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

Report #7: Alberta Shortgrass Prairie

Prairie Habitat Monitoring Project

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ABSTRACT

This report presents data for one transect in one physiographic unit in the Alberta Shortgrass Prairie. One additional unit has been sampled in the Saskatchewan portion of that unit. These two units account for just over half of the total area of the ecoregion.

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

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

For the single physiographic unit sampled in the Alberta portion of the ecoregion:

(a) The distribution of sampling on various soil parent materials and landforms is confined to dissected and ridged morainal terrain.

(b) Wetlands cover 4.2 percent of the total land area of the sampled physiographic unit. This compares to an average of 4.0 percent for Alberta Fescue Prairie, 4.4 percent for Alberta Mixedgrass Prairie and 9.9 percent for Alberta Parkland.

(c) An overwhelming proportion of wetland numbers (88.2 percent) and wetland area (92.9 percent) are temporary or seasonal

in nature.

(d) None of the wetland area or wetland numbers are classed as permanent water (natural, fresh open water). This compares to 6.3 and 0.8 percent, respectively, for Alberta Fescue Prairie, 2.4 and 1.5 percent, respectively, for Alberta Mixedgrass Prairie and 18.5 and 5.4 percent, respectively, for Alberta Parkland.

(e) Less than one percent of the wetland area is not subjected to any human use. Grazing occurs on 65.4 percent of the wetland area.

(f) Less than one fifth (16.1 percent) of the total upland area is in annual crops compared to 78.4 percent in Alberta Fescue Prairie, 60.9 percent in Alberta Mixedgrass Prairie and 63.8 percent in Alberta Parkland. Native cover occurs on 82.4 percent of the upland compared to 17.3 percent in Alberta Fescue Prairie, 29.6 percent in Alberta Mixedgrass Prairie and 28.0 percent in Alberta Parkland.

(g) Grazing occurs on 79.9 percent of the uplands compared to only 14.0 percent in Alberta Fescue Prairie, 27.8 percent in Alberta Mixedgrass Prairie and 21.5 percent in Alberta Parkland.

Both the Lodge Benchland and Sage Creek Plain are initially rated as class three habitat for waterfowl production in the sampled part of the morainal portion of the ecoregion. However, when they are rated in comparison to Fescue Prairie, Mixedgrass Prairie and Parkland units both are downgraded to a class four in every case.

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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 1992a). In this report only methodology relating specifically to the Alberta Shortgrass Prairie will be discussed.

### A. Delineation of Physiographic Units

Boundary changes from those delineated by Adams (1985) - These have affected all of the physiographic units in the mapped area to a greater or less degree. The Milk River Plain (1.01) in particular has been substantially reduced in size.

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

### B. Sampling Network

None of the transects discussed in this report are the product

of transect splitting.

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

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

1. Total wetland area - 2.0 percent of total land area
2. Grassy wetland cover - 39 percent of total wetland area
3. Bulrush/cattail cover - zero percent of total wetland area
4. Open water wetlands - zero percent of total wetland area
5. Unused wetlands - 2.4 percent of total wetland area
6. Shrubby and grassy upland cover - 41.5 percent of total upland area.
7. Unused uplands - 0.3 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 Shortgrass Prairie

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

The total area occupied by the Alberta Shortgrass Prairie is calculated to be approximately 405,200 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.

Two physiographic units which have been sampled with habitat monitoring transects, including one sampled in the Saskatchewan portion of the unit, account for just over one half (53.8 percent) of the total area of the ecoregion (Table 1) while unsampled units cover one third (33.4 percent) of the area. Major river and stream valleys as well as lakes have been excluded from the area of physiographic units and collectively comprise 12.8 percent of the total area of the ecoregion. This is double the value recorded for these landscape features in any previous reports covering Saskatchewan and Alberta Parkland, Alberta Mixedgrass Prairie or Alberta Fescue Prairie.

### 2. Distribution of Landforms in the Ecoregion

The distribution of various landforms in Alberta Shortgrass Prairie is summarized in Table 2. All of the physiographic units are morainal in origin and 61.7 percent of their total area is currently being sampled in this study. Three fifths (60.4 percent)

of the total area in physiographic units has a predominantly dissected landform and 57 percent of that is in units which have been sampled. Just over one quarter (27.3 percent) of the area is undulating ground moraine and all of that is in one unit which has been sampled. The remaining 12.3 percent of the area in physiographic units is knob and kettle terrain and none of that has been sampled.

The distribution of habitat sampling between various morainal landform categories is also shown in Table 2. The relationship between distribution of sampling effort and the occurrence of the category in the ecoregion is quite variable. For the predominantly dissected terrain the relationship is quite close with that category occupying 60.4 percent of the total land area in physiographic units and 50 percent of our sampling being located in that landform. The remaining 50 percent of our sampling effort is on undulating ground moraine which occupies only 27.3 percent of the total land area in physiographic units. Knob and kettle terrain is not sampled at all.

