ENVIRONMENTALLY SENSITIVE AREAS STUDY: COUNTY OF LEDUC

Edmonton Metropolitan
Regional Planning Commission

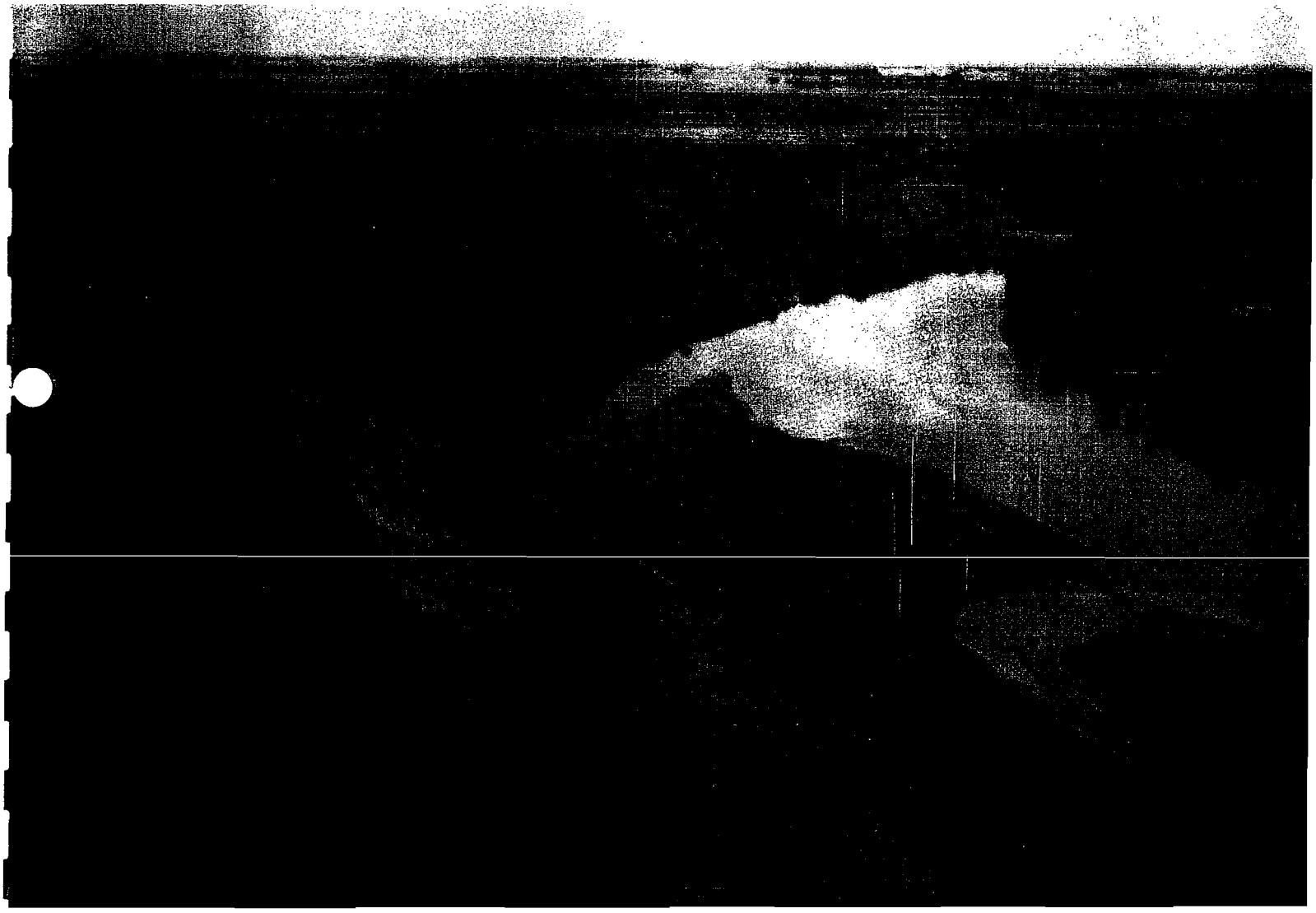

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Table of Contents

List of Tables

List of Figures

List of Photos

1.0 INTRODUCTION

Interest in setting aside or protecting natural landscapes and unique natural or cultural features has increased in Canada in recent years as public and government agencies become increasingly aware of the possible environmental consequences of expanding human settlement and resource development. In heavily settled or developed regions, natural landscapes have been dramatically altered and in some regions, important natural landscapes have disappeared entirely. These concerns are perhaps most acute in the vicinity of major urban centres where expanding residential and industrial developments threaten environmentally sensitive or significant areas.

