units but only 13.2 percent of our sampling effort is in that landform. On the other hand, undulating morainal terrain occurs on 21.8 of the total area in physiographic units and 30.7 percent of our sampling is in that landform. The dissected morainal category is sampled at almost exactly the same level as it occurs in the landscape. Sampling for all morainal categories collectively amounts to 50.5 percent of our total effort while those same categories occupy 61.9 percent of the total land area in

physiographic units in the ecoregion.

Lacustrine landforms are sampled at a somewhat greater (33.0 percent) level than their occurrence (24.4 percent) in the landscape. The variety of fluvial and eolian categories have been sampled at slightly more (16.5 percent) than the level of their presence (13.7 percent) in the ecoregion.

3. Location and Landform Character of Individual Physiographic Units

Figure 1 shows the location of all physiographic units in Alberta 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 16 sample sites in 13 physiographic units. Individual units and transects located in them are listed in Table 3. Collectively these units comprise an area of approximately 3,479,400 hectares (Table 5) or about 53.7 percent of the total Alberta Mixedgrass Prairie Ecoregion.

Origin of soil parent material and surface form for the 13 units are summarized in Table 3. Six of the units are entirely or predominantly of morainal origin. Four are on lacustrine and three on fluvial material. Two of the morainal units have predominantly knob and kettle landform, three are on undulating ground moraine and one is on dissected morainal terrain. Three of the lacustrine units are on undulating and one is on rolling terrain. The three fluvial units all have an undulating landform.

The 26 physiographic units in Alberta Mixedgrass Prairie which have not been sampled to date are summarized in Table 4 as to their

soil parent material, surface form and area. Fifteen of them are entirely or predominantly morainal in nature and eight are on lacustrine material. Of the remaining three, two are of fluvial origin and one is 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 0.3 percent of the Chin Plain to a high of 1.7 percent of the Little Bow Plain. Overall sample size for the 13 units is 0.7 percent.

Nine of the 13 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 Alberta Mixedgrass Prairie this situation is most extreme in the Oyen Upland South and Chin Plain which have been divided into eight and six sub-units, respectively. Ideally, transects should be related to the sub-units in which they occur rather than to the unit as a whole. However, if this were to be done there should be additional sampling in other significant sub-units. Also, a number of 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 16 individual transects in Alberta Mixedgrass Prairie there is over a 10-fold variation (1.3 to 13.6) in the percent of total land area occupied by wetlands (Table 6). The highest value (13.6 percent) is due to the presence of one large lake-marsh complex that is fed by irrigation. If this extreme value is excluded the range of wetland area drops to 1.3 to 7.4 percent, a six-fold variation.

i. Landform character and wetland area - Eight of the 16 transects in Alberta Mixedgrass Prairie are located on morainal terrain and these possess both the highest and the lowest percentages of wetland area. There is no obvious difference in the range of wetland area on transects in knob and kettle moraine and those on undulating ground moraine. Ignoring the extreme wetland area percentage on the irrigated transect at Stirling, the range in wetland area on lacustrine transects is 1.5 to 4.3 percent and on the fluvial transects it is 1.3 to 5.7 percent.

For the sampled portion of the ecoregion as a whole the percent of land area occupied by wetlands averages 4.4 which is less than half that recorded for Alberta Parkland (9.9 percent, Millar 1992).

ii. Variability in wetland area between samples within the same physiographic unit - Two of the 13 physiographic units sampled in the Alberta Mixedgrass Prairie contain more than one transect. One has two transects and one has three. The expectation in such

situations is that transects within the same relatively homogeneous sub-unit should have reasonably comparable habitat values. This does not hold true in either of the above situations. In the two-transect unit, the Fincastle Plain, the Lethbridge transect has wetlands covering 3.2 percent of the sample while the Stirling transect has 13.6 percent coverage, some 325 percent greater. Interestingly, both transects occur in the same sub-unit and are on irrigated land. The high value for the Stirling transect is due, as mentioned previously, to the presence of one large lake-marsh complex fed by irrigation water. The greatest wetland area (7.4 percent) in the three-transect unit, the Richdale-Cessford Plain, is more than double the lowest value (3.4 percent). This unit is divided into three sub-units but the highest and lowest values are both in the same sub-unit. The situations just described for both of the multi-transect units confirm that there is a high degree of habitat variability even in areas considered to be relatively homogeneous.

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 zero percent at

Lethbridge to 4.7 percent at Pakowki (Table 6) where 84 percent of the total wetland area is cultivated. The values for Pakowki are substantially higher than the second highest values of 1.6 percent of total land area and 37 percent of total wetland area at Claresholm. In 13 of the 16 transects cultivated wetlands occupy less than one percent of the total landscape.

Differences between transects in the same physiographic unit, in percent of total land area occupied by cultivated wetlands, are quite small because of the size of the percentages involved.

For the ecoregion as a whole, total land area occupied by cultivated wetlands averages 0.7 percent. This is slightly less than that observed in Alberta Parkland (0.9 percent, Millar 1992).

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 (61.5 to 98.6 percent of total wetland area) in all transects but one. In that transect (Lethbridge) the natural wetland pattern is modified by the presence of irrigation and 61.7 percent of wetland area is either bulrush/cattail, natural fresh open water or artificial water. As expected, the level of dominance by the cultivated/grassy/wooded cover group is substantially higher than in Alberta Parkland. In 10 of the 15 transects dominated by this group those cover categories accounted for more than 90 percent of

the total wetland area.

The percent of wetland area that is cultivated in the 16 transects varies from 0.5 percent on undulating lacustrine terrain at Lethbridge to 83.7 percent on undulating morainal terrain at Pakowki. It is the dominant cover class in three transects. The percentage of cultivated wetland area varies widely between transects within the same morainal and lacustrine categories and is uniformly low on fluvial transects. Interestingly, the lowest cultivation values are all associated with irrigated areas on lacustrine or fluvial landforms. I have no data to indicate the extent to which small shallow wetlands may have been lost through drainage in these areas. The next four lowest cultivation levels all occur on transects in which there is a high level of grazing.

Grass (including sedges and forbs) is the dominant cover class in 12 of 16 transects. While both wet meadow and shallow marsh vegetation are included in the class, groundtruthing 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 Alberta Parkland.

Willow and tree cover is of only rare occurrence in wetlands in the grassland ecoregions. In the mixedgrass sample covered in this report willows are recorded on only four transects and in every case special circumstances are involved. As explained previously, the Oyen transect is actually located in the parkland unit, Oyen Upland North, and the data have been applied to Oyen Upland South because, except for the presence of woody vegetation

in Oyen Upland North, general habitat and land use conditions are felt to be comparable in both units. Two transects, Scapa East and Kirkpatrick Lake West, both touch the edge of the parkland boundary and contain some shrub and tree outliers. The fourth transect, Stirling, is in an irrigated area and the willow-filled wetlands are associated with irrigation seepage.

Bulrush and cattail (deep marsh vegetation) are completely absent from 11 transects and are of significant important (13.6 to 44.7 percent of wetland area) only in the three irrigated transects, Lethbridge, Stirling and Patricia.

Transitional open water, which can only be identified from ground surveys, is totally absent from all transects, suggesting that none of the 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 five transects and ranges up to 9.7 percent at Munson. In this report open running water has been grouped with natural open water in ponds.

The range in area of artificial open water (0.2 to 14.6 percent) is higher than that recorded for Alberta Parkland and this primarily reflects an increased effort to provide more secure water supplies for grazing needs. The maximum value of 14.6 percent at Walsh is due primarily to the presence of numerous reservoirs in watercourses on the slopes of the Cypress Hills. Three of the five highest values occur on the three irrigated transects and in those instances involve reservoirs associated with irrigation.

Saline open water is present on only four transects and in significant amounts on only one of those, Oyen (32.8 percent). However, based on personal observations, this cover class is more widely distributed outside the sample sites.

Other cover classes are recorded on only three transects and never account for more than 1.7 percent of the wetland area. The two largest values occur on irrigated transects. In all cases the cover classes are indicative of disturbance situations.

The percent of wetland area in various cover classes varies widely between transects within the same physiographic unit. Of the eight data pairs and triads (i.e., those cover classes which were recorded in both or all three transects), three or 37.5 percent have differences of less than five percent of the total wetland area while in the remaining five or 62.5 percent the differences are greater and run as high as 30 percent. Four (80 percent) of the large differences are associated with the three most common cover types but only one (33 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, two-thirds of small differences are associated with the more poorly represented cover classes.

For the ecoregion sample as a whole 95.9 percent of the total wetland area falls into five cover classes: grass - 63.6 percent, cultivated - 16.5 percent, bulrush and cattail - 7.9 percent, saline open water 4.1 percent and artificial open water 3.8

percent. The identity and order of these cover classes is substantially different than that recorded for Alberta Parkland. Grass remains as the overall dominant category but natural fresh open water and willows and trees drop off the top-five list and cultivated and bulrush/cattail rise to second and third places, respectively. The status of bulrush/cattail is almost entirely an artifact produced as a result of irrigation on three transects. Saline open water and artificial open water are new additions to the list.

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 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 1.4 per quarter section at Lethbridge to 9.8 at Oyen. The five lowest density values all occur on lacustrine terrain. The range in wetland

density is roughly comparable on all morainal and fluvial categories. The maximum density of 9.8 at Oyen is less than half the maximum (23.5) recorded for Alberta Parkland (Millar 1992).

The variability in wetland density between transects within the same physiographic unit is very low on both the undulating morainal landform of the Richdale-Cessford Plain (8.4 to 9.7) and the undulating irrigated lacustrine landform of the Fincastle Plain (1.4 to 2.4).

For the entire ecoregion sample the average density is 5.9 wetlands per quarter section, only 43 percent of that recorded for Alberta Parkland (13.6, Millar 1992).

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 and woody vegetation, collectively dominate (51.8 to 97.4 percent) the numbers of wetlands in 15 of 16 transect (Table 8). In only two of these transects, Stirling and Patricia, does the level drop below 80 percent. Both of these are irrigated areas. The single transect where the three cover classes do not dominate is the third irrigated area (Lethbridge) and there 80.1 percent of the wetlands are artificial open water. Obviously, under normal circumstances, i.e., no irrigation, an over-whelming proportion of the wetland numbers in all areas are temporary or seasonal in nature. Within

these three cover classes grasses dominate in 10 transects and cultivation in five. Interestingly, woody vegetation appears in the record of wetland numbers in three more transects than it does in the data on wetland area. This is indicative that this cover type occurs in very tiny wetlands in this ecoregion. In two of the three cases low buckbrush was involved and in the third, which was an irrigated transect (Patricia), the vegetation was willows.

With few exceptions, representation of all other cover classes is at a very low level. Natural fresh open water never exceeds 6.6 percent and if the two top values, both of which occur on irrigated transects, are excluded the maximum level under natural conditions is 4.4 percent at Munson. Bulrush/cattail achieve a maximum of 13.8 percent at Patricia in an artificial irrigation situation. If the values for the other two irrigated transects are also excluded the range under natural conditions is zero to 0.7 percent. Transitional open water is totally absent from all transects.

Artificial open water has an interesting pattern of distribution. In the three irrigated transects 15.5 to 80.1 percent of all wetlands fall into this category. In the remaining transects 1.2 to 15.4 percent of the wetlands are artificial open water.

The variability in percent of total wetland numbers in various cover classes between different transects within the same physiographic unit is 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 six or

75 percent of the eight data pairs and triads having large differences. This is the reverse of the results obtained for Alberta Parkland (Millar 1992). All of the large differences are associated with the three most common cover types but none 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 three cases and do not coincide in five cases.

For the ecoregion sample as a whole 87.7 percent of the wetlands are dominated by grass (62.3 percent), cultivation (24.4 percent), and shrubs and trees (1.0 percent). Of the remaining wetlands, 1.5 percent are dominated by natural fresh open water, 8.3 percent by artificial open water, 1.5 percent by bulrush/cattail and one percent by all other categories together. Percentages of wetland numbers in cultivated, grass and bulrush/cattail cover classes are quite comparable to the figures obtained for Alberta Parkland. However, the figure for bulrush/cattail is artificially high due to the presence of three irrigated transects in the sample. The presence of woody vegetation is only one sixth that recorded for Alberta Parkland and even that figure is inflated for reasons described previously. Natural fresh open water wetlands account for just over one quarter of the percent of total wetlands that they did in Alberta Parkland and even that figure is inflated by the influence of irrigation in three transects. The percent of artificial open water wetlands in

the total wetland population is three times greater in the Mixedgrass Prairie as it was in Alberta Parkland but again this figure is inflated in part by the influence of irrigation.

e) Area of Wetlands in Various Land Use Activity Classes

Utilization of wetlands in the 16 transects falls into five major land use categories - no use, abandoned cultivation, annual crops, haying and grazing. Collectively these five activity classes occur on 74.9 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 Cessford East to 65.7 percent at Oyen. The minimal no use value at Cessford East is associated with a very high (96.7 percent) level of utilization for grazing.