3. Location and Landform Character of Individual Physiographic Units

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

This report presents baseline habitat data for one sample site in one physiographic unit. In addition, partial data are also presented for one unit (Sage Creek Plain) which has been sampled in

Saskatchewan portion of the unit. Individual units and transects located in them are listed in Table 3. Collectively these two units comprise an area of approximately 218,200 hectares (Table 1) or about 53.8 percent of the total Alberta Shortgrass Prairie Ecoregion.

Origin of soil parent material and surface form for the two sampled units are summarized in Table 3. Both of the units are entirely or predominantly of morainal origin. One of the units has predominantly undulating landform and one is on mixed dissected, hummocky and blanket veneer morainal terrain.

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

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 0.5 percent of the entire Sage Creek Plain (including the Saskatchewan portion of the unit) to a high of 1.3 percent of the portion of the Lodge Benchland in Alberta. Overall sample size for the two units is 1.4 percent of the portions of the units occurring in Alberta. Both of the 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 Shortgrass Prairie this situation is most extreme in the Lodge Benchland which has been divided into eight sub-units. Ideally, transects should be related to the sub-units in which they occur rather than to the unit as a whole. However, if this were to be done there should be additional sampling in other significant sub-units. Also, in the Lodge Benchland the transect does straddle sub-unit boundaries.

B. Sample Results

Baseline habitat data for the Sage Creek Plain (1.02) are provided from the Consul transect in the Saskatchewan portion of that unit and will be discussed in detail in a future report on Saskatchewan Shortgrass Prairie. In this report reference to data from this unit will be limited to the section on extrapolation of sampling results. Discussions of sampling results in this section will be limited to the Manyberries transect in the Lodge Benchland. Since there is only one transect located in the Alberta Shortgrass Prairie there can be no discussion of variability in habitat conditions between physiographic units or between transects within the same unit. Also, figures for the entire ecoregion sample will be the same as those for the Manyberries transect.

1. Wetlands

a) Percent of Total Land Area Occupied by Wetlands

The percent of total land area occupied by wetlands in the Manyberries transect (4.2 percent, Table 6) is comparable to the averages recorded for Alberta Mixedgrass Prairie (4.4 percent, Millar 1992b) and Alberta Fescue Prairie (4.0 percent, Millar

1992c) but less than half that recorded for Alberta Parkland (9.9 percent, Millar 1992a).

i. Landform character and wetland area - The Manyberries transect is located on a mixture of ridged and dissected terrain and the only other transect reported on to date which has comparable landform is the Walsh transect in the Cypress Hills Benchland in the Alberta Mixedgrass Prairie. Only 1.5 percent of the land area in the Walsh transect is occupied by wetlands (Millar 1992b) compared to 4.2 percent in the Manyberries transect. The greater presence of wetlands at Manyberries is likely due to the fact that part of the transect is on ridged rather than dissected terrain.

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

The percent of total land area occupied by cultivated wetlands in the Manyberries transect is 1.2. This is identical to the average recorded for Alberta Fescue Prairie (Millar 1992c) and slightly more than the averages observed for either Alberta Parkland (0.9 percent, Millar 1992a or Alberta Mixedgrass Prairie (0.7 percent, Millar 1992b).

b) Area of Wetlands in Various cover Classes

The percent of total wetland area in various cover classes is summarized for the Manyberries transect in Table 7. Cover types characteristic of temporary or seasonal water conditions occupy 92.9 percent of the total wetland area. Grass (including sedges and forbs) is the dominant cover type (63.6 percent of total wetland area) followed by cultivated ground (29.3 percent). The remaining 7.1 percent of wetland area is occupied by artificial open water in the form of dugouts and dams. All other cover types including willows and trees, bulrush and cattail, transitional open water, natural open water and saline open water are completely absent from the transect.

c) Wetland Density

As mentioned in previous reports, wetland density figures must be interpreted with caution.

Mean wetland density per quarter section is 4.3 in the Manyberries transect (Table 8). This is lower than the averages recorded to date for any of the other Alberta ecoregions (Parkland 13.6, Mixedgrass Prairie 5.9, and Fescue Prairie 7.6).

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.

Cover classes characteristic of temporary or seasonal wetlands dominate 88.2 percent of all wetlands (Table 8). Grass alone dominates over three quarters (77.4 percent) of the wetlands and 10.8 percent are cultivated. Of the remaining wetlands, 10.8

percent are artificial open water in the form of dugouts and dams and 0.9 percent are in the "other" category. The single wetland involved in the "other" category is a tiny wetland disturbed by an oilwell drilling operation. It is too small to show up in the wetland area data. The percentage of wetlands which are cultivated at Manyberries is less than half the average recorded for either Alberta Parkland or Mixedgrass Prairie and Less than one quarter of the average recorded for Alberta Fescue Prairie.

e) Area of Wetlands in Various Land Use Activity Classes

Utilization of wetlands at Manyberries falls into two major land use categories - annual crops and grazing. Collectively these two activity classes occur on 94.6 percent of the total wetland area (Table 9). Almost two thirds (64.5 percent) of the total wetland area is grazed and 29.2 percent is cropped. In both cases these figures exceed the averages recorded in all other Alberta ecoregions reported on to date. In fact, the figure for grazing is exceeded in only eight of 40 other transects and the value for cropping is exceeded in only 10 of those transects.