In Alberta, concerns regarding the impacts of expanding residential, industrial, forestry and agricultural development on natural landscapes in the province have increased considerably over the last decade. In response to these concerns, studies designed to identify environmentally sensitive areas and to provide guidelines for their management were initiated at the regional level by the Calgary (Lamoureux 1983), Oldman River (Cottonwood Consultants 1987, 1988, 1989), Red Deer River (Sweetgrass Consultants 1989) and Edmonton Metropolitan Regional Planning Commissions (Infotech 1989a, 1989b). As part of this on-going planning process, the County of Leduc requested that the Edmonton Metropolitan Regional Planning Commission undertake an environmentally sensitive areas study in the county. The following report, prepared for the Edmonton Metropolitan Regional Planning Commission by D.A. Westworth & Associates Ltd., represents the results of an environmentally sensitive ares inventory conducted in the County of Leduc in 1989 and 1990.

1.1 Objectives

The overall objective of the study was to conduct an inventory and evaluation of environmentally sensitive and significant areas on public and privately-owned lands within the County of Leduc. The inventory will provide the basis for formulating land use planning principles that will assist the Edmonton Metropoli-

tan Regional Planning Commission and the County of Leduc in future planning and environmental management in the region. Specific objectives of the study were to:

- Evaluate and classify the relative sensitivity and the significance of these areas as to their local, regional, provincial, national and international importance.
- Formulate appropriate land use planning principles for environmentally sensitive and significant areas which may be used to guide future planning and development in the County of Leduc.
- Refine, where necessary, the existing policies in Section 7.0 of the Edmonton Metropolitan Regional Plan, which deals with environmentally sensitive areas.

1.2 Background

Because of recent concerns about the potential effects of residential, industrial and resource developments on the environment, various levels of government in Canada have become involved in efforts to conserve or protect important natural landscapes and features. The federal government has participated through the national parks program while Alberta and other provinces have enacted legislation to establish provincial parks, wilderness areas, natural areas and ecological reserves.

Conservation efforts have increased at a regional level as well. In Canada, the most important work in the development of criteria for identifying environmentally sensitive areas occurred as a result of studies undertaken for various regional governments in southern Ontario by the Centre for Resources Development at the University of Guelph during the 1970's (Eagles et al. 1976, Elrick et al. 1977, Blackman et al. 1978). The criteria developed during these studies and subsequently updated by Eagles (1980, 1984) deal principally with the identification of areas that represent unique, unusual or remnant ecosystems, unique landforms, habitats for rare and endangered species, areas of unusually high biological diversity, areas that perform a vital ecological function and areas with significant scientific or educational potential. These studies have formed the basis for criteria that were subsequently used in environmentally sensitive area studies undertaken

in the Calgary (Lamoureux et al. 1983), Oldman (Cottonwood Consultants 1987, 1988,1989) and Red Deer River (Sweetgrass Consultants 1989) regions.

In 1986, D.A. Westworth & Associates Ltd. undertook an inventory and evaluation of significant natural features and landscapes on behalf of Strathcona County (Westworth and Knapik 1987). This inventory adopted criteria similar to those used in the Calgary and Oldman Region Studies with the exception that it did not include historical and archaeological sites (heritage sites in Strathcona County were the subject of a separate inventory) nor did it include an evaluation of hazard lands (which was included in the Oldman study). However, the Strathcona study was the first study in the province that identified sites with a local level of significance.

More recently, Infotech (1989a, 1989b) completed an environmentally sensitive areas study of the County of Strathcona and the Municipal District (M.D.) of Sturgeon. This study incorporated information compiled in the earlier inventory of Strathcona County along with information on hazard lands and significant cultural/historical features. The classification criteria used in that study are the same as those employed in the present study.