The abandoned cultivation land use activity class is a transitory category that is assigned to wetlands which are in a state of flux between being used for annual crops and reverting to an unused condition. This category most frequently occurs when higher water levels flood out previously cultivated basins and persist long enough to permit the establishment of disturbed wetland vegetation. Since development of the abandoned cultivation class is related to local precipitation conditions, its presence can be expected to be erratic within and between transects. The percent of the total wetland area in this category ranges from zero to 4.7 for the 16 transects covered in this report.

The amount of wetland area being used for crop production

ranges from 0.5 percent at Lethbridge to 83.7 percent at Pakowki.

Haying of wetlands occurs in four of the 16 transects and on 0.7 to 3.7 percent of the total wetland area in those transects. Maximum extent of wetland haying in Alberta Mixedgrass Prairie is just over one third that recorded for Alberta Parkland (10.1 percent, Millar 1992). There is no apparent association between haying and landform.

Grazing of wetlands occurs in all of the 16 transects and on 8.4 to 96.7 percent of the wetland area. The level of grazing is considerably higher in Alberta Mixedgrass Prairie than in Alberta Parkland (Millar 1992). In 11 of the 16 transects grazing occurs on more than 30 percent of the wetland area and in nine of those it occurs on more than 50 percent of the wetland area. As in both Alberta and Saskatchewan Parklands, 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 11 of 16 transects and in five cases those uses exceed five percent of the wetland area. Maximum other usage is 25.1 percent at Patricia where a number of wetlands are canals or storage reservoirs used for irrigation. The second and fifth highest values also occur on irrigated transects, Lethbridge and Stirling, respectively. At Munson (9.7 percent) the principal "other" use was disposal of wastes, i.e., sewage lagoons. At Walsh (8.5 percent) other uses include disposal of wastes, water storage and farm site activities.

The frequency of substantial differences in land use

activities on wetlands in different transects within the same physiographic unit is somewhat less than that observed for cover and wetland area data. Large differences (over five and up to 64.8 percent of the total wetland area) occur in 56 percent of the 9 data pairs and triads.

For the ecoregion sample as a whole, 94.0 percent of the total wetland area falls into four land use categories, no use, annual crops, haying and grazing. This compares with 97.7 percent for those categories in Alberta Parkland (Millar 1992). Slightly less than one fifth (16.8 percent) of the wetland area is unused compared to 47.3 percent in Alberta Parkland. The most pronounced difference in wetland land use between the two ecoregions is in grazing. In Mixedgrass Prairie the level is one and a half times what it is in Alberta Parkland (60.5 to 38.2 percent). This increase in grazing in the drier grassland ecoregions is to be expected. Cropping occurs on almost double (16.4 percent) the wetland area in the Mixedgrass Prairie that it does in Alberta Parkland (8.7 percent). Haying occurs on only 0.3 percent of the wetland area compared to 3.5 percent in the parkland.

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 ranges from a low of 16.7 at Vauxhall to a high of 100 at Lethbridge (Table 10). The levels of impaction on the three irrigated transects (83.3 to 100 percent) are double the next highest figure (42.1 percent at Vulcan East). Much of the impaction in irrigated areas is in the form of artificial water supply, either from deliberate flooding or through seepage from canals and ditches. Outside the irrigated areas the highest rates of impaction occur in transects on lacustrine terrain.

Differences in the rate of impaction between transects in the same physiographic unit are generally quite low, ranging from 0.6 to 16.7 percent of total wetlands.

For the entire ecoregion sample the average impaction level is

35.6 percent compared to 26.5 percent in Alberta Parkland (Millar 1992).

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 Alberta Mixedgrass Prairie.

No streams are recorded in six of the 16 transects and in the remaining 10 the percent of quarter sections containing streams ranges from 5.0 at Cessford West to 35.0 at Scapa East.

In neither of the two physiographic units containing two or more transects is the presence or absence of streams consistent for all transects within the same unit.

In the total ecoregion sample 11.8 percent of all quarter sections contain stream segments. This is somewhat lower than the average recorded for Alberta Parkland (14.5 percent, Millar 1992).

2. Uplands

a) Distribution of Upland Cover Classes

Upland cover data have been analysed on the basis of seven classes, four native and three planted, plus a catch-all category for all other classes. In the 16 Alberta Mixedgrass Prairie transects 97.4 to 99.9 percent of the upland cover falls into these seven classes (Table 12).

Annual crops and summerfallow are the single most common upland cover class in 10 of the 16 transects and in nine of these occupies 72.4 to 91.2 percent of the upland area. In the remaining

seven transects this class accounts for 6.8 to 47.3 percent of the upland area. Pakowki is the most intensively cultivated transect in the ecoregion with 91.2 percent of its uplands in crop as well as 87.3 percent of its wetland area.

Native grass is the dominant upland cover class in five of the transects occupying 54.7 to 86.0 percent of the area. In the remaining 11 transects it occupies 4.0 to 43.2 percent of the uplands.

Shrubs, as is to be expected in a grassland situation, are a minor element in the landscape. Low shrubs (buckbrush) are present in nine transects and occupy from a trace to 2.8 percent of the upland area while tall shrubs occur in eight transects and on a trace to 0.3 percent of the uplands. Maximum values for both low and tall shrubs occur on the Oyen transect which, as mentioned previously, is located within the edge of the parkland. If those values are excluded the maximums are 1.3 and 0.2 percent, respectively.

Native trees are recorded in only four transects and on 0.1 to 1.4 percent of the uplands. In three cases their presence is associated with parkland fringe situations and in the fourth with irrigation.

Total native cover occupies from 4.0 to 86.0 percent of total upland area in the 16 transects. It exceeds all planted cover in five transects. In 10 transects it occupies more than 10 percent of the upland area and in seven it exceeds 20 percent.

Planted grasses and forbs are found on 0.5 to 39.9 percent of

the uplands. Five transects have values in excess of 10 percent of the upland area. On one of the irrigated transects (Patricia) it is the dominant upland cover type.

Planted trees and shrubs are a minor part of the landscape, accounting for 0.5 percent or less of the upland area in any transect.

Variability in upland cover values between transects within the same physiographic unit is substantial. Five of the nine data pairs or triads for individual cover classes have large difference (in excess of five percent of total upland area). Four of those are associated with annual crops and planted grass and forbs. In addition there is a large difference in total native cover for one of the two physiographic units with two or more transects.

For the ecoregion sample as a whole 60.8 percent of the total upland cover is annual crops and summerfallow. This is comparable to that recorded for Alberta Parkland (63.8 percent, Millar 1992). Total native cover accounts for 29.6 percent of the upland area compared to 28.0 percent in Alberta Parkland. Almost all of that amount (28.9 percent) is native grass. Planted grasses and forbs cover 8.3 percent of the uplands, compared to 6.7 percent for Alberta Parkland. Pakowki is the most intensively cultivated transect in Alberta Mixedgrass Prairie (91.2 percent of upland area and 87.3 percent of wetland area which works out to 91 percent of total land area) but Loreburn, Saskatchewan continues to hold the record as the most intensively cultivated transect in this study (96.8 percent of uplands and 76 percent of wetland area or 95

(96.8 percent of uplands and 76 percent of wetland area or 95 percent of total land area, Millar 1988).

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 most 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 0.1 to 8.6 percent of upland area. Land which has been abandoned from other uses never amounts to more than 0.7 percent of the total upland area in any transect.

Forage production occurs on 0.2 to 34.4 percent of the upland area in 13 of 16 transects. Grazing occurs in all transects on 1.0 to 91.8 percent of the uplands. It is the dominant land use activity in five transects. Land use activities which are associated with native vegetation and/or planted grasses and forbs collectively occupy more than half the total upland area in six physiographic units.

A minor but consistent part of the uplands is devoted to farmsteads (0.2 to 3.1 percent) in 15 of 16 transects and to roads and railways (1.2 to 3.9 percent) in all transects. Other land uses collectively occupy zero to 2.9 percent of the uplands. Variability in land use activity values between transects within

the same physiographic unit is somewhat less than that observed for upland cover with only four large differences in the 11 data pairs or triads. All of the large differences are associated with production of annual crops and grazing.

For the ecoregion sample as a whole, land use activities occur in descending order of importance as follows: annual crop production (60.9 percent), grazing (27.8 percent), forage production (4.8 percent), roads and railways (2.6 percent), idle (no use and abandoned - 2.2 percent), farmsteads (1.1 percent) and other uses (0.6 percent).

Differences in land use activities between Alberta Mixedgrass Prairie and Parkland are rather minor with the exception of idle land which is two thirds lower in the Mixedgrass Prairie.

C. Extrapolation of Sampling Results

1. Data Variability

One of the objectives of this baseline habitat study has been to generate estimates of current habitat values for individual physiographic units by extrapolating the sample results obtained in this study to the entire unit. Application of standard statistical procedures to the sample data has, however, shown there to be such a high degree of variability in the data that the mean values generated cannot be considered to provide a consistently accurate estimate of conditions beyond the samples themselves for all habitat factors in all transects. Examples of the variability in the data are illustrated for some major wetland cover, upland cover and upland land use classes in Tables 14 to 16, respectively.

Some indications of the degree of variability in the data can be obtained by comparing the different sets of data. For the three wetland cover classes, cultivated, grass and willows, the number of transects in which the standard error equals or exceeds the mean is very low (two, five and zero, respectively - Table 14). In the three upland cover classes, cropland, native grass and native trees, these numbers rise to 11, 14 and zero transects, respectively (Table 15), suggesting a greater amount of variability in the extent of upland cover. In both cases the zero values for woody vegetation reflect the spotty distribution of that cover type in the Mixedgrass Prairie.

The greatest extremes in data variability are to be found in upland land use categories (Table 16). In six of the transects the standard error exceeds the mean for unused land. For grazing this situation occurs in 14 of 16 transects. This confirms general observations that the occurrence of unused land and grazing is very irregular in most areas though this irregularity would appear to be somewhat less than it is in Alberta Parkland. At the other extreme, the standard error for roads and railways is consistently less than the mean in all transects. This is to be expected since this land use occurs with great uniformity across the country.

A very common situation which contributes significantly to the variability in habitat data is the presence within a sample of one or more quarter sections operated by a landowner whose land use practises, e.g., grazing, are markedly different than those of his neighbors. 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 or more transects within the same physiographic unit are combined indicated that, while increasing the sample size does decrease the variability of the data somewhat, expanded sampling on a scale that would be economically feasible is not likely to improve the situation very much.

When data for the entire ecoregion sample are analysed collectively the degree of variability is reduced but not as much as was noted for Alberta Parkland (Millar 1992). In Mixedgrass Prairie two categories (native grass and grazing) out of nine in Tables 14 to 16 have standard errors which continue to exceed the mean.

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 groundtruth 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 Alberta Mixedgrass Prairie the top unit in terms of total quantity of wetland habitat is the Fincastle Plain (2.03). It is the fourth largest unit and betters that rank in the wetland qualities which contribute to good waterfowl habitat. These include: (a) large areas and numbers of semi-permanent and permanent wetlands for secure brood rearing habitat, (b) large areas and numbers of grassy (seasonal) wetlands for additional breeding pair habitat, and (c) a good proportion of undisturbed wetlands to ensure adequate escape cover. This unit is, however, an artificial situation created by irrigation. In the rest of the units the most significant habitat deficiency is the lack of permanent or semi-permanent brood waters. The best, albeit low, values in this category are associated with either irrigation or parkland fringe situations.

Extrapolated wetland data for the entire sampled portion of Alberta 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 higher than that produced in the physiographic unit analysis by just 1.7 percent. Five of the eight cover class values are also higher, three by less than six percent and one by under 12 percent. One extreme deviation of 34.4 percent involves bulrush/cattail which is primarily confined to irrigated areas. Three cover classes are lower by 8.3, 20.3 and 90 to 100 percent, the latter value involves only a trace of land area.

The pattern for wetland numbers is somewhat different. The ecoregion analysis of total wetland numbers is lower than the physiographic unit analysis by 5.1 percent. Three of eight cover class values are lower by 3.0, 6.1 and 14.5 percent. One cover class is exactly the same and four are higher by 2.2, 8.9, 11.9 and 14.3 percent.

The ecoregion analysis of wetland area devoted to various land use activities produces lower values in three of the six categories

by 9.1 to 17.6 percent and higher values in three categories by 10.0 to 12.0 percent.

3. Uplands

Estimated areas of upland cover and land use activity classes are presented in Tables 20 and 21. Amongst the 13 physiographic units covered in this report, the Richdale-Cessford Plain (2.32) ranks second 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. The second, third and fourth ranking units for the quantity of the above-mentioned upland cover and land use classes are, respectively, the Sounding Creek Plain (2.39), Oyen Upland South (2.33) and Matzhiwin Plain (2.19). They rank 6th, 5th and 9th, respectively, in unit size. The situation in the Matzhiwin Plain is an artificial one created by irrigation.