The percentage of wetland area that is not used at all or has been abandoned from cultivation is very minor. It is, however, interesting to note that the area which has been abandoned exceeds that which has been subjected to no use at all. This is a circumstance which has been observed in only two of the other 40 Alberta transects analysed to date.

Other land use activities occur on 3.6 percent of the wetland area and these include transportation (road allowances), drainage

and water storage.

f) Wetland Size Distribution

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

g) Wetlands Affected by One or More Permanent Impacts

Enough material has been generated on the nature and distribution of permanent, human-induced impacts on wetlands in the monitoring samples to provide the basis for a full-scale study on that subject alone. For the present, however, discussion of the effects of impacts on wetlands will be limited to an evaluation of the extent to which individual wetlands have been affected by one or more such impacts. It should be emphasized here that in this study cultivation is not considered a permanent impact. The percent of wetlands affected by one or more permanent impacts in the Manyberries transect is 34.9. This almost equals the average level of impaction observed in the Alberta Mixedgrass Prairie (35.6 percent, Millar 1992b) and exceeds the average levels observed in both the Alberta Parkland (26.5 percent, Millar 1992a) and Alberta Fescue Prairie (22.4 percent, Millar 1992c).

h) Distribution of Streams

The presence of streams segments in the data sample has been summarized in Table 11 to provide an indication of the importance of this type of water body in the Alberta Shortgrass Prairie. No stream segments were recorded in the Manyberries transect. However, examination of topographic maps confirms that this is not an accurate indication of the distribution of streams within the ecoregion.

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 an "other" category for all other minor classes. In the Manyberries transect 98.5 percent of the total upland area is occupied by two cover classes, native grass (82.4 percent) and annual crops (16.1 percent). The occurrence of native grass at Manyberries is the second highest recorded in the 41 Alberta transects analysed to date in four ecoregions while the level of cropping is the second lowest.

b) Distribution of Upland Land Use Activities

Upland land use data have been separated into seven classes plus an eighth catch-all category for all other minor land uses (Table 13). In the Manyberries transect 96 percent of the total upland area is devoted to two land use activities, grazing (79.9 percent) and production of annual crops (16.1 percent). These figures are, respectively, the second highest and second lowest observed to date for these land use activities in Alberta

ecoregions. The only other land use activity to occupy more than one percent of the total upland area is roads and railways. Their distribution (2.5 percent) is consistent with the averages recorded in all other Alberta ecoregions.

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.

Five of the seven examples of Manyberries data show a high level of variability. In wetland cover (Table 14) the standard error exceeds the mean for both the cultivated and grass classes. The zero value for willows indicates its absence from the transect. In upland cover (Table 15) the standard error exceeds the mean for both cropland and native grass. Again, the zero value for native trees indicates their absence from the transect. In upland land uses (Table 16) the standard error exceeds the mean for grazing but is less than the mean for both unused land and roads and railways.

The wide distribution of grazing at Manyberries leaves little room for variability in the presence of unused land and, as has been mentioned in previous reports, the distribution of roads and railways occurs with great uniformity across the country.

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 two physiographic units, the Lodge Benchland and the Sage Creek Plain, in the Alberta Shortgrass Prairie are presented in Tables 17 to 19, respectively. As mentioned previously, the Sage Creek Plain has been sampled in the Saskatchewan portion of that unit and extrapolated habitat data for the Alberta portion of the unit have been included here to provide a somewhat broader picture of current habitat conditions in the

Alberta portion of the Shortgrass Prairie.

The Alberta portions of the Lodge Benchland and Sage Creek Plain are relatively comparable in size - 121,800 and 96,400 hectares, respectively. The Lodge Benchland has over three times as much total wetland area and almost three times as many total wetlands as the Sage Creek Plain but, other than that, neither unit stands out from the other in terms of quantity of wetland habitat. Both lack semi-permanent and permanent wetlands for secure brood rearing habitat and undisturbed wetlands for good escape cover.

In the one previous report (Alberta Parkland) involving a unit which was sampled outside the province extrapolated wetland values for individual physiographic units were summarized both including and excluding the data for that unit. The analysis of the entire ecoregion sample as a single unit was, however, based only on data from those units actually sampled within the province. Accordingly, the discussion of variations in the results derived from the two methods of analysis was confined to units sampled within the province. In the interests of consistency this same approach has been followed in dealing with the Alberta Shortgrass Prairie data. However, since only one unit has been sampled in the Alberta portion of the unit, the results from the physiographic unit and ecoregion analyses are identical and no comparison is possible.