2.0 STUDY AREA

The County of Leduc is located immediately south of the city of Edmonton, occupying an area of approximately 2,709 km^2. The areal extent of the county was reduced considerably as part of a number of changes in municipal boundaries that occurred in the region in 1988 and 1989.

The North Saskatchewan River is the major watercourse in the region and forms a portion of the north boundary of the county. A number of small creeks are also present, all of which drain north into the North Saskatchewan River. The county includes the northern portion of Pigeon Lake, the largest waterbody in the region. The county also includes a portion of Ministik Lake along with Wizard Lake, Looking Back Lake, Big Hay Lake and Coyote Lake.

In 1989, the County of Leduc had a total population of 35,641 people, 68% (24,363) of whom were located in seven urban centres (Alberta Municipal Affairs 1989). The county is bisected in a north-south direction by Highway 2 along which the City of Leduc (13,363 people) is situated. The remaining 11,278 people comprise the rural component of the county's population.

Ecologically, the County of Leduc encompasses two of the 12 major ecoregions in Alberta, including the Aspen Parkland, and Boreal Mixedwood Ecoregions (Strong and Leggat 1981). Most of the county is comprised of the Aspen Subregion of the Aspen Parkland Ecoregion, however, inclusions of the Moist Mixedwood Subregion of the Boreal Mixedwood Ecoregion are also present in the northeast and west-central portions of the county. The County of Leduc contains a variety of landscapes that form a broad transition zone from the aspen-dominated communities in the east to mixedwood and conifer-dominated communities in the west.

Meteorological information from the Calmar weather station indicates that the mean annual daily temperature is 2.2 ^{o}C, however, mean daily temperatures range from -15.8 ^{o}C in January to 16.3 ^{o}C in July (Environment Canada 1982). Annual summer and winter precipitation values are 363.2 mm and 125.5 mm, respectively.

Slightly higher seasonal precipitation values are recorded at the Breton weather station located at the western edge of the county, where the respective annual rainfall and snowfall values are 404.6 mm and 131.9 mm. The growing season in the Leduc region varies from 35 to 125 days but typically averages 95 days (Strong and Leggat 1981).

The principal land use in the county is agriculture, particularly in the eastern and west central portions of the county. In these areas, barley, wheat, canola and oats are the most commonly planted crops. Cattle grazing appears to be more common on lands located in the west end of the county. Other land uses in the county include oil and gas extraction, hunting and fishing and other forms of recreational activity. Because of the proximity to such major urban centres as the cities of Edmonton and Leduc, many lakes in the county have been exposed to high density cottage development.

3.0 CLASSIFICATION OF ENVIRONMENTALLY SENSITIVE AREAS

3.1 Classification Criteria and Level of Significance

Each of the sites or areas identified as environmentally sensitive were evaluated for significance on a local, regional, provincial, national, or international level using the following 10 components of the natural environment as identified in Section III of the Terms of Reference:

1. Hazard lands and areas which are unsuitable for development in their natural state (eg. floodplains, steep and unstable slopes).

2. Areas which perform a vital environmental, ecological or hydrological function (eg. aquifer recharge of groundwater storage areas).

3. Areas which contain unique geological or physiographic features.

4. Areas, buildings or features which are important for cultural, historical, prehistoric or archaeological reasons.

5. Areas which contain significant, rare or endangered species.

6. Areas which are unique habitats with limited representation in the region or areas that represent small remnants of previously abundant which have virtually disappeared.

7. Areas which contain an unusual diversity of plant and/or animal communities due to a variety of geomorphological features and microclimatic effects.

8. Areas which contain large and relatively undisturbed habitats and provide sheltered habitats for species which are intolerant of human disturbance.

9. Areas which contain plants, animals or landforms which are unusual or are of local, regional, provincial, national or international significance.

10. Areas which provide an important linking function and permit the movement of wildlife over considerable distances.

As mentioned previously, these components or criteria are consistent with previous environmentally significant areas studies conducted in the province as well as with concepts in environmental planning used in developing environmentally sensitive area criteria and classification methodologies. Consequently, these criteria did not undergo much revision during the course of this study. An important point to

consider, however, in identifying environmentally sensitive areas is that, while it is desirable to develop consistent criteria and a uniform approach to identifying and classifying these sites across the province, it is also essential that the environmentally sensitive areas inventory reflect the planning requirements of the region. The County of Leduc, like the counties of Strathcona and Parkland and the M.D. of Sturgeon, face development pressures and planning requirements that are somewhat different from other regions of Alberta. Significant examples of natural landscapes still exist in the county, however, these are primarily associated with marginal agricultural lands. Because of the proximity to the City of Edmonton and the smaller outlying communities, development and subdivision pressures on these remaining undeveloped lands will continue to increase. This problem is further exacerbated by the loss of good agricultural lands through urban expansion.