Extrapolated upland data for the entire sampled portion of the Alberta Mixedgrass Prairie have been summarized in the same ways as previously described for wetland data. The two analyses generate virtually identical values for total upland area. Five individual cover class estimates generated in the ecoregion analysis are higher by 1.5 to 16.9 percent and three are lower by 2.8 to 25.0 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 five ecoregion estimates are higher and three lower than the physiographic unit summation. Half of the differences are very minor. The four extreme differences of +18.1, +49.3, -17.2 and -17.6 percent all involve very minor land use categories, respectively, farmsteads, "other", unused and abandoned, each of which occupies two percent or less 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 Alberta 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, Oyen Upland South (2.33) receives top rating as a waterfowl production area relative to other sampled units in the Mixedgrass Prairie (Table 22). Cypress Hills Benchland is given a three rating and the remaining four morainal units are rated as fours. Two of the latter, Richdale-Cessford Plain (2.32) and Chin Plain (2.02) have been downgraded for losing points for both semi-permanent and permanent wetlands.

It is obvious that marked differences in some of the minimal habitat rating values between Alberta Parkland and Mixedgrass Prairie, particularly semi-permanent and permanent wetlands, will mean that the number one rating given Oyen Upland South using

Mixedgrass Prairie rating values is not equivalent to a comparable rating given a unit in the Parkland. Therefore I have decided to use Alberta Parkland habitat rating values as a benchmark for comparing the results obtained for grassland units using grassland rating values. When Parkland rating values are applied Oyen Upland South drops to a three, Cypress Hills Benchland drops to a four and all other units continue as fours. I believe these ratings more accurately reflect the relative value of Mixedgrass Prairie morainal units as waterfowl production habitat in relation to other ecoregions in the settled portion of Alberta.

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 groundtruthing surveys. The date of baseline aerial photography for all transects covered in this report was May 1985. The interval between that date and the completion of the groundtruthing surveys for these transects has varied from 36 to 63 months (Table 23). Recorded changes are as small as the cultivation of a single wetland and as extreme as the clearing and 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 16 transects and the percent of quarter sections affected ranges from 12.5 at Vulcan East to a high of 70.8 at Patricia. Contrary to the situation in Alberta Parkland, the lowest levels of change did not always occur in transects where grazing is a significant land use component. The two highest levels of change occurred on irrigated transects and may reflect both the intensity of agricultural activities and frequency of cropping changes in such areas. Differences in percent of affected quarters recorded for transects within the same physiographic unit are quite variable.

The extent to which quarter sections in the Alberta Mixedgrass Prairie sample have been affected by land use/cover change is somewhat lower than that reported for transects in Alberta Parkland (Millar 1992) even though the time interval between the taking of aerial photos and completion of groundtruthing surveys is somewhat greater for some of the transects. This suggests that in the last few years agricultural change has been proceeding at a slower pace in the Alberta Mixedgrass Prairie than it has in the Alberta Parkland.

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Figure 1. Distribution of Habitat Sampling in Alberta Mixedgrass Prairie

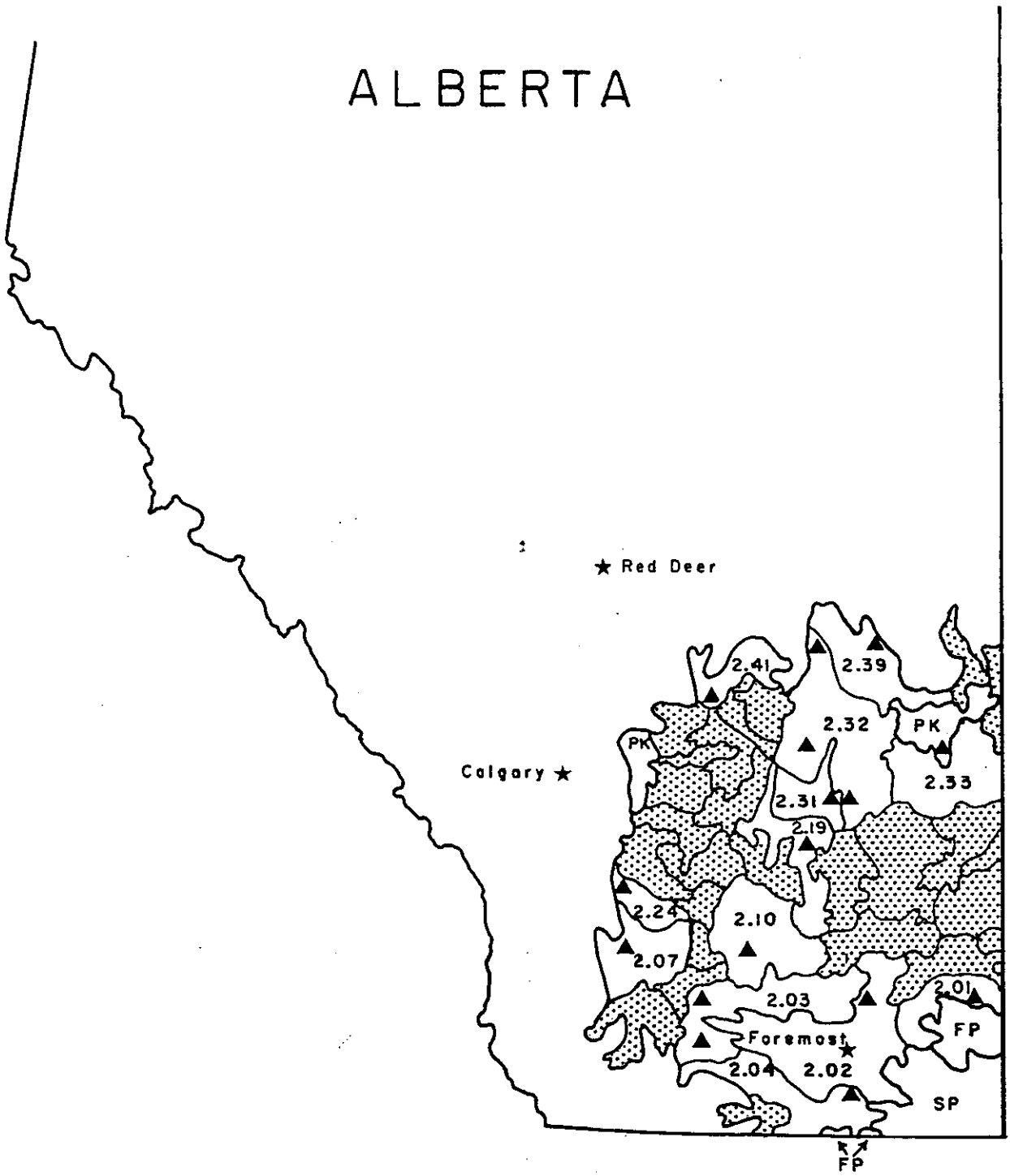

Table 1. Distribution of Habitat Sampling Relative to the Entire Alberta Mixedgrass Prairie.

| | No. of Units | Area | |
|---|---|---|---|
| | | In Hectares[1] | As Percentage of Entire Ecoregion |
| Sampled Physiographic Units | 13 | 3,479,400 | 53.7 |
| Unsampled Physiographic Units | 26 | 2,554,500 | 39.5 |
| Areas Not Included in Physiographic Units | | | |
| - River and Stream Valleys | - | 374,000 | 5.8 |
| - Lakes[2] | - | 41,500 | 0.6 |
| - Urban Areas[2] | - | 24,700 | 0.4 |
| Total Alberta Mixedgrass Prairie Ecoregion | 39 | 6,474,100 | 100 |

1. To the nearest 100 hectares.

2. Larger than 500 hectares.

Table 2. Distribution of Landforms in Alberta Mixedgrass Prairie.

| Origin of Predominant Parent Material | Predominant Surface Form | Area in Hectares[1] Sampled Units[2] | Unsampled Units[2] | Total[3] | % of Sampling Effort in Landform Category |
|---|---|---|---|---|---|
| Morainal | | | | | |
| | Knob & Kettle | 869,100 ( 44.2 ) | 1,097,600 ( 55.8 ) | 1,966,700 ( 32.6 ) | 13.2 |
| | Undulating | 1,057,000 ( 80.2 ) | 260,200 ( 19.8 ) | 1,317,200 ( 21.8 ) | 30.7 |
| | Dissected | 165,800 ( 45.0 ) | 202,700 ( 55.0 ) | 368,500 ( 6.1 ) | 6.6 |
| | Rolling | - | 52,400 ( 100 ) | 52,400 ( 0.9 ) | 0.0 |
| | Ridged | - | 27,800 ( 100 ) | 27,800 ( 0.5 ) | 0.0 |
| Total Morainal | | 2,091,900 ( 56.0 ) | 1,640,700 ( 44.0 ) | 3,732,600 ( 61.9 ) | 50.5 |
| Lacustrine | | | | | |
| | Undulating | 647,200 ( 64.7 ) | 353,100 ( 35.3 ) | 1,000,300 ( 16.6 ) | 26.4 |
| | Rolling | 142,100 ( 42.4 ) | 193,100 ( 57.6 ) | 335,200 ( 5.5 ) | 6.6 |
| | Veneer(Undulating) | - | 137,100 ( 100 ) | 137,100 ( 2.3 ) | 0.0 |
| Total Lacustrine | | 789,300 ( 53.6 ) | 683,300 ( 46.4 ) | 1,472,600 ( 24.4 ) | 33.0 |

**Table 2 Continued.**

Table 2 **Continued**. Distribution of Landforms in Alberta Mixedgrass Prairie.

| Origin of Predominant Parent Material | Surface Form | Area in Hectares[1] Sampled Units[2] | Unsampled Units[2] | Total[3] | % of Sampling Effort in Landform Category |
|---|---|---|---|---|---|
| Fluvial | Undulating | 598,200 ( 90.6 ) | 62,400 ( 9.4 ) | 660,400 ( 10.9 ) | 16.5 |
| | Hummocky | - | 138,600 ( 100 ) | 138,600 ( 2.3 ) | 0.0 |
| Eolian | Hummocky | - | 29,500 ( 100 ) | 29,500 ( 0.5 ) | 0.0 |
| Total Fluvial, Eolian | | 598,200 ( 72.2 ) | 230,500 ( 27.8 ) | 828,700 ( 13.7 ) | 16.5 |
| TOTAL FOR ECOREGION | | 3,479,400 ( 57.7 ) | 2,554,500 ( 42.3 ) | 6,033,900 ( 100 ) | 100.0 |

1. To nearest100 hectares.

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

3. Figure in parentheses is the percent each landform category is of the total ecoregion.

Table 3. Physiographic Units Covered in This Report.

| Unit Number | Name | Landform Character[1] Origin of Parent Material | Surface Form | Transect[2] |
|---|---|---|---|---|
| 2.01 | Cypress Hills Benchland | Morainal | Dissected ( Rolling ) | Walsh |
| 2.02 | Chin Plain | Morainal | Knob & Kettle | Bow Island |
| 2.03 | Fincastle Plain | Lacustrine ( Fluvial ) | Undulating | Lethbridge<br>Stirling |
| 2.04 | Verdigris Plain | Morainal | Undulating ( Hummocky ) | Pakowki |
| 2.07 | Keho Lake Plain | Lacustrine ( Fluvial ) | Undulating | Claresholm |
| 2.10 | Enchant Plain | Morainal | Undulating | Vauxhall |
| 2.19 | Matzhiwin Plain | Fluvial ( Lacustrine ) | Undulating | Patricia |
| 2.24 | Little Bow Plain | Lacustrine ( Morainal ) | Undulating ( Rolling ) | Vulcan East |
| 2.31 | Lower Berry Creek Plain | Fluvial ( Lacustrine ) | Undulating | Cessford West ( 20 ) |
| 2.32 | Richdale - Cessford Plain | Morainal | Undulating ( Dissected ) | Cessford East ( 20 )<br>Scapa East ( 20 )<br>Sunnynook |
| 2.33 | Oyen Upland South | Morainal | Knob & Kettle ( Hummocky ) | Oyen |
| 2.39 | Sounding Creek Plain | Fluvial ( Morainal ) | Undulating | Kirkpatrick Lake W. (16) |
| 2.41 | Chain Lakes Plain | Lacustrine ( Morainal ) | Rolling ( Knob & Kettle ) | Munson |

1. Categories in parentheses are of secondary importance.

2. 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 Alberta Mixedgrass Prairie which have **not** been Sampled.