3. Uplands

Estimated areas of upland cover and land use activity classes are presented in Tables 20 and 21. The Lodge Benchland has 23

percent more upland area than the Sage Creek Plain but three times as much native cover and two and one quarter times as much native cover plus planted grassy cover. Two and one third times as much of its upland area is in land use activities which are conducive to the perpetuation of nesting cover, i.e., idle land, forage production and grazing.

Comparison of extrapolated upland data derived through the physiographic unit and ecoregion analyses is not possible for the Alberta Shortgrass Prairie for the reasons given in the preceding section on wetlands.

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

On the basis of the habitat rating analysis described in the Methods section both the Lodge Benchland and Sage Creek Plain rate as class three waterfowl habitat in the Alberta Shortgrass Prairie. Both units are downgraded for losing points for both semi-permanent and permanent wetlands.

When the Alberta Shortgrass Prairie Units are rated using Alberta Fescue, Mixedgrass and Parkland rating values their rating drops to a four in every case.

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 the one transect covered in this report was May 1985. Recorded changes may be as small as the cultivation of a single wetland or as extreme as the conversion to cropland of an entire quarter section. Frequently changes have been associated with road construction. Temporary interruptions of cultivation in wetlands or uplands are not counted as changes.

The interval between date of baseline aerial photography and completion of the groundtruthing survey for the Manyberries transect was 63 months (Table 23). This is the maximum interval reported for any transect in this project. At the same time, the percent of quarters affected by change (8.3) is the lowest reported to date for any of the Alberta ecoregions (Millar 1992a, 1992b, 1992c). This low rate of change occurs in a transect which has the second greatest extent of native vegetation and second greatest occurrence of grazing in these ecoregions. Four transects in Saskatchewan Parkland had equal or lower rates of change (Millar 1988) compared to that reported for Manyberries but in all those cases the time interval between aerial photography and groundtruthing surveys was three to 23 months compared to 63 months for Manyberries.

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Figure 1. Distribution of Habitat Sampling in Alberta Shortgrass Prairie.