With regard to level of significance, the classification is primarily a function of rarity and geographic scale. For example, areas that provide habitat for species that have been identified as threatened or endangered in Canada may have national significance whereas key habitat areas for common or abundant wildlife species might have regional or local significance. Similarly, significance levels often reflect the geographical context of the site. The complex of wetlands found on the Cooking Lake moraine for example, may have national or international significance because of the importance of the region as a breeding and staging area for continental waterfowl populations, however, individual lakes or wetlands within this complex may only be significant from a provincial, regional or local level.

While sites of provincial, national or international significance are usually easily recognized, it is often more difficult to make consistent distinctions between local and regional levels of significance. In general terms, sites which stand out in the range of environmental features found within the region are considered to be of regional or greater significance. In terms of human use and enjoyment, regionally significant areas have the potential to attract use by people living a considerable distance from the site. Sites which stand out in the context of a more restricted

geographical area are of only local significance, but may be important to the use and enjoyment of the area by local residents.

In Strathcona County, Westworth and Knapik (1987) used the following criteria to determine significance levels of individual sites:

> **Local Significance:** Natural features that are considered sensitive or significant from a local perspective. These include sites that have intrinsic appeal due to community interest.
>
> **Regional Significance:** Natural landscapes or features that are of limited distribution or are the best examples of a feature in the region.
>
> **Provincial Significance:** Natural landscapes or features which are of limited distribution at a provincial level or are the best examples of a feature in Alberta.
>
> **National Significance:** Natural landscapes or features that are of limited distribution or are the best examples of a feature in Canada.
>
> **International Significance:** Natural landscapes or features that are unique in the world.

These criteria were subsequently used by Infotech (1989) in their inventory of environmentally sensitive areas in the County of Strathcona and the M.D. of Sturgeon.

3.2 Environmental Sensitivity

In addition to the classification of site sensitivity/significance used in identifying environmentally sensitive areas, a further assessment of environmental sensitivity is useful for formulating management guidelines. Environmental sensitivity ratings are an evaluation of site or land performance in response to various types of disturbance. Changes resulting from development activities and surface disturbance can be measured in terms of soil, vegetation and wildlife habitat parameters, as well as in terms of land use and social and economic values. Some disturbances involve minor, short-term changes that can be easily remedied with normal operating procedures while other lands may be more sensitive to disturbances because of the following characteristics:

- a very high susceptibility to erosion if disturbed,

- severe limitations to revegetation, or
- distinctive or unusual landforms and plant and animal communities that are locally, regionally, provincially, nationally or internationally important.

Areas that would be rated "Highly Sensitive" often are associated with landform-soil-vegetation units that are highly erodible, droughty, steep or have unstable slopes and poor soil quality. Examples of highly sensitive areas in the Edmonton region include aeolian terrain (i.e. sand dune formations) which have low trafficability, are extremely vulnerable to wind and water erosion and require special revegetation practices due to the coarse texture of soils and low levels of water and nutrient supplies for plants. Similar problems exist with eroded terrain and high relief slopes. Because of their productivity and importance to wildlife, wetlands and riparian zones are also often classified as highly sensitive to disturbance. These areas generally require special land management strategies to maintain their vital ecological functions. Other examples include:

Prime agricultural lands.

Lands with high erosion potential.