| Unit Number | Physiographic Name | Landform Character[1,2] Origin of Parent Material | Surface Form | Area in Hectares[3] |
|---|---|---|---|---|
| 2.05 | Upper Milk River Plain | Morainal | Rolling | 52,400 |
| 2.06 | Three River Plain | Lacustrine ( Fluvial ) | Veneer ( Undulating ) | 137,100 |
| 2.08 | Travers - Coaldale Plain | Morainal ( Lacustrine ) | Ridged ( Undulating ) | 27,800 |
| 2.09 | Picture Butte Plain | Lacustrine | Undulating | 51,200 |
| 2.11 | Suffield South Plain | Morainal | Knob & Kettle ( Undulating ) | 170,700 |
| 2.12 | Medicine Hat Plain | Morainal | Dissected | 143,700 |
| 2.13 | Big Stick Lake Plain | Lacustrine ( Fluvial ) | Undulating | 21,800 |
| 2.14 | Schuler Upland | Morainal | Hummocky (Undulating) | 157,400 |
| 2.15 | Middle Sand Hills South | Eolian ( Fluvial ) | Hummocky (Undulating) | 29,500 |
| 2.16 | Middle Sand Hills | Fluvial ( Eolian ) | Hummocky | 138,600 |
| 2.17 | Rainy Hills | Morainal ( Fluvial ) | Knob & Kettle (Hummocky ) | 310,400 |
| 2.18 | Kininvie Plain | Morainal | Knob & Kettle ( Hummocky ) | 139,800 |
| 2.20 | Lake Newell Plain | Morainal | Undulating ( Knob & Kettle ) | 102,800 |
| 2.21 | Lomond Upland | Morainal | Knob & Kettle | 55,800 |
| 2.22 | Majorville Upland | Morainal | Knob & Kettle | 103,200 |
| 2.23 | Blackfoot Plain | Lacustrine | Undulating | 88,200 |
| 2.25 | Arrowwood Creek Plain | Lacustrine | Undulating | 131,500 |
| 2.26 | Crowfoot Plain | Lacustrine ( Fluvial ) | Rolling ( Undulating ) | 115,600 |
| 2.27 | Wintering Hills | Morainal | Knob & Kettle | 43,400 |
| 2.28 | Rosebud - Drumheller Plain | Lacustrine | Rolling | 77,500 |

**Table 4 Continued.**

Table 4 **Continued.** Physiographic Units in Alberta Mixedgrass Prairie which have **not** been Sampled.

| Unit Number | Physiographic Name | Landform Character[1,2] Origin of Parent Material | Surface Form | Area in Hectares[3] |
|---|---|---|---|---|
| 2.29 | Deadhorse Lake Upland | Morainal ( Lacustrine ) | Knob & Kettle ( Rolling ) | 98,200 |
| 2.30 | Crawling Valley Plain | Morainal | Knob & Kettle | 96,400 |
| 2.34 | Sibbald Plain | Lacustrine ( Fluvial ) | Undulating( Hummocky ) | 60,500 |
| 2.36 | Grassy Island Plain | Fluvial | Undulating | 62,400 |
| 2.42 | Hand Hills Upland | Morainal | Knob & Kettle ( Rolling ) | 79,600 |
| 2.43 | East Coulee Plain | Morainal | Dissected ( Knob & Kettle ) | 59,000 |
| | | | TOTAL | 2,554,500 |

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

2. Categories in parentheses are of secondary importance.

3. To the nearest 100 hectares.

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

| Unit Number | Physiographic Unit Name[1] | | Area in Hectares Unit[2] | Sample | Percentage that Sample is of Unit Area |
|---|---|---|---|---|---|
| 2.01 | Cypress Hills Benchland | ( 24 ) | 165,800 | 1582 | 1.0 |
| 2.02 | Chin Plain | ( 24 ) | 560,600 | 1594 | 0.3 |
| 2.03 | Fincastle Plain | ( 48 ) | 319,200 | 3149 | 1.0 |
| 2.04 | Verdigris Plain | ( 24 ) | 238,400 | 1590 | 0.7 |
| 2.07 | Keho Lake Plain | ( 24 ) | 233,800 | 1584 | 0.7 |
| 2.10 | Enchant Plain | ( 24 ) | 330,900 | 1588 | 0.5 |
| 2.19 | Matzhiwin Plain | ( 24 ) | 223,900 | 1587 | 0.7 |
| 2.24 | Little Bow Plain | ( 24 ) | 94,200 | 1587 | 1.7 |
| 2.31 | Lower Berry Creek Plain | ( 20 ) | 111,900 | 1311 | 1.2 |
| 2.32 | Richdale - Cessford Plain | ( 64 ) | 487,700 | 4217 | 0.9 |
| 2.33 | Oyen Upland South | ( 24 ) | 308,500 | 1605 | 0.5 |
| 2.39 | Sounding Creek Plain | ( 16 ) | 262,400 | 1061 | 0.4 |
| 2.41 | Chain Lakes Plain | ( 24 ) | 142,100 | 1586 | 1.1 |
| TOTAL FOR ECOREGION | | | 3,479,400 | 24,041 | 0.7 |

1. Figures in parentheses are the numbers of quarter sections in the sample.

2. To nearest 100 hectares.

Table 6. Land Area Occupied by Wetlands and Uplands

| Unit | Transect[1] | Sample Size ( in ha ) | Percent of Total Sample[2] Wetlands Total | Wetlands Uncultivated | Wetlands Cultivated | Uplands |
|---|---|---|---|---|---|---|
| | ( Morainal - D ) | | | | | |
| 2.01 | Walsh | 1582 | 1.5 | 1.2 | 0.3 | 98.5 |
| | ( Morainal - K & K ) | | | | | |
| 2.02 | Bow Island | 1594 | 2.4 | 1.6 | 0.8 | 97.6 |
| 2.33 | Oyen | 1605 | 6.7 | 6.5 | 0.2 | 93.3 |
| | ( Morainal - U ) | | | | | |
| 2.04 | Pakowki | 1590 | 5.6 | 0.9 | 4.7 | 94.4 |
| 2.10 | Vauxhall | 1588 | 1.3 | 0.5 | 0.8 | 98.7 |
| 2.32 | Cessford - East | 1323 | 7.4 | 7.3 | 0.1 | 92.6 |
| | Scapa - East | 1326 | 6.1 | 5.5 | 0.6 | 93.9 |
| | Sunnynook | 1568 | 3.4 | 3.1 | 0.3 | 96.6 |
| | | (4217) | (5.5) | (5.2) | (0.3) | (94.5) |
| | ( Lacustrine - U ) | | | | | |
| 2.03 | Lethbridge | 1561 | 3.2 | 3.2 | 0.0 | 96.8 |
| | Stirling | 1588 | 13.6 | 13.5 | 0.1 | 86.4 |
| | | (3149) | ( 8.4) | ( 8.3) | (0.1) | (91.6) |
| 2.07 | Claresholm | 1584 | 4.3 | 2.7 | 1.6 | 95.7 |
| 2.24 | Vulcan - East | 1587 | 1.5 | 1.3 | 0.2 | 98.5 |
| | ( Lacustrine - M ) | | | | | |
| 2.41 | Munson | 1586 | 1.7 | 0.6 | 1.1 | 98.3 |
| | ( Fluvial - U ) | | | | | |
| 2.19 | Patricia | 1587 | 5.3 | 5.2 | 0.1 | 94.7 |
| 2.31 | Cessford - West | 1311 | 1.4 | 1.3 | 0.1 | 98.6 |
| 2.39 | Kirkpatrick Lake - West | 1061 | 5.8 | 5.7 | 0.1 | 94.2 |
| Entire Ecoregion Sample | | 24041 | 4.4 | 3.7 | 0.7 | 95.6 |

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 & Kettle, H - Hummocky, U - Undulating, D - Dissected, M - Rolling.

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

Table 7. Distribution of Wetland Area in Various Cover Classes.

| Physio-graphic Unit | Transect[1] | Total Wetland Area in Sample ( in ha )[1] | Percent of Total Wetland Area in Cover Class[2] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cult-ivated | Willows and Trees | Grasses | Bulrush Cattail | Transi-tional Open Water | Natural Open Water | Arti-ficial Water | Saline Open Water | Other |
| | ( Morainal - D ) | | | | | | | | | | |
| 2.01 | Walsh | 25 | 20.4 | 0.0 | 56.3 | 1.0 | 0.0 | 7.8 | 14.6 | 0.0 | 0.0 |
| | ( Morainal - K & K ) | | | | | | | | | | |
| 2.02 | Bow Island | 38 | 34.8 | 0.0 | 60.1 | 0.0 | 0.0 | 3.2 | 1.3 | 0.6 | 0.0 |
| 2.33 | Oyen | 108 | 3.6 | 3.3 | 54.7 | 0.0 | 0.0 | 5.4 | 0.2 | 32.8 | 0.0 |
| | ( Morainal - U ) | | | | | | | | | | |
| 2.04 | Pakowki | 89 | 83.7 | 0.0 | 14.9 | 0.0 | 0.0 | 0.3 | 1.1 | 0.0 | 0.0 |
| 2.10 | Vauxhall | 21 | 62.5 | 0.0 | 34.1 | 0.0 | 0.0 | 0.0 | 3.4 | 0.0 | 0.0 |
| 2.32 | Cessford - East | 98 | 1.8 | 0.0 | 95.1 | 0.0 | 0.0 | 2.4 | 0.6 | 0.0 | 0.0 |
| | Scapa - East | 81 | 9.3 | 16.2 | 65.1 | 0.2 | 0.0 | 0.0 | 3.7 | 5.4 | 0.0 |
| | Sunnynook | 53 | 8.6 | 0.0 | 85.3 | 0.0 | 0.0 | 3.6 | 2.3 | 0.0 | 0.4 |
| | | (232) | (6.0) | (5.8) | (82.4) | ( T )[3] | (0.0) | (1.9) | (1.9) | (1.9) | (0.1) |
| | ( Lacustrine - U ) | | | | | | | | | | |
| 2.03 | Lethbridge | 49 | 0.5 | 0.0 | 37.9 | 44.7 | 0.0 | 7.8 | 9.2 | 0.0 | 0.0 |
| | Stirling | 216 | 1.0 | 0.2 | 67.9 | 23.6 | 0.0 | 0.8 | 5.3 | 0.0 | 1.2 |
| | | (265) | (0.9) | (0.2) | (62.2) | (27.5) | (0.0) | (2.2) | (6.1) | (0.0) | (0.9) |
| 2.07 | Claresholm | 68 | 37.5 | 0.0 | 56.9 | 0.0 | 0.0 | 0.0 | 0.7 | 4.9 | 0.0 |
| 2.24 | Vulcan - East | 23 | 10.5 | 0.0 | 86.3 | 0.0 | 0.0 | 0.0 | 3.2 | 0.0 | 0.0 |
| | ( Lacustrine - M ) | | | | | | | | | | |
| 2.41 | Munson | 27 | 64.9 | 0.0 | 21.0 | 0.0 | 0.0 | 9.7 | 4.4 | 0.0 | 0.0 |
| | ( Fluvial - U ) | | | | | | | | | | |
| 2.19 | Patricia | 85 | 0.8 | 0.0 | 73.4 | 13.6 | 0.0 | 3.7 | 6.8 | 0.0 | 1.7 |
| 2.31 | Cessford - West | 19 | 3.2 | 0.0 | 92.6 | 0.0 | 0.0 | 1.1 | 3.2 | 0.0 | 0.0 |
| 2.39 | Kirkpatrick Lake W. | 62 | 1.5 | 0.3 | 90.7 | 0.0 | 0.0 | 0.0 | 7.5 | 0.0 | 0.0 |
| Entire Ecoregion Sample | | 1162 | 16.5 | 1.7 | 63.6 | 7.9 | 0.0 | 2.4 | 3.8 | 4.1 | T |