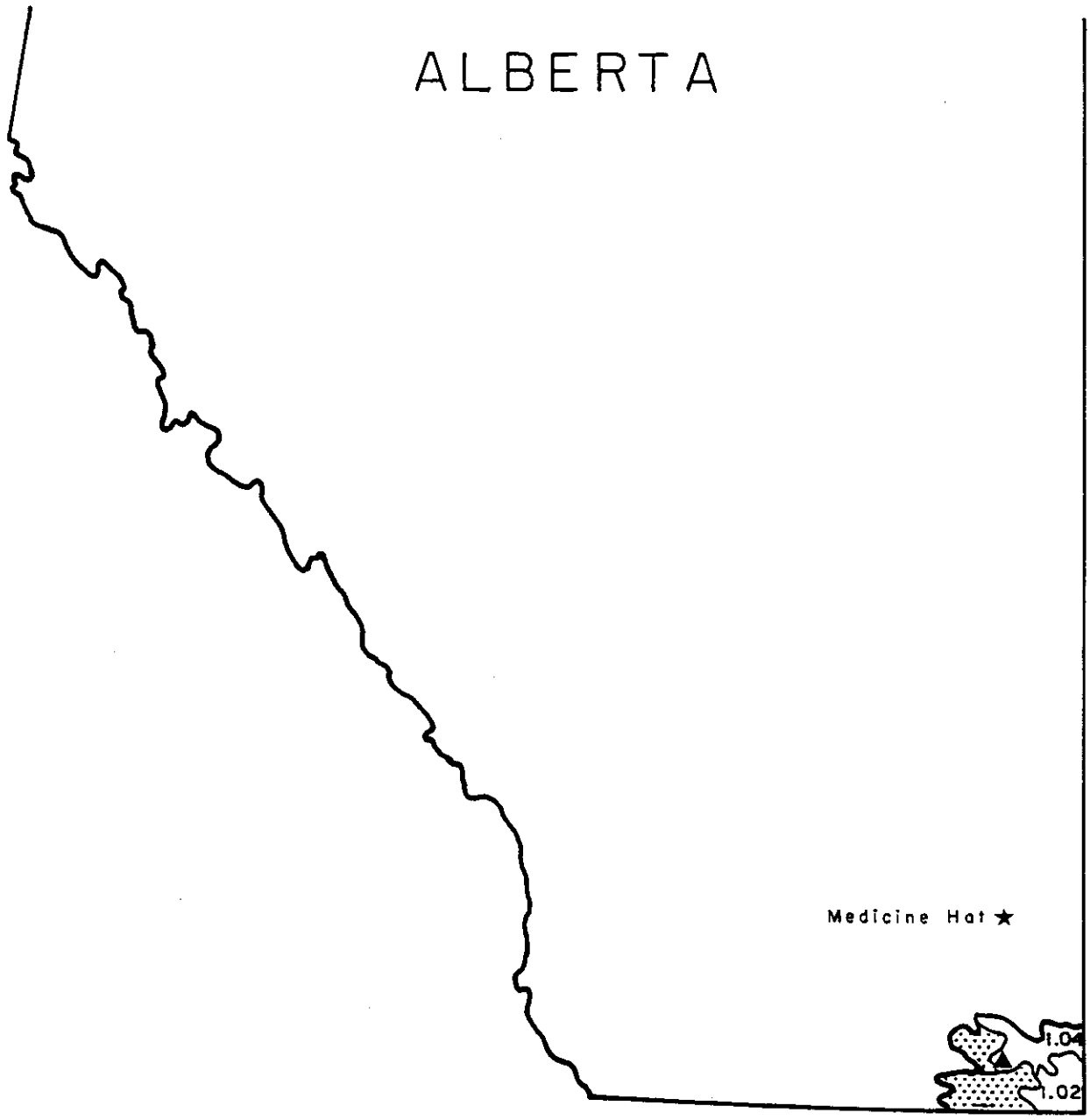

Table 1. Distribution of Habitat Sampling Relative to the Entire Alberta Shortgrass Prairie.

| | No. of Units | Area | |
|---|---|---|---|
| | | In Hectares[1] | As Percentage of Entire Ecoregion |
| Sampled Physiographic Units | 2[2] | 218,200 | 53.8 |
| Unsampled Physiographic Units | 2 | 135,200 | 33.4 |
| Areas Not Included in Physiographic Units | | | |
| - River and Stream Valleys | - | 40,100 | 9.9 |
| - Lakes[3] | - | 11,700 | 2.9 |
| - Urban Areas | - | 0 | 0.0 |
| Total Alberta Shortgrass Prairie Ecoregion | 4 | 405,200 | 100 |

1. To the nearest 100 hectares.

2. Including one unit, totalling 96,400 hectares or 23.8 percent of Alberta Shortgrass Prairie, which is sampled in the Saskatchewan portion of that unit.

3. Larger than 500 hectares.

Table 2. Distribution of Landforms in Alberta Shortgrass Prairie.

| Origin of Parent Material | Surface Form | Area in Hectares[1] Sampled Units[2] | Unsampled Units[2] | Total[3] | % of Sampling Effort in Landform Category |
|---|---|---|---|---|---|
| Morainal | | | | | |
| | Undulating | 96,400[4] ( 100 ) | - | 96,400 ( 27.3 ) | 50.0 |
| | Dissected | 121,800 ( 57.0 ) | 91,700 ( 43.0 ) | 213,500 ( 60.4 ) | 50.0 |
| | Knob and Kettle | - | 43,500 ( 100 ) | 43,500 ( 12.3 ) | 0.0 |
| TOTAL MORAINAL | | 218,200 ( 61.7 ) | 135,200 ( 38.3 ) | 353,400 ( 100 ) | 100.0 |
| TOTAL ECOREGION | | 218,200 ( 61.7 ) | 135,200 ( 38.3 ) | 353,400 | 100.0 |

1. To nearest 100 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.

4. Unit is sampled in the Saskatchewan portion of the unit.

Table 3. Physiographic Units Covered in This Report.

| Unit Number | Name | Landform Character[1] | | Transect[2] |
|---|---|---|---|---|
| | | Origin of Parent Material | Surface Form | |
| 1.04 | Lodge Benchland | Morainal | Dissected ( Hummocky ), ( Blanket Veneer ) | Manyberries |
| 1.02 | Sage Creek Plain | Morainal ( Fluvial ) | Undulating | Sampled in Saskatchewan |

1. Categories in parentheses are of minor or secondary importance.

2. The sample size in the transects are 24 quarter sections.

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

| Unit Number | Physiographic Name | Landform Character[1,2] Origin of Parent Material | Surface Form | Area in Hectares[3] |
|---|---|---|---|---|
| 1.01 | Milk River Plain | Morainal ( Undifferentiated ) ( Rock ) | Dissected ( blanket veneer/ rolling ) | 91,700 |
| 1.03 | Pakowki Plain | Morainal ( Eolian ) | Knob and Kettle ( Undulating ) ( Ridged ) | 43,500 |
| | | | TOTAL | 135,200 |

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 separted by / are roughly egual in occurrence while those in parentheses are of minor or 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[2,3] | Sample | Percentage that Sample is of Unit Area |
|---|---|---|---|---|---|
| 1.04 | Lodge Benchland ( 24 ) | | 121,800 | 1,583 | 1.3 |
| 1.02 | Sage Creek Plain ( 24 ) | | 96,400[3] | 1,554[4] | 0.5[5] |
| TOTAL FOR ECOREGION | | Excluding 1.02 | 121,800 | 1,583 | 1.3 |
| | | Including 1.02[6] | 218,200 | 3,137 | 1.4 |
| | | Including 1.02[7] | 434,900 | 3,137 | 0.7 |

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

Table 6. Land Area Occupied by Wetlands and Uplands

| Unit | Transect[1] | Sample Size ( in ha ) | Percent of Total Sample Wetlands | | | Uplands |
|---|---|---|---|---|---|---|
| | | | Total | Uncultivated | Cultivated | |
| | ( Morainal - D ) | | | | | |
| 1.04 | Manyberries | 1583 | 4.2 | 3.0 | 1.2 | 95.8 |
| Entire Ecoregion Sample | | 1583 | 4.2 | 3.0 | 1.2 | 95.8 |

1. Transects are grouped by landform ( parent material and surface form ). Letters identifying surface forms in this and subsequent tables are as follows D - Dissected.