Lands with geological/pedological significance:

- Paleosols

- Geological sections, exposures, erratics

- Special landforms (e.g. eskers, drumlins, moraines, subglacial valleys)

Hazard lands (e.g. slumps/slides, floodplains)

Surface water resources and wetlands (e.g. water supply for domestic, agricultural and industrial uses)

Groundwater resources:

- Important aquifers

- Sensitive recharge areas

- Discharge features (e.g. springs)

4.0 METHODOLOGY

4.1 Literature Review

The first phase of data collection involved a comprehensive review of all available published and unpublished reports and maps. The review included information available from government agencies, and from university and private sector sources. This included all major data files such as the Alberta Ecological Survey, the Alberta Natural Areas Program, the Alberta Soil Survey, Alberta Culture (Archaeological Survey of Alberta, Historic Sites Service) and the Alberta Fish and Wildlife Division. As well, interviews were conducted with scientists, government personnel and informed residents of the county to obtain information on sites that were not yet identified in the literature.

4.2 Aerial Photograph Interpretation

Airphoto interpretation was conducted using 1987 1:30,000 scale aerial photographs. Major landscape units and features of potential interest were identified and the extent of remaining natural vegetation cover was determined.

No minimum size limit was used during the identification of environmentally sensitive areas. Instead, environmentally sensitive areas were selected on the basis of their environmental sensitivity, significance and their ecological function, regardless of size. Some features of significance, such as unique cultural or terrain features, are not readily identifiable on 1:30,000 aerial photographs. Conversely, certain wildlife habitat areas may be significant because of their large size and contiguity with other habitat features.

During airphoto interpretation, the following landscape features were identified:

- Areas of vegetation diversity.
- Major groundwater discharge areas.
- Sand dune complexes.
- Extensive areas of riparian shrublands and woodlands.
- Areas of forest linking wildlife habitats.

- Remnant grasslands, and major wetlands.
- Major stands of old-growth or climax forest.
- Areas with interesting or unusual landscape features.

4.3 Field Reconnaissance

Field reconnaissance surveys were conducted to ground check the airphoto interpretation and to provide verification and descriptions of identified sites. These included ground surveys conducted over the late fall and winter periods, and a helicopter survey conducted in May 1990.

5.0 OVERVIEW OF NATURAL FEATURES AND LANDSCAPES

5.1 Ecoregions and Subregions

Despite its relatively small size, two of the twelve ecoregions in the province are represented in the county. An ecoregion has been defined as "an area characterized by a distinctive regional climate as expressed by vegetation" (Strong and Leggat 1981). It is a generalized level of classification and great variation can occur within ecoregions. In defining the ecoregions of Alberta, Strong and Leggat (1981) recognized two ecoregions in the county; the Aspen Parkland and the Boreal Mixedwood.

The regional climate characteristics associated with the ecoregions provide an initial basis for evaluating land suitability for such land uses as agriculture, tree growth, outdoor recreation and wildlife production. The ecoregions therefore provide a primary level of classification for land use planning. General climatic and ecological conditions of the ecoregions were described by Strong and Leggat (1981), and potential vegetation types were outlined by Russell et al. (1984).

The two ecological regions can be further divided into six ecological subregions as recognized in the Provincial Wildlife Habitat Subregion Classification and Inventory (Knapik and Westworth 1984). They are characterized by distinctive patterns of landforms, soils and vegetation. The subregions were defined in part, by Pettapiece's (1981) physiographic districts and vegetation/land use patterns. The subregions correlate with the Agroecological Resource Areas of Alberta (Pettapiece 1989). The classification of ecoregions and ecological subregions of the County of Leduc is shown in Figure 1.

5.1.1 The Aspen Parkland Ecoregion

The Aspen Parkland Ecoregion (4.0) is the second largest ecoregion in Alberta, forming a transition between the grassland prairies to the south and the boreal forests to the north. This ecoregion covers approximately 80 percent of the county (Figure 1). The Aspen Parkland is characterized by aspen/grassland vegetation