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

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

| Physio-graphic Unit | Transect[1] | Total Number of Wetlands in Sample | Mean Density Per Quarter Section | Percent of Total Wetland Numbers in Cover Class[2] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Cult-ivated | Willows and Trees | Grasses | Bulrush Cattail | Transi-tional Open Water | Natural Open Water | Arti-ficial Water | Saline Open Water | Other |
| | ( Morainal - D ) | | | | | | | | | | | |
| 2.01 | Walsh | 204 | 8.5 | 42.2 | 0.9 | 47.1 | 0.0 | 0.0 | 0.9 | 8.8 | 0.0 | 0.0 |
| | ( Morainal - K & K ) | | | | | | | | | | | |
| 2.02 | Bow Island | 131 | 5.5 | 52.8 | 0.0 | 42.8 | 0.7 | 0.0 | 1.5 | 1.5 | 0.7 | 0.0 |
| 2.33 | Oyen | 235 | 9.8 | 15.3 | 2.2 | 79.2 | 0.0 | 0.0 | 0.8 | 1.2 | 1.2 | 0.0 |
| | ( Morainal - U ) | | | | | | | | | | | |
| 2.04 | Pakowki | 143 | 6.0 | 67.8 | 0.0 | 24.5 | 0.0 | 0.0 | 0.7 | 7.1 | 0.0 | 0.0 |
| 2.10 | Vauxhall | 114 | 4.8 | 64.0 | 0.0 | 29.9 | 0.0 | 0.0 | 0.0 | 6.1 | 0.0 | 0.0 |
| 2.32 | Cessford - East | 192 | 9.7 | 0.5 | 0.0 | 96.9 | 0.0 | 0.0 | 1.0 | 1.6 | 0.0 | 0.0 |
| | Scapa - East | 168 | 8.4 | 13.7 | 7.1 | 68.5 | 0.6 | 0.0 | 0.0 | 9.5 | 0.6 | 0.0 |
| | Sunnynook | 225 | 9.4 | 14.7 | 0.9 | 79.6 | 0.4 | 0.0 | 0.9 | 3.1 | 0.0 | 0.4 |
| | | (585) | (9.2) | ( 9.7) | (2.4) | (82.0) | (0.3) | (0.0) | (0.8) | (4.4) | (0.2) | (0.2) |
| | ( Lacustrine - U ) | | | | | | | | | | | |
| 2.03 | Lethbridge | 34 | 1.4 | 2.8 | 0.0 | 8.5 | 5.7 | 0.0 | 2.8 | 80.1 | 0.0 | 0.0 |
| | Stirling | 58 | 2.4 | 8.7 | 3.3 | 39.8 | 3.3 | 0.0 | 6.6 | 33.2 | 0.0 | 5.0 |
| | | (92) | (1.9) | (6.3) | (2.1) | (28.4) | (4.2) | (0.0) | (5.3) | (50.5) | (0.0) | (3.2) |
| 2.07 | Claresholm | 59 | 2.5 | 35.8 | 0.0 | 45.5 | 0.0 | 0.0 | 0.0 | 11.8 | 6.9 | 0.0 |
| 2.24 | Vulcan - East | 45 | 1.9 | 46.8 | 0.0 | 35.6 | 0.0 | 0.0 | 2.1 | 15.4 | 0.0 | 0.0 |
| | ( Lacustrine - M ) | | | | | | | | | | | |
| 2.41 | Munson | 65 | 2.7 | 52.4 | 0.0 | 32.5 | 0.0 | 0.0 | 4.4 | 10.7 | 0.0 | 0.0 |
| | ( Fluvial - U ) | | | | | | | | | | | |
| 2.19 | Patricia | 188 | 7.8 | 3.7 | 0.5 | 57.5 | 13.8 | 0.0 | 4.7 | 15.5 | 0.5 | 3.7 |
| 2.31 | Cessford - West | 138 | 6.9 | 3.6 | 0.0 | 92.8 | 0.0 | 0.0 | 0.7 | 2.9 | 0.0 | 0.0 |
| 2.39 | Kirkpatrick Lake W. | 152 | 9.5 | 7.9 | 0.6 | 82.2 | 0.0 | 0.0 | 0.0 | 9.3 | 0.0 | 0.0 |
| Entire Ecoregion Sample | | 2151 | 5.9 | 24.4 | 1.0 | 62.3 | 1.5 | 0.0 | 1.5 | 8.3 | 0.5 | 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.

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

| Physio-graphic Unit | Transect[1] | Total Wetland Area ( in ha )[2] | Percent of Total Wetland Area in Land Use Activity Class[2] | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | No Use | Abandoned Cultivation | Annual Crop | Haying | Grazing | Other |
| | ( Morainal - D ) | | | | | | | |
| 2.01 | Walsh | 25 | 1.9 | 4.7 | 19.8 | 3.7 | 61.3 | 8.5 |
| | ( Morainal - K & K ) | | | | | | | |
| 2.02 | Bow Island | 38 | 41.5 | 3.8 | 34.6 | 0.0 | 17.0 | 3.1 |
| 2.33 | Oyen | 108 | 65.7 | 0.5 | 3.6 | 0.7 | 29.6 | 0.0 |
| | ( Morainal - U ) | | | | | | | |
| 2.04 | Pakowki | 89 | 3.3 | 0.3 | 83.7 | 0.0 | 8.4 | 4.3 |
| 2.10 | Vauxhall | 21 | 4.5 | 0.0 | 61.8 | 0.0 | 30.3 | 3.4 |
| 2.32 | Cessford - East | 98 | 0.2 | 1.2 | 1.8 | 0.0 | 96.7 | 0.0 |
| | Scapa - East | 81 | 8.9 | 0.0 | 9.3 | 0.0 | 81.3 | 0.5 |
| | Sunnynook | 53 | 4.1 | 0.5 | 8.6 | 0.0 | 83.3 | 3.6 |
| | | (232) | (4.1) | (0.6) | (6.1) | (0.0) | (88.4) | (0.8) |
| | ( Lacustrine - U ) | | | | | | | |
| 2.03 | Lethbridge | 49 | 61.4 | 1.9 | 0.5 | 0.0 | 24.2 | 12.1 |
| | Stirling | 216 | 2.6 | 0.0 | 1.0 | 0.0 | 89.0 | 7.5 |
| | | (265) | (13.6) | (0.4) | (0.9) | (0.0) | (76.8) | ( 8.3) |
| 2.07 | Claresholm | 68 | 5.7 | 0.0 | 37.5 | 0.0 | 56.9 | 0.0 |
| 2.24 | Vulcan - East | 23 | 55.3 | 0.0 | 10.6 | 0.0 | 34.0 | 0.0 |
| | ( Lacustrine - M ) | | | | | | | |
| 2.41 | Munson | 27 | 4.4 | 1.8 | 64.9 | 0.0 | 19.3 | 9.7 |
| | ( Fluvial - U ) | | | | | | | |
| 2.19 | Patricia | 85 | 6.8 | 0.0 | 0.9 | 2.0 | 65.3 | 25.1 |
| 2.31 | Cessford - West | 19 | 2.1 | 1.1 | 3.2 | 0.0 | 93.6 | 0.0 |
| 2.39 | Kirkpatrick Lake W | 62 | 28.3 | 0.0 | 1.6 | 1.6 | 66.7 | 1.8 |
| Entire Ecoregion Sample | | 1062 | 16.8 | 0.7 | 16.4 | 0.3 | 60.5 | 5.3 |

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 10. Wetlands Affected by One or More Permanent Impacts.

| Physiographic Unit | Transect[1] | Mean Number of Wetlands/Quarter[2] Total | Affected by One or More Impacts | Percent of Wetlands Impacted |
|---|---|---|---|---|
| | ( Morainal - D ) | | | |
| 2.01 | Walsh | 8.5 | 1.9 | 22.4 |
| | ( Morainal - K & K ) | | | |
| 2.02 | Bow Island | 5.5 | 1.3 | 23.6 |
| 2.33 | Oyen | 9.8 | 2.6 | 26.5 |
| | ( Morainal - U ) | | | |
| 2.04 | Pakowki | 6.0 | 1.8 | 30.0 |
| 2.10 | Vauxhall | 4.8 | 0.8 | 16.7 |
| 2.32 | Cessford - East | 9.6 | 3.0 | 31.3 |
| | Scapa - East | 8.4 | 2.0 | 23.8 |
| | Sunnynook | 9.4 | 2.4 | 25.5 |
| | | (9.2) | (2.4) | (26.1) |
| | ( Lacustrine - U ) | | | |
| 2.03 | Lethbridge | 1.4 | 1.4 | 100.0 |
| | Stirling | 2.4 | 2.0 | 83.3 |
| | | (1.9) | (1.7) | ( 89.5) |
| 2.07 | Claresholm | 2.5 | 0.9 | 36.0 |
| 2.24 | Vulcan - East | 1.9 | 0.8 | 42.1 |
| | ( Lacustrine - M ) | | | |
| 2.41 | Munson | 2.7 | 1.0 | 37.0 |
| | ( Fluvial - U ) | | | |
| 2.19 | Patricia | 7.9 | 7.5 | 94.9 |
| 2.31 | Cessford - West | 6.9 | 1.3 | 18.8 |
| 2.39 | Kirkpatrick Lake West | 9.5 | 3.1 | 32.6 |
| Entire Ecoregion Sample | | 5.9 | 2.1 | 35.6 |

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.

Table 11. Occurrence of Streams in Data Samples.

| Physiographic Unit | Transect[1] | Number of Quarters In Sample[2] | Number of Quarters Containing Streams[2] | Percent of Quart Containing Strea |
|---|---|---|---|---|
| | ( Morainal - D ) | | | |
| 2.01 | Walsh | 24 | 7 | 29.2 |
| | ( Morainal - K & K ) | | | |
| 2.02 | Bow Island | 24 | 2 | 8.3 |
| 2.33 | Oyen | 24 | 0 | 0.0 |
| | ( Morainal - U ) | | | |
| 2.04 | Pakowki | 24 | 0 | 0.0 |
| 2.10 | Vauxhall | 24 | 0 | 0.0 |
| 2.32 | Cessford - East | 20 | 0 | 0.0 |
| | Scapa - East | 20 | 7 | 35.0 |
| | Sunnynook | 24 | 5 | 20.8 |
| | | (64) | (12) | (18.8) |
| | ( Lacustrine - U ) | | | |
| 2.03 | Lethbridge | 24 | 0 | 0.0 |
| | Stirling | 24 | 6 | 25.0 |
| | | (48) | (6) | (12.5) |
| 2.07 | Claresholm | 24 | 0 | 0.0 |
| 2.24 | Vulcan - East | 24 | 5 | 20.8 |
| | ( Lacustrine - M ) | | | |
| 2.41 | Munson | 24 | 2 | 8.3 |
| | ( Fluvial - U ) | | | |
| 2.19 | Patricia | 24 | 6 | 25.0 |
| 2.31 | Cessford - West | 20 | 1 | 5.0 |
| 2.39 | Kirkpatrick Lake West | 16 | 2 | 12.5 |
| Entire Ecoregion Sample | | 364 | 43 | 11.8 |

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.

Table 12. Distribution of Upland Cover Classes

| Physio-graphic Unit | Transect[1] | 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 |
| | ( Morainal - D ) | | | | | | | | | | |
| 2.01 | Walsh | 1557 | 17.7 | 1.3 | 0.2 | 0.0 | 19.2 | 74.9 | 4.9 | 0.1 | 0.8 |
| | ( Morainal - K & K ) | | | | | | | | | | |
| 2.02 | Bow Island | 1556 | 7.2 | 0.0 | 0.0 | 0.0 | 7.2 | 90.2 | 2.4 | 0.1 | 0.1 |
| 2.33 | Oyen | 1498 | 43.2 | 2.8 | 0.3 | 0.1 | 46.4 | 47.3 | 5.3 | 0.2 | 0.8 |
| | ( Morainal - U ) | | | | | | | | | | |
| 2.04 | Pakowki | 1501 | 6.8 | 0.0 | 0.0 | 0.0 | 6.8 | 91.2 | 1.2 | 0.1 | 0.7 |
| 2.10 | Vauxhall | 1567 | 16.0 | 0.0 | 0.0 | 0.0 | 16.0 | 81.4 | 2.1 | 0.1 | 0.4 |
| 2.32 | Cessford - East | 1225 | 86.0 | 0.0 | 0.0 | 0.0 | 86.0 | 6.8 | 6.9 | 0.0 | 0.2 |
| | Scapa - East | 1245 | 54.7 | 0.1 | T[4] | 0.4 | 55.2 | 41.1 | 2.8 | 0.2 | 0.8 |
| | Sunnynook | 1515 | 66.0 | 0.9 | 0.0 | 0.0 | 66.9 | 31.4 | 0.5 | 0.1 | 1.1 |
| | | (3985) | (68.7) | (0.3) | ( T ) | (0.1) | (69.2) | (26.9) | (3.2) | (0.1) | (0.7) |
| | ( Lacustrine - U ) | | | | | | | | | | |
| 2.03 | Lethbridge | 1512 | 4.0 | 0.0 | 0.0 | 0.0 | 4.0 | 85.7 | 8.2 | 0.3 | 1.7 |
| | Stirling | 1372 | 8.8 | T | T | 0.0 | 8.8 | 72.4 | 16.3 | 0.3 | 2.2 |
| | | (2884) | (6.3) | ( T ) | ( T ) | (0.0) | (6.3) | (79.4) | (12.1) | (0.3) | (1.9) |
| 2.07 | Claresholm | 1516 | 9.7 | 0.0 | 0.0 | 0.0 | 9.7 | 74.8 | 12.5 | 0.4 | 2.6 |
| 2.24 | Vulcan - East | 1564 | 7.7 | 0.0 | 0.1 | 0.0 | 7.8 | 87.3 | 3.8 | 0.3 | 0.9 |
| | ( Lacustrine - M ) | | | | | | | | | | |
| 2.41 | Munson | 1558 | 12.6 | 1.1 | 0.1 | 0.0 | 13.8 | 82.2 | 2.1 | 0.1 | 1.9 |
| | ( Fluvial - U ) | | | | | | | | | | |
| 2.19 | Patricia | 1502 | 28.7 | 0.1 | 0.1 | 0.1 | 29.0 | 28.7 | 39.9 | 0.5 | 1.9 |
| 2.31 | Cessford - West | 1292 | 68.5 | 0.3 | 0.0 | 0.0 | 68.8 | 19.9 | 10.2 | 0.1 | 0.9 |
| 2.39 | Kirkpatrick Lake W. | 999 | 55.0 | 0.8 | 1.0 | 1.4 | 58.2 | 22.8 | 18.6 | 0.0 | 0.5 |
| Entire Ecoregion Sample | | 22979 | 28.9 | 0.5 | 0.1 | 0.1 | 29.6 | 60.8 | 8.3 | 0.2 | 1.1 |