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

| Physio-graphic Unit | Transect[1] | Total Wetland Area in Sample ( in ha ) | Percent of Total Wetland Area in Cover Class | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cult-ivated | Willows and Trees | Grasses | Bulrush Cattail | Transi-tional Open Water | Natural Open Water | Arti-ficial Water | Saline Open Water | Other |
| | ( Morainal - D ) | | | | | | | | | | |
| 1.04 | Manyberries | 67 | 29.3 | 0.0 | 63.6 | 0.0 | 0.0 | 0.0 | 7.1 | 0.0 | 0.0 |
| Entire Ecoregion Sample | | 67 | 29.3 | 0.0 | 63.6 | 0.0 | 0.0 | 0.0 | 7.1 | 0.0 | 0.0 |

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

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: Cultivated | Willows and Trees | Grasses | Bulrush Cattail | Transitional Open Water | Natural Open Water | Artificial Water | Saline Open Water | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ( Morainal - D ) | | | | | | | | | | | |
| 1.04 | Manyberries | 102 | 4.3 | 10.8 | 0.0 | 77.4 | 0.0 | 0.0 | 0.0 | 10.8 | 0.0 | 0.9 |
| Entire Ecoregion Sample | | 102 | 4.3 | 10.8 | 0.0 | 77.4 | 0.0 | 0.0 | 0.0 | 10.8 | 0.0 | 0.9 |

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

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

| Physio-graphic Unit | Transect[1] | Total Wetland Area ( in ha ) | Percent of Total Wetland Area in Land Use Activity Class: No Use | Abandoned Cultivation | Annual Crop | Haying | Grazing | Other |
|---|---|---|---|---|---|---|---|---|
| | ( Morainal - D ) | | | | | | | |
| 1.04 | Manyberries | 67 | 0.7 | 1.1 | 29.2 | 0.0 | 65.4 | 3.6 |
| Entire Ecoregion Sample | | 67 | 0.7 | 1.1 | 29.2 | 0.0 | 65.4 | 3.6 |

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

Table 10. Wetlands Affected by One or More Permanent Impacts.

| Physiographic Unit | Transect[1] | Mean Number of Wetlands/Quarter: Total | Affected by One or More Impacts | Percent of Wetlands Impacted |
|---|---|---|---|---|
| ( Morainal - D ) | | | | |
| 1.04 | Manyberries | 4.3 | 1.5 | 34.9 |
| Entire Ecoregion Sample | | 4.3 | 1.5 | 34.9 |

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

Table 11. Occurrence of Streams in Data Samples.

| Physiographic Unit | Transect[1] | Number of Quarters In Sample | Number of Quarters Containing Streams | Percent of Quarters Containing Streams |
|---|---|---|---|---|
| ( Morainal - D ) | | | | |
| 1.04 | Manyberries | 24 | 0 | 0.0 |
| Entire Ecoregion Sample | | 24 | 0 | 0.0 |

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

Table 12. Distribution of Upland Cover Classes

| Physio-graphic Unit | Transect[1] | Upland Area ( in ha ) | Percent of Total Upland in Cover: Native: Grass | Native: Low Shrub | Native: Tall Shrub | Native: Trees | Native: Total | Planted: Annual Crops[2] | Planted: Perennial Grass & Forbs | Planted: Trees & Shrubs | Planted: Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ( Morainal - D ) | | | | | | | | | | |
| 1.04 | Manyberries | 1515 | 82.4 | T[3] | 0.0 | 0.0 | 82.4 | 16.1 | 0.6 | 0.1 | 0.8 |
| Entire Ecoregion Sample | | 1515 | 82.4 | T | 0.0 | 0.0 | 82.4 | 16.1 | 0.6 | 0.1 | 0.8 |

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

2. Includes summerfallow.

3. T = trace = less than 0.05 percent

Table 13. Distribution of Upland Land Use Activity Class.

| Physio-graphic Unit | Transect[1] | Total Upland Area ( in ha ) | Percent of Total Upland Area in Land Use in Activity: Unused | Abandoned | Annual Crops[2] | Forage | Grazing | Farm-steads | Road & Railway | Other |
|---|---|---|---|---|---|---|---|---|---|---|
| | ( Morainal - D ) | | | | | | | | | |
| 1.04 | Manyberries | 1515 | 0.6 | 0.4 | 16.1 | 0.2 | 79.9 | 0.2 | 2.5 | 0.1 |
| Entire Ecoregion Sample | | 1515 | 0.6 | 0.4 | 16.1 | 0.2 | 79.9 | 0.2 | 2.5 | 0.1 |

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

2. Includes summerfallow.

Table 14. Examples of Variability in Wetland Cover Data.