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

Table 13. Distribution of Upland Land Use Activity Classes.

| Physio-graphic Unit | Transect[1] | Total Upland Area ( in ha )[2] | Percent of Total Upland Area in Land Use in Activity | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Unused | Abandoned | Annual Crops[3] | Forage | Grazing | Farm-steads | Road & Railway | Other |
| | ( Morainal - D ) | | | | | | | | | |
| 2.01 | Walsh | 1557 | 1.0 | 0.1 | 74.9 | 1.7 | 17.5 | 1.1 | 3.7 | 0.1 |
| | ( Morainal - K & K ) | | | | | | | | | |
| 2.02 | Bow Island | 1556 | 2.3 | 0.1 | 90.2 | 0.0 | 5.4 | 0.2 | 1.8 | 0.0 |
| 2.33 | Oyen | 1498 | 6.2 | 0.5 | 47.3 | 2.8 | 40.6 | 0.5 | 2.1 | T[4] |
| | ( Morainal - U ) | | | | | | | | | |
| 2.04 | Pakowki | 1501 | 0.6 | 0.2 | 91.2 | 0.3 | 4.8 | 0.5 | 2.4 | T |
| 2.10 | Vauxhall | 1567 | 2.3 | 0.0 | 81.4 | 0.0 | 12.6 | 0.5 | 2.7 | 0.5 |
| 2.32 | Cessford - East | 1225 | 0.0 | 0.1 | 6.8 | 0.0 | 91.8 | 0.0 | 1.2 | 0.1 |
| | Scapa - East | 1245 | 3.6 | 0.3 | 41.0 | 1.8 | 50.4 | 1.1 | 1.9 | 0.0 |
| | Sunnynook | 1515 | 0.3 | 0.5 | 31.4 | 0.2 | 64.4 | 0.5 | 2.6 | 0.1 |
| | | (3985) | (1.2) | (0.3) | (26.9) | (0.6) | (68.5) | (0.6) | (2.0) | ( T ) |
| | ( Lacustrine - U ) | | | | | | | | | |
| 2.03 | Lethbridge | 1512 | 0.4 | 0.0 | 85.7 | 8.0 | 1.0 | 1.9 | 2.1 | 0.8 |
| | Stirling | 1372 | 1.2 | 0.1 | 72.4 | 10.1 | 7.9 | 2.0 | 3.9 | 2.4 |
| | | (2884) | (0.8) | (0.1) | (79.4) | ( 9.0) | (4.2) | (2.0) | (2.9) | (1.6) |
| 2.07 | Claresholm | 1516 | 0.9 | 0.1 | 74.8 | 2.1 | 16.6 | 3.1 | 2.2 | 0.2 |
| 2.24 | Vulcan - East | 1564 | 1.6 | 0.1 | 87.3 | 0.4 | 3.9 | 1.0 | 2.9 | 2.9 |
| | ( Lacustrine - M ) | | | | | | | | | |
| 2.41 | Munson | 1558 | 4.7 | 0.4 | 82.2 | 0.5 | 6.9 | 1.1 | 3.6 | 0.5 |
| | ( Fluvial - U ) | | | | | | | | | |
| 2.19 | Patricia | 1502 | 1.0 | 0.3 | 28.7 | 34.4 | 29.5 | 2.3 | 3.1 | 0.8 |
| 2.31 | Cessford - West | 1292 | 0.0 | 0.4 | 19.9 | 3.7 | 71.9 | 0.6 | 2.5 | 1.0 |
| 2.39 | Kirkpatrick Lake W. | 999 | 7.9 | 0.7 | 22.8 | 13.1 | 52.3 | 0.2 | 3.0 | 0.1 |
| Entire Ecoregion Sample | | 22979 | 2.0 | 0.2 | 60.9 | 4.8 | 27.8 | 1.1 | 2.6 | 0.6 |

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.
3. Includes summerfallow.
4. T = trace = less than 0.05

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. |
| | ( Morainal - D ) | | | | | | | | | |
| 2.01 | Walsh | 0.2 | T[5] | 0.3 | 0.6 | 0.1 | 0.7 | 0.0 | 0.0 | 0.0 |
| | ( Morainal - K & K ) | | | | | | | | | |
| 2.02 | Bow Island | 0.6 | 0.2 | 1.6 | 1.0 | 0.5 | 2.4 | 0.0 | 0.0 | 0.0 |
| 2.33 | Oyen | 0.2 | T | 0.5 | 2.4 | 0.6 | 1.1 | 0.2 | T | 0.4 |
| | ( Morainal - U ) | | | | | | | | | |
| 2.04 | Pakowki | 3.1 | 7.7 | 12.1 | 0.6 | 0.3 | 2.7 | 0.0 | 0.0 | 0.0 |
| 2.10 | Vauxhall | 0.6 | 0.1 | 0.8 | 0.3 | 0.1 | 1.1 | 0.0 | 0.0 | 0.0 |
| 2.32 | Cessford - East | 0.1 | T | 0.9 | 4.7 | 0.5 | 0.5 | 0.0 | 0.0 | 0.0 |
| | Scapa - East | 0.4 | 0.1 | 1.1 | 2.7 | 3.2 | 5.4 | 0.7 | 0.6 | 4.1 |
| | Sunnynook | 0.2 | T | 1.1 | 1.9 | 1.3 | 3.3 | 0.0 | 0.0 | 0.0 |
| | | (0.2) | ( T ) | (1.1) | (3.0) | (1.1) | (2.9) | (0.2) | (0.1) | (4.4) |
| | ( Lacustrine - U ) | | | | | | | | | |
| 2.03 | Lethbridge | T | 0.0 | 0.2 | 0.8 | 1.3 | 8.2 | 0.0 | 0.0 | 0.0 |
| | Stirling | 0.1 | T | 1.2 | 6.1 | 48.9 | 39.3 | T | 0.0 | 0.4 |
| | | (0.1) | ( T ) | (1.1) | (3.4) | (18.4) | (37.1) | ( T ) | ( T ) | (0.4) |
| 2.07 | Claresholm | 1.1 | 4.3 | 19.7 | 1.0 | 0.7 | 3.6 | 0.0 | 0.0 | 0.0 |
| 2.24 | Vulcan - East | 0.1 | T | 0.7 | 0.8 | 0.6 | 3.5 | 0.0 | 0.0 | 0.0 |
| | ( Lacustrine - M ) | | | | | | | | | |
| 2.41 | Munson | 0.7 | 0.5 | 3.2 | 0.2 | 0.1 | 1.2 | 0.0 | 0.0 | 0.0 |
| | ( Fluvial - U ) | | | | | | | | | |
| 2.19 | Patricia | T | 0.0 | 0.2 | 2.5 | 2.5 | 4.9 | 0.0 | 0.0 | 0.1 |
| 2.31 | Cessford - West | T | 0.0 | 0.2 | 0.9 | 0.2 | 0.9 | 0.0 | 0.0 | 0.0 |
| 2.39 | Kirkpatrick Lake W. | 0.1 | 0.0 | 0.3 | 3.4 | 4.6 | 5.3 | T | 0.0 | 0.1 |
| Entire Ecoregion Sample | | 0.5 | 0.2 | 9.6 | 1.8 | 1.2 | 12.2 | 0.1 | T | 3.5 |

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. 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. |
| | ( Morainal - D ) | | | | | | | | | |
| 2.01 | Walsh | 48.6 | 64.1 | 6.5 | 11.5 | 21.8 | 9.3 | T[5] | 0.0 | 0.1 |
| | ( Morainal - K & K ) | | | | | | | | | |
| 2.02 | Bow Island | 58.5 | 24.5 | 2.1 | 4.7 | 12.7 | 13.4 | 0.0 | 0.0 | T |
| 2.33 | Oyen | 29.5 | 116.9 | 19.4 | 27.0 | 118.6 | 21.5 | 0.1 | 0.0 | 0.2 |
| | ( Morainal - U ) | | | | | | | | | |
| 2.04 | Pakowki | 57.1 | 34.6 | 3.0 | 4.2 | 21.2 | 24.6 | 0.0 | 0.0 | 0.0 |
| 2.10 | Vauxhall | 53.2 | 70.0 | 6.5 | 10.5 | 62.5 | 29.3 | 0.0 | 0.0 | T |
| 2.32 | Cessford - East | 4.2 | 43.0 | 45.9 | 52.7 | 65.6 | 5.6 | 0.0 | 0.0 | 0.0 |
| | Scapa - East | 25.6 | 146.9 | 25.7 | 34.1 | 144.8 | 19.0 | 0.2 | T | 0.9 |
| | Sunnynook | 19.8 | 134.2 | 33.2 | 41.7 | 128.6 | 15.1 | 0.0 | 0.0 | T |
| | | (16.7) | ( 71.8) | (34.4) | (42.8) | ( 71.2) | (13.3) | (0.1 ) | ( T ) | (1.0) |
| | ( Lacustrine - U ) | | | | | | | | | |
| 2.03 | Lethbridge | 54.0 | 29.2 | 2.6 | 2.5 | 0.7 | 1.3 | 0.0 | 0.0 | T |
| | Stirling | 41.4 | 93.8 | 11.1 | 5.0 | 2.7 | 2.6 | 0.0 | 0.0 | 0.1 |
| | | (47.7) | (48.4) | ( 7.0) | (3.8) | (1.4) | (2.6) | ( T ) | ( T ) | (0.1) |
| 2.07 | Claresholm | 47.3 | 78.9 | 8.2 | 6.1 | 15.2 | 12.2 | 0.0 | 0.0 | 0.0 |
| 2.24 | Vulcan - East | 56.9 | 24.5 | 2.1 | 5.0 | 6.9 | 6.7 | 0.0 | 0.0 | 0.0 |
| | ( Lacustrine - M ) | | | | | | | | | |
| 2.41 | Munson | 53.3 | 45.5 | 4.2 | 8.2 | 31.4 | 18.8 | 0.0 | 0.0 | T |
| | ( Fluvial - U ) | | | | | | | | | |
| 2.19 | Patricia | 18.0 | 68.0 | 18.5 | 18.0 | 68.9 | 18.8 | 0.1 | T | 0.6 |
| 2.31 | Cessford - West | 12.9 | 121.2 | 42.1 | 44.3 | 150.7 | 15.2 | 0.0 | 0.0 | T |
| 2.39 | Kirkpatrick Lake W. | 14.2 | 117.7 | 33.1 | 34.3 | 127.9 | 14.9 | 0.8 | 0.7 | 3.5 |
| Entire Ecoregion Sample | | 38.4 | 34.4 | 17.1 | 18.2 | 27.0 | 28.3 | 0.1 | T | 2.7 |

1. Grouped by landform ( parent soil material, surface form and percent slope ).
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: Unused[2] Mean | Unused[2] S.E.[3] | Unused[2] C.V.[4] | Grazing[2] Mean | Grazing[2] S.E. | Grazing[2] C.V | Road & Railways[2] Mean | Road & Railways[2] S.E. | Road & Railways[2] C.V. |
|---|---|---|---|---|---|---|---|---|---|---|
| | ( Morainal - D ) | | | | | | | | | |
| 2.01 | Walsh | 0.6 | 0.9 | 7.3 | 11.3 | 34.8 | 15.1 | 2.4 | 0.1 | 0.2 |
| | ( Morainal - K & K ) | | | | | | | | | |
| 2.02 | Bow Island | 1.5 | 2.4 | 7.9 | 3.5 | 19.6 | 27.3 | 1.2 | 0.1 | 0.5 |
| 2.33 | Oyen | 3.9 | 3.7 | 4.7 | 25.4 | 157.3 | 30.4 | 1.3 | 0.2 | 0.7 |
| | ( Morainal - U ) | | | | | | | | | |
| 2.04 | Pakowki | 0.4 | 0.1 | 1.0 | 3.0 | 23.1 | 37.8 | 1.5 | 0.1 | 0.5 |
| 2.10 | Vauxhall | 1.5 | 7.9 | 25.9 | 8.2 | 55.4 | 33.0 | 1.7 | 0.1 | 0.3 |
| 2.32 | Cessford - East | 0.0 | 0.0 | 0.0 | 56.2 | 44.0 | 3.5 | 0.8 | 0.1 | 0.3 |
| | Scapa - East | 2.2 | 12.5 | 25.2 | 31.3 | 162.5 | 23.2 | 1.2 | 0.2 | 0.9 |
| | Sunnynook | 0.2 | 0.1 | 1.8 | 40.7 | 134.5 | 16.2 | 1.7 | 0.2 | 0.5 |
| | | (0.8) | ( 2.2) | (23.8) | (42.6) | (77.5) | (14.6) | (1.2) | (0.1) | (0.7) |
| | ( Lacustrine - U ) | | | | | | | | | |
| 2.03 | Lethbridge | 0.3 | 0.1 | 1.7 | 0.6 | 0.5 | 3.7 | 1.3 | 0.1 | 0.4 |
| | Stirling | 0.7 | 0.6 | 4.1 | 4.5 | 8.1 | 8.8 | 2.2 | 0.6 | 1.4 |
| | | (0.5) | (0.2) | (3.5) | (2.6) | (3.5) | (9.6) | (1.8) | (0.3) | (1.1) |
| 2.07 | Claresholm | 0.6 | 0.4 | 3.2 | 10.5 | 53.0 | 24.8 | 1.4 | 0.1 | 0.4 |
| 2.24 | Vulcan - East | 1.0 | 0.5 | 2.3 | 2.5 | 6.6 | 12.9 | 1.9 | 0.1 | 0.2 |
| | ( Lacustrine - M ) | | | | | | | | | |
| 2.41 | Munson | 3.1 | 8.4 | 13.4 | 4.5 | 35.1 | 38.4 | 2.3 | 0.5 | 1.0 |
| | ( Fluvial - U ) | | | | | | | | | |
| 2.19 | Patricia | 0.6 | 0.1 | 1.2 | 18.5 | 90.0 | 23.9 | 1.9 | 0.1 | 0.2 |
| 2.31 | Cessford - West | 0.0 | 0.0 | 0.1 | 46.5 | 124.3 | 12.0 | 1.6 | 0.1 | 0.3 |
| 2.39 | Kirkpatrick Lake W. | 4.9 | 23.4 | 19.1 | 32.6 | 190.2 | 23.3 | 1.9 | 0.2 | 0.4 |
| Entire Ecoregion Sample | | 1.3 | 0.9 | 12.9 | 17.6 | 30.6 | 33.3 | 1.7 | 0.1 | 0.6 |