| Physio-graphic Unit | Transect[1] | Area in Hectares Per Quarter Section | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Cultivated | | | Grass | | | Willows | | |
| | | Mean | S.E.[2] | C.V.[3] | Mean | S.E. | C.V | Mean | S.E. | C.V. |
| | ( Morainal - D ) | | | | | | | | | |
| 1.04 | Manyberries | 0.8 | 2.2 | 13.4 | 1.8 | 2.8 | 7.8 | 0.0 | 0.0 | 0.0 |
| Entire Ecoregion Sample | | 0.8 | 2.2 | 13.4 | 1.8 | 2.8 | 7.8 | 0.0 | 0.0 | 0.0 |

1. Grouped by landform ( parent soil material and surface form ).
2. S.E. - Standard Error
3. C.V. - Coefficient of Variation.

Table 15. Examples of Variability in Upland Cover Data.

| Physio-graphic Unit | Transect[1] | Area in Hectares Per Quarter Section | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Cropland | | | Native Grass | | | Native Trees | | |
| | | Mean | S.E.[2] | C.V.[3] | Mean | S.E. | C.V | Mean | S.E. | C.V. |
| | ( Morainal - D ) | | | | | | | | | |
| 1.04 | Manyberries | 10.2 | 109.3 | 52.8 | 52.0 | 110.5 | 10.4 | 0.0 | 0.0 | 0.0 |
| Entire Ecoregion Sample | | 10.2 | 109.2 | 52.8 | 52.0 | 110.5 | 10.4 | 0.0 | 0.0 | 0.0 |

1. Grouped by landform ( parent soil material and surface form ).
2. S.E. - Standard Error
3. C.V. - Coefficient of Variation.

Table 16. Examples of Variability in Upland Land Use Data.

| Physio-graphic Unit | Transect[1] | Area in Hectares Per Quarter | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Unused | | | Grazing | | | Road & Railways | | |
| | | Mean | S.E.[2] | C.V.[3] | Mean | S.E. | C.V | Mean | S.E. | C.V. |
| | ( Morainal - D ) | | | | | | | | | |
| 1.04 | Manyberries | 0.4 | 0.1 | 1.2 | 50.5 | 113.5 | 11.0 | 1.6 | 0.1 | 0.4 |
| Entire Ecoregion Sample | | 0.4 | 0.1 | 1.2 | 50.5 | 113.5 | 11.0 | 1.6 | 0.1 | 0.4 |

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

2. S.E. - Standard Error

3. C.V. - Coefficient of Variation

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

| Unit | Physiographic Unit[1] Name | | Estimated Area in Thousands of Hectares | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total Wetland Area | Cultivated | Willows & Trees | Grasses | Bulrush Cattail | Transitional Open Water | Natural Open Water | Artificial Open Water | Saline Open Water | Other |
| | (Morainal-D) | | | | | | | | | | | |
| 1.04 | Lodge Benchland | | 5.1 | 1.5 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 |
| | (Morainal-U) | | | | | | | | | | | |
| 1.02 | Sage Creek Plain | | 1.5 | 0.3 | 0.0 | 1.2 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 |
| Total for Entire Sampled Portion of Ecoregion | | A[2] | 6.6 | 1.8 | 0.0 | 4.4 | 0.0 | 0.0 | 0.0 | 0.5 | 0.0 | 0.0 |
| | | A[3] | 5.1 | 1.5 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 |
| | | B[4] | 5.1 | 1.5 | 0.0 | 3.2 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 |

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

[2] Based on summation of values from individual physiographic units including 1.02.

[3] Based on summation of values from individual physiographic units excluding 1.02.

[4] Based on the analysis of the ecoregion sample as a single unit excluding 1.02.

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

| Unit | Physiographic Unit[1] Name | | Estimated Number of Wetlands (in Thousands) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Total Wetland Area | Cultivated | Willows & Trees | Grasses | Bulrush Cattail | Transitional Open Water | Natural Open Water | Artificial Open Water | Saline Open Water | Other |
| | (Morainal-D) | | | | | | | | | | | |
| 1.04 | Lodge Benchland | | 7.8 | 0.8 | 0.0 | 6.1 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.1 |
| | (Morainal-U) | | | | | | | | | | | |
| 1.02 | Sage Creek Plain | | 2.7 | 0.9 | 0.0 | 1.4 | 0.0 | 0.0 | 0.0 | 0.4 | 0.0 | 0.0 |
| Total for Entire Sampled Portion of Ecoregion | | A[2] | 10.5 | 1.7 | 0.0 | 7.5 | 0.0 | 0.0 | 0.0 | 1.2 | 0.0 | 0.1 |
| | | A[3] | 7.8 | 0.8 | 0.0 | 6.1 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.1 |
| | | B[4] | 7.8 | 0.8 | 0.0 | 6.1 | 0.0 | 0.0 | 0.0 | 0.8 | 0.0 | 0.1 |

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

[2] Based on summation of values from individual physiographic units including 1.02.