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.
3. S.E. - Standard Error

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

| Unit | Physiographic Unit[1] Name | Estimated Area in Thousands of Hectares: Total Wetland Area | Cultivated | Willows and Trees | Grasses | Bulrush Cattail | Transitional Open Water | Natural Open Water | Artificial Open Water | Saline Open Water | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ( Morainal - D ) | | | | | | | | | | |
| 2.01 | Cypress Hills Benchland | 2.5 | 0.5 | 0.0 | 1.4 | T[2] | 0.0 | 0.2 | 0.4 | 0.0 | 0.0 |
| | ( Morainal - K & K ) | | | | | | | | | | |
| 2.02 | Chin Plain | 13.5 | 4.7 | 0.0 | 8.1 | 0.0 | 0.0 | 0.4 | 0.2 | 0.1 | 0.0 |
| 2.33 | Oyen Upland | 20.7 | 0.7 | 0.7 | 11.3 | 0.0 | 0.0 | 1.1 | T | 6.8 | 0.0 |
| | ( Morainal - U ) | | | | | | | | | | |
| 2.04 | Verdigris Plain | 13.4 | 11.2 | 0.0 | 2.0 | 0.0 | 0.0 | T | 0.2 | 0.0 | 0.0 |
| 2.10 | Enchant Plain | 4.3 | 2.7 | 0.0 | 1.5 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| 2.32 | Richdale - Cessford Plain | 26.8 | 1.6 | 1.6 | 22.1 | T | 0.0 | 0.5 | 0.5 | 0.5 | T |
| | TOTAL MORAINAL | 81.2 | 21.4 | 2.3 | 46.4 | T | 0.0 | 2.2 | 1.4 | 7.4 | T |
| | ( Lacustrine - U ) | | | | | | | | | | |
| 2.03 | Fincastle Plain | 26.8 | 0.2 | 0.1 | 16.7 | 7.4 | 0.0 | 0.6 | 1.6 | 0.0 | 0.2 |
| 2.07 | Keho Lake Plain | 10.1 | 3.8 | 0.0 | 5.7 | 0.0 | 0.0 | 0.0 | 0.1 | 0.5 | 0.0 |
| 2.24 | Little Bow Plain | 1.4 | 0.2 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | T | 0.0 | 0.0 |
| | ( Lacustrine - M ) | | | | | | | | | | |
| 2.41 | Chain Lakes Plain | 2.4 | 1.6 | 0.0 | 0.5 | 0.0 | 0.0 | 0.2 | 0.1 | 0.0 | 0.0 |
| | TOTAL LACUSTRINE | 40.7 | 5.8 | 0.1 | 24.1 | 7.4 | 0.0 | 0.8 | 1.8 | 0.5 | 0.2 |

**Table 17 continued on next page**

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

| Unit | Physiographic Unit[3] Name | | Estimated Area in Thousands of Hectares: Total Wetland Area | Cultivated | Willows and Trees | Grasses | Bulrush Cattail | Transitional Open Water | Natural Open Water | Artificial Open Water | Saline Open Water | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ( Fluvial - U ) | | | | | | | | | | | |
| 2.19 | Matzhiwin Plain | | 11.9 | 0.1 | 0.0 | 8.7 | 1.6 | 0.0 | 0.4 | 0.8 | 0.0 | 0.2 |
| 2.31 | Lower Berry Creek Plain | | 1.6 | 0.1 | 0.0 | 1.4 | 0.0 | 0.0 | T | 0.1 | 0.0 | 0.0 |
| 2.39 | Sounding Creek Plain | | 15.2 | 0.2 | 0.1 | 13.8 | 0.0 | 0.0 | 0.0 | 1.1 | 0.0 | 0.0 |
| | TOTAL FLUVIAL | | 28.7 | 0.4 | 0.1 | 23.9 | 1.6 | 0.0 | 0.4 | 2.0 | 0.0 | 0.2 |
| Total for Entire Sampled | | A[3] | 150.6 | 27.6 | 2.5 | 94.4 | 9.0 | 0.0 | 3.4 | 5.2 | 7.9 | 0.4 |
| Portion of Ecoregion | | B[4] | 153.1 | 25.3 | 2.6 | 97.4 | 12.1 | 0.0 | 3.6 | 5.8 | 6.3 | T |

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

2. T = trace - less than 50 hectares.

3. Based on summation of values from individual physiographic units.

4. Based on the analysis of the ecoregion sample as a single unit.

Table 18. Estimated Numbers of Wetland Cover Class in Physiographic Unit.

| Unit | Physiographic Unit[1] Name | Estimated Number of Wetlands ( in thousands ) Total Number of Wetlands | Cultivated | Willows and Trees | Grasses | Bulrush Cattail | Transitional Open Water | Natural Open Water | Artificial Open Water | Saline Open Water | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ( Morainal - D ) | | | | | | | | | | |
| 2.01 | Cypress Hills Benchland | 21.4 | 9.0 | 0.2 | 10.1 | 0.0 | 0.0 | 0.2 | 1.9 | 0.0 | 0.0 |
| | ( Morainal - K & K ) | | | | | | | | | | |
| 2.02 | Chin Plain | 46.1 | 24.3 | 0.0 | 19.7 | 0.3 | 0.0 | 0.7 | 0.7 | 0.3 | 0.0 |
| 2.33 | Oyen Upland South | 45.2 | 6.9 | 1.0 | 35.8 | 0.0 | 0.0 | 0.4 | 0.5 | 0.5 | 0.0 |
| | ( Morainal - U ) | | | | | | | | | | |
| 2.04 | Verdigris Plain | 21.4 | 14.5 | 0.0 | 5.2 | 0.0 | 0.0 | 0.2 | 1.5 | 0.0 | 0.0 |
| 2.10 | Enchant Plain | 23.8 | 15.2 | 0.0 | 7.1 | 0.0 | 0.0 | 0.0 | 1.5 | 0.0 | 0.0 |
| 2.32 | Richdale - Cessford Plain | 67.7 | 6.6 | 1.6 | 55.5 | 0.2 | 0.0 | 0.5 | 3.0 | 0.1 | 0.1 |
| | TOTAL MORAINAL | 225.6 | 76.5 | 2.8 | 133.4 | 0.5 | 0.0 | 2.0 | 9.1 | 0.9 | 0.1 |
| | ( Lacustrine - U ) | | | | | | | | | | |
| 2.03 | Fincastle Plain | 9.3 | 0.6 | 0.2 | 2.6 | 0.4 | 0.0 | 0.5 | 4.7 | 0.0 | 0.3 |
| 2.07 | Keho Lake Plain | 8.7 | 3.1 | 0.0 | 4.0 | 0.0 | 0.0 | 0.0 | 1.0 | 0.6 | 0.0 |
| 2.24 | Little Bow Plain | 2.7 | 1.3 | 0.0 | 1.0 | 0.0 | 0.0 | T[2] | 0.4 | 0.0 | 0.0 |
| | ( Lacustrine - M ) | | | | | | | | | | |
| 2.41 | Chain Lakes Plain | 5.8 | 3.0 | 0.0 | 1.9 | 0.0 | 0.0 | 0.3 | 0.6 | 0.0 | 0.0 |
| | TOTAL LACUSTRINE | 26.5 | 8.0 | 0.2 | 9.5 | 0.4 | 0.0 | 0.8 | 6.7 | 0.6 | 0.3 |

**Table 18 continued on next page**

Table 18 continued. Estimated Numbers of Wetland Cover Class in Physiographic Unit.

| Unit | Physiographic Unit Name | | Estimated Number of Wetlands ( in thousands ) Total Number of Wetlands | Cultivated | Willows and Trees | Grasses | Bulrush Cattail | Transitional Open Water | Natural Open Water | Artificial Open Water | Saline Open Water | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ( Fluvial - U ) | | | | | | | | | | | |
| 2.19 | Matzhiwin Plain | | 26.5 | 1.0 | 0.1 | 15.2 | 3.7 | 0.0 | 1.3 | 4.1 | 0.1 | 1.0 |
| 2.31 | Lower Berry Creek Plain | | 11.8 | 0.4 | 0.0 | 11.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.0 | 0.0 |
| 2.39 | Sounding Creek Plain | | 37.6 | 3.0 | 0.2 | 30.9 | 0.0 | 0.0 | 0.0 | 3.5 | 0.0 | 0.0 |
| | TOTAL FLUVIAL | | 75.9 | 4.4 | 0.3 | 57.1 | 3.7 | 0.0 | 1.4 | 7.9 | 0.1 | 1.0 |
| Total for Entire Sampled | | A[3] | 328.0 | 88.9 | 3.3 | 200.0 | 4.6 | 0.0 | 4.2 | 23.7 | 1.6 | 1.4 |
| Portion of Ecoregion | | B[4] | 311.3 | 76.0 | 3.1 | 193.9 | 4.7 | 0.0 | 4.7 | 25.8 | 1.6 | 1.6 |

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

2. T = trace - less than 50 hectares.

3. Based on summation of values from individual physiographic units.

4. Based on the analysis of region sample as a single unit.

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

| Unit Number | Physiographic Unit[1] Name | Estimated Area in Thousand of Hectares: Total Wetland Area | No Use | Abandoned Cultivation | Annual Crop | Haying | Grazing | Other |
|---|---|---|---|---|---|---|---|---|
| ( Morainal - D ) | | | | | | | | |
| 2.01 | Cypress Hills Benchland | 2.5 | T[2] | 0.1 | 0.5 | 0.1 | 1.5 | 0.2 |
| ( Morainal - K & K ) | | | | | | | | |
| 2.02 | Chin Plain | 13.5 | 5.6 | 0.5 | 4.7 | 0.0 | 2.3 | 0.4 |
| 2.33 | Oyen Upland South | 20.7 | 13.6 | 0.1 | 0.8 | 0.1 | 6.1 | 0.0 |
| ( Morainal - U ) | | | | | | | | |
| 2.04 | Verdigris Plain | 13.4 | 0.4 | T | 11.2 | 0.0 | 1.1 | 0.6 |
| 2.10 | Enchant Plain | 4.3 | 0.2 | 0.0 | 2.7 | 0.0 | 1.3 | 0.2 |
| 2.32 | Richdale - Cessford Plain | 26.8 | 1.1 | 0.2 | 1.6 | 0.0 | 23.7 | 0.2 |
| TOTAL MORAINAL | | 81.2 | 20.9 | 0.9 | 21.5 | 0.2 | 36.0 | 1.6 |
| ( Lacustrine - U ) | | | | | | | | |
| 2.03 | Fincastle Plain | 26.8 | 3.7 | 0.1 | 0.2 | 0.0 | 20.6 | 2.2 |
| 2.07 | Keho Lake Plain | 10.1 | 0.6 | 0.0 | 3.8 | 0.0 | 5.7 | 0.0 |
| 2.24 | Little Bow Plain | 1.4 | 0.8 | 0.0 | 0.1 | 0.0 | 0.5 | 0.0 |
| ( Lacustrine - M ) | | | | | | | | |
| 2.41 | Chain Lakes Plain | 2.4 | 0.1 | T | 1.6 | 0.0 | 0.5 | 0.2 |
| TOTAL LACUSTRINE | | 40.7 | 5.2 | 0.1 | 5.7 | 0.0 | 27.3 | 2.4 |
| ( Fluvial - U ) | | | | | | | | |
| 2.19 | Matzhiwin Plain | 11.9 | 0.8 | 0.0 | 0.1 | 0.2 | 7.8 | 3.0 |
| 2.31 | Lower Berry Creek Plain | 1.6 | T | T | 0.1 | 0.0 | 1.5 | 0.0 |
| 2.39 | Sounding Creek Plain | 15.2 | 4.3 | 0.0 | 0.2 | 0.2 | 10.1 | 0.3 |
| TOTAL FLUVIAL | | 28.7 | 5.1 | T | 0.4 | 0.4 | 19.4 | 3.3 |
| Total for Entire Sampled | A[3] | 150.6 | 31.2 | 1.0 | 27.6 | 0.6 | 82.7 | 7.3 |
| Portion of Ecoregion | B[4] | 153.1 | 25.7 | 1.1 | 25.1 | 0.5 | 92.6 | 8.1 |