[3] Based on summation of values from individual physiographic units excluding 1.02.

[4] Based on the analysis of the ecoregion sample as a single unit excluding 1.02.

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

| Unit No. | Physiographic Unit[1] Name | | Estimated Area in Thousand of Hectares: Total Wetland Area | No Use | Abandoned Cultivation | Annual Crop | Haying | Grazing | Other |
|---|---|---|---|---|---|---|---|---|---|
| | (Morainal-D) | | | | | | | | |
| 1.04 | Lodge Benchland | | 5.1 | T[2] | 0.1 | 1.5 | 0.0 | 3.3 | 0.2 |
| | (Morainal-U) | | | | | | | | |
| 1.02 | Sage Creek Plain | | 1.5 | 0.1 | 0.0 | 0.3 | 0.0 | 1.1 | 0.0 |
| Total for Entire | | A[3] | 6.6 | 0.1 | 0.1 | 1.8 | 0.0 | 4.4 | 0.2 |
| Sampled Portion of | | A[4] | 5.1 | T | 0.1 | 1.5 | 0.0 | 3.3 | 0.2 |
| Ecoregion | | B[5] | 5.1 | T | 0.1 | 1.5 | 0.0 | 3.3 | 0.2 |

[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 including 1.02.

[4] Based on summation of values from individual physiographic units excluding 1.02.

[5] Based on the analysis of the ecoregion sample as a single unit, excluding 1.02.

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

| Unit No. | Physiographic Unit[1] Name | | Total Upland Area | Estimated Area in Thousands of Hectares | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Native | | | | | Planted | | | |
| | | | | Grass | Low Shrub | Tall Shrub | Trees | Total | Annual Crops | Perennial Grasses & Forbs | Trees & Shrubs | Other |
| | (Morainal-D) | | | | | | | | | | | |
| 1.04 | Lodge Benchland | | 116.7 | 96.2 | T[2] | 0.0 | 0.0 | 96.2 | 18.8 | 0.7 | 0.1 | 0.9 |
| | (Morainal-U) | | | | | | | | | | | |
| 1.02 | Sage Creek Plain | | 94.9 | 31.0 | T | 0.0 | 0.0 | 31.0 | 52.0 | 11.7 | 0.2 | T |
| Total for Entire Sampled Portion of Ecoregion | | A[3] | 211.6 | 127.2 | T | 0.0 | 0.0 | 127.2 | 70.8 | 12.4 | 0.3 | 0.9 |
| | | A[4] | 116.7 | 96.2 | T | 0.0 | 0.0 | 96.2 | 18.8 | 0.7 | 0.1 | 0.9 |
| | | B[5] | 116.7 | 96.2 | T | 0.0 | 0.0 | 96.2 | 18.8 | 0.7 | 0.1 | 0.9 |

[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 including 1.02.

[4] Based on summation of values from individual physiographic units excluding 1.02.

[5] Based on the analysis of the ecoregion sample as a single unit, excluding 1.02.

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

| Unit No. | Physiographic Unit[1] Name | | Estimated Area in Thousands of Hectares: Total Upland Area | Unused | Abandoned | Crops | Annual Forage | Grazing | Farmsteads | Roads & Railways | Other |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (Morainal-M) | | | | | | | | | | |
| 1.04 | Lodge Benchland | | 116.7 | 0.7 | 0.5 | 18.8 | 0.2 | 93.3 | 0.2 | 2.9 | 0.1 |
| | (Morainal-U) | | | | | | | | | | |
| 1.02 | Sage Creek Plain | | 94.9 | 0.5 | 0.3 | 52.0 | 0.3 | 39.3 | T[2] | 2.5 | T |
| Total for Entire Sampled Portion of Ecoregion | | A[3] | 211.6 | 1.2 | 0.8 | 70.8 | 0.5 | 132.5 | 0.2 | 5.4 | 0.1 |
| | | A[4] | 116.7 | 0.7 | 0.5 | 18.8 | 0.2 | 93.3 | 0.2 | 2.9 | 0.1 |
| | | B[5] | 116.7 | 0.7 | 0.5 | 18.8 | 0.2 | 93.3 | 0.2 | 2.9 | 0.1 |

[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 including 1.02.

[4] Based on summation of values from individual physiographic units excluding 1.02.

[5] Based on the analysis of the ecoregion sample as a single unit, excluding 1.02.

Table 22. Rating of Sampled MORAINAL Physiographic Units in Alberta Shortgrass 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 | | |
| 1.04 | Lodge Benchland | 4.2 | 63.6 | 0.0 | 0.0 | 0.7 | 83.0 | 0.6 | 121.8 | 3/4/4/4 |
| 1.02 | Sage Creek Plain | 1.6 | 78.1 | 0.0 | 0.0 | 4.8 | 45.0 | 0.5 | 96.4 | 3/4/4/4 |

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

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

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 ) | | | | |
| 1.04 | Manyberries | 24 | 2 | 8.3 | 63 |

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.