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

2. T = trace - less than 50 hectares.

3. Based on summation of values from individual physiographic units.

4. Based on the analysis of the ecoregion sample as a single unit.

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

| Unit # | Physiographic Unit[1] Name | Total Upland Area | Native: Grass | Native: Low Shrub | Native: Tall Shrub | Native: Trees | Native: Total | Planted: Annual Crops | Planted: Perennial Grasses and Forbs | Planted: Trees and Shrubs | Planted: Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Estimated Area in Thousands of Hectares | | | | | | | | | |
| | ( Morainal - D ) | | | | | | | | | | |
| 2.01 | Cypress Hills Benchland | 163.2 | 28.9 | 2.1 | 0.3 | 0.0 | 31.3 | 122.3 | 8.0 | 0.2 | 1.3 |
| | ( Morainal - K & K ) | | | | | | | | | | |
| 2.02 | Chin Plain | 547.3 | 39.4 | 0.0 | 0.0 | 0.0 | 39.4 | 493.7 | 13.1 | 0.6 | 0.6 |
| 2.33 | Oyen Upland South | 287.9 | 124.4 | 8.0 | 0.9 | 0.3 | 133.6 | 136.2 | 15.2 | 0.6 | 2.3 |
| | ( Morainal - U ) | | | | | | | | | | |
| 2.04 | Verdigris Plain | 225.1 | 15.3 | 0.0 | 0.0 | 0.0 | 15.3 | 205.3 | 2.7 | 0.2 | 1.6 |
| 2.10 | Enchant Plain | 326.5 | 52.2 | 0.0 | 0.0 | 0.0 | 52.2 | 265.8 | 6.9 | 0.3 | 1.3 |
| 2.32 | Richdale - Cessford Plain | 460.9 | 316.6 | 1.4 | T[2] | 0.5 | 318.5 | 124.0 | 14.7 | 0.5 | 3.2 |
| | TOTAL MORAINAL | 2010.9 | 576.8 | 11.5 | 1.2 | 0.8 | 590.3 | 1347.3 | 60.5 | 2.4 | 10.3 |
| | ( Lacustrine - U ) | | | | | | | | | | |
| 2.03 | Fincastle Plain | 292.3 | 18.4 | T | T | 0.0 | 18.4 | 232.1 | 35.4 | 0.9 | 5.5 |
| 2.07 | Keho Lake Plain | 223.8 | 21.7 | 0.0 | 0.0 | 0.0 | 21.7 | 167.4 | 28.0 | 0.9 | 5.8 |
| 2.24 | Little Bow Plain | 92.8 | 7.1 | 0.0 | 0.1 | 0.0 | 7.2 | 81.0 | 3.5 | 0.3 | 0.8 |
| | ( Lacustrine - M ) | | | | | | | | | | |
| 2.41 | Chain Lakes Plain | 139.6 | 17.6 | 1.5 | 0.1 | 0.0 | 19.2 | 114.7 | 2.9 | 0.1 | 2.7 |
| | TOTAL LACUSTRINE | 748.5 | 64.8 | 1.5 | 0.2 | 0.0 | 66.5 | 595.2 | 69.8 | 2.2 | 14.8 |
| | ( Fluvial - U ) | | | | | | | | | | |
| 2.19 | Matzhiwin Plain | 211.9 | 60.8 | 0.2 | 0.2 | 0.2 | 61.4 | 60.8 | 84.6 | 1.1 | 4.0 |
| 2.31 | Lower Berry Creek Plain | 110.3 | 75.6 | 0.3 | 0.0 | 0.0 | 75.9 | 22.0 | 11.3 | 0.1 | 1.0 |
| 2.39 | Sounding Creek Plain | 247.1 | 135.9 | 2.0 | 2.5 | 3.4 | 143.8 | 56.3 | 45.9 | 0.0 | 1.2 |
| | TOTAL FLUVIAL | 569.3 | 272.3 | 2.5 | 2.7 | 3.6 | 281.1 | 139.1 | 141.8 | 1.2 | 6.2 |
| | Total for Entire Sampled A[3] | 3328.7 | 913.9 | 15.5 | 4.1 | 4.4 | 937.9 | 2081.6 | 272.1 | 5.8 | 31.3 |
| | Portion of Ecoregion B[4] | 3326.3 | 961.3 | 16.6 | 3.3 | 3.3 | 984.5 | 2022.4 | 276.1 | 6.7 | 36.6 |

1. Grouped by landform ( parent soil material and surface form).
2. T = trace - less than 50 hectares.
3. Based on summation of values from individual physiographic units.
4. Based on the analysis of the ecoregion sample as a single unit.

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

| Unit # | Physiographic Unit[1] Name | Estimated Area in Thousands of Hectares: Total Upland Area | Unused | Abandoned | Crops | Annual Forage | Grazing | Farmsteads | Roads and Railways | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| ( Morainal - D ) | | | | | | | | | | |
| 2.01 | Cypress Hills Benchland | 163.2 | 1.6 | 0.2 | 122.2 | 2.8 | 28.5 | 1.8 | 6.0 | 0.2 |
| ( Morainal - K & K ) | | | | | | | | | | |
| 2.02 | Chin Plain | 547.3 | 12.6 | 0.6 | 493.7 | 0.0 | 29.5 | 1.1 | 9.8 | 0.0 |
| 2.33 | Oyen Upland South | 287.9 | 17.8 | 1.4 | 136.2 | 8.1 | 116.9 | 1.4 | 6.1 | T[2] |
| ( Morainal - U ) | | | | | | | | | | |
| 2.04 | Verdigris Plain | 225.1 | 1.3 | 0.5 | 205.3 | 0.7 | 10.8 | 1.1 | 5.4 | T |
| 2.10 | Enchant Plain | 326.5 | 7.5 | 0.0 | 265.8 | 0.0 | 41.1 | 1.6 | 8.8 | 1.6 |
| 2.32 | Richdale - Cessford Plain | 460.9 | 5.5 | 1.4 | 124.0 | 2.8 | 315.2 | 2.8 | 9.2 | T |
| TOTAL MORAINAL | | 2010.9 | 46.3 | 4.1 | 1347.2 | 14.4 | 542.0 | 9.8 | 45.3 | 1.8 |
| ( Lacustrine - U ) | | | | | | | | | | |
| 2.03 | Fincastle Plain | 292.3 | 2.3 | 0.3 | 232.1 | 26.3 | 12.3 | 5.8 | 8.5 | 4.7 |
| 2.07 | Keho Lake Plain | 223.8 | 2.0 | 0.2 | 167.4 | 4.7 | 37.2 | 6.9 | 4.9 | 0.5 |
| 2.24 | Little Bow Plain | 92.8 | 1.5 | 0.1 | 81.0 | 0.4 | 3.6 | 0.9 | 2.7 | 2.7 |
| ( Lacustrine - M ) | | | | | | | | | | |
| 2.41 | Chain Lakes Plain | 139.6 | 6.6 | 0.6 | 114.8 | 0.7 | 9.6 | 1.5 | 5.0 | 0.7 |
| TOTAL LACUSTRINE | | 748.5 | 12.4 | 1.2 | 595.3 | 32.1 | 62.7 | 15.1 | 21.1 | 8.6 |
| ( Fluvial - U ) | | | | | | | | | | |
| 2.19 | Matzhiwin Plain | 211.9 | 2.1 | 0.6 | 60.8 | 72.8 | 62.4 | 4.9 | 6.6 | 1.7 |
| 2.31 | Lower Berry Creek Plain | 110.3 | 0.0 | 0.4 | 21.9 | 4.1 | 79.3 | 0.7 | 2.8 | 1.1 |
| 2.39 | Sounding Creek Plain | 247.1 | 19.5 | 1.7 | 56.3 | 32.4 | 129.1 | 0.5 | 7.4 | 0.2 |
| TOTAL FLUVIAL | | 569.3 | 21.6 | 2.7 | 139.0 | 109.3 | 270.8 | 6.1 | 16.8 | 3.0 |
| Total for Entire Sampled | A[3] | 3328.7 | 80.3 | 8.0 | 2081.5 | 155.8 | 875.5 | 31.0 | 83.2 | 13.4 |
| Portion of Ecoregion | B[4] | 3326.3 | 66.5 | 6.6 | 2025.7 | 159.7 | 924.7 | 36.6 | 86.5 | 20.0 |

1. Grouped by landform ( parent soil material and surface form).
2. T = trace - less than 50 hectares.
3. Based on summation of values from individual physiographic units.
4. Based on the analysis of the ecoregion sample as a single unit.

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

| Unit Number | Physiographic Unit[1] Name | Percent of Total Unit Area in Wetlands | Percent of Wetland Area In Cover Class | | | | Percent of Upland Area | | Area of Unit in 1000's of Hectares | Rating as [2] Waterfowl Production Habitat |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Grass | Bulrush/ Cattail | Natural, Fresh, Open Water | That is Unused | In Native and Seeded Grass and Shrub Cover | That is Unused | | |
| 2.33 | Oyen Upland South | 6.7 | 54.7 | 0.0 | 5.4 | 65.7 | 51.6 | 6.2 | 308.5 | 1 / 3 |
| 2.32 | Richdale - Cessford Plain | 5.6 | 82.4 | T[3] | 1.9 | 4.1 | 72.2 | 1.2 | 487.7 | 4 / 4 |
| 2.04 | Verdigris Plain | 5.6 | 14.9 | 0.0 | 0.3 | 3.3 | 8.0 | 0.6 | 238.4 | 4 / 4 |
| 2.02 | Chin Plain | 2.4 | 60.1 | 0.0 | 3.2 | 41.5 | 9.6 | 2.3 | 506.6 | 4 / 4 |
| 2.01 | Cypress Hills Benchland | 1.5 | 56.3 | 1.0 | 7.8 | 1.9 | 24.1 | 1.0 | 165.8 | 3 / 4 |
| 2.10 | Enchant Plain | 1.3 | 34.1 | 0.0 | 0.0 | 4.5 | 18.2 | 2.3 | 330.9 | 4 / 4 |

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

2. Two waterfowl production habitat ratings have been calculated for each unit using the minimum rating values for, sequentially, Alberta Mixedgrass Prairie/ Alberta Parkland.

3. T = trace - less than 0.05 percent.

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

| Physio-graphic Unit | Transect[1] | Numbers of Quarters[2] In Sample | Affected by Land Use/Cover Changes | Percent of Quarters Affected [2] | Time Interval from May 1985 to Ground Truth Survey (in months) |
|---|---|---|---|---|---|
| ( Morainal - D ) | | | | | |
| 2.01 | Walsh | 24 | 6 | 25.0 | 60 |
| ( Morainal - K & K ) | | | | | |
| 2.02 | Bow Island | 24 | 10 | 41.7 | 63 |
| 2.33 | Oyen | 24 | 6 | 25.0 | 51 |
| ( Morainal - U/H ) | | | | | |
| 2.04 | Pakowki | 24 | 9 | 37.5 | 60 |
| 2.10 | Vauxhall | 24 | 6 | 25.0 | 63 |
| 2.32 | Cessford - East | 20 | 4 | 20.0 | 51 |
| Scapa - East | | 20 | 3 | 15.0 | 36 |
| Sunnynook | | 24 | 10 | 41.7 | 52 |
| | | (64) | (17) | (26.6) | |
| ( Lacustrine - U ) | | | | | |
| 2.03 | Lethbridge | 24 | 9 | 37.5 | 60 |
| Stirling | | 24 | 16 | 66.7 | 60 |
| | | (48) | (25) | (52.1) | |
| 2.07 | Clareshoim | 24 | 7 | 29.2 | 60 |
| 2.24 | Vulcan - East | 24 | 3 | 12.5 | 63 |
| ( Lacustrine - M ) | | | | | |
| 2.41 | Munson | 24 | 8 | 33.3 | 52 |
| ( Fluvial - U ) | | | | | |
| 2.19 | Patricia | 24 | 17 | 70.8 | 52 |
| 2.31 | Cessford - West | 20 | 5 | 25.0 | 51 |
| 2.39 | Kirkpatrick Lake - West | 16 | 7 | 43.8 | 51 |

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

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