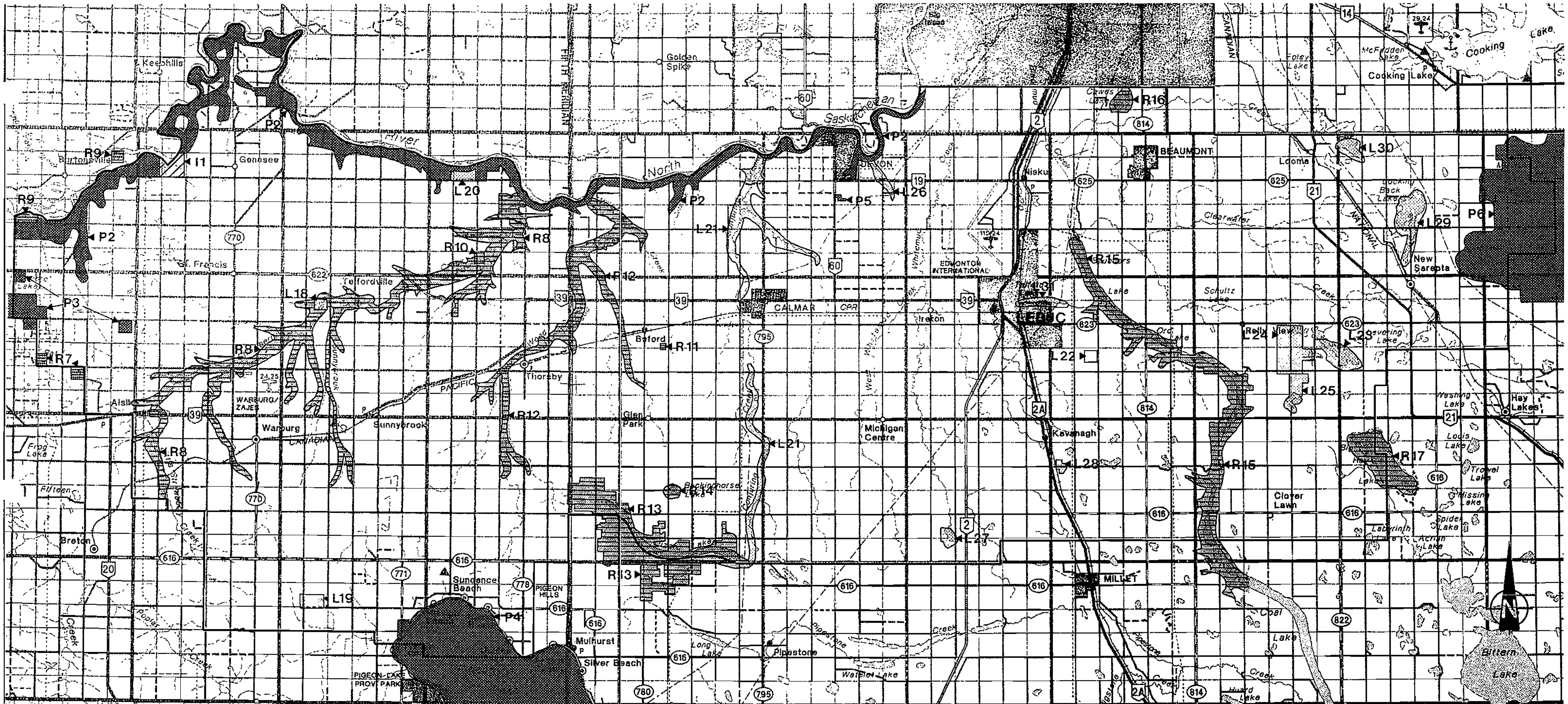
and Black Chernozemic soils. Precipitation is more evenly distributed through the growing season in the Aspen Parkland than it is in the grasslands, thus droughty periods are infrequent in July and August. The absence of drought is favourable for the growth of aspen. Low winter temperatures and infrequent chinooks result in continuous snow cover throughout the winter. The summer freeze-free period usually exceeds 90 days and is considered adequate for maturing most cereal crops commonly planted in the area.

The vegetation of the Aspen Parkland has been described by Bird (1930), Moss (1932), and Russell et al. (1984). In the County of Leduc, a large proportion of forest cover has been cleared for cultivation or pasture, particularly in the east-central areas of the county. However, where areas remain in a natural state, the ecoregion sites are characterized by zones of aspen with patches of grassland. Although aspen is presently the dominant vegetation cover type, the morphology of the soils suggests that the area was predominantly grassland prior to settlement and the reduction in the incidence of wildfire (Pettapiece 1971). Most of the soils in the County of Leduc have high capability for agriculture.

5.1.1.2 The Edmonton Plain

The Edmonton Plain subregion (4.02) of the Aspen Parkland, is an area of low relief and is dominated by widespread agricultural development. This plain forms the north side of the County, following the North Saskatchewan River and extending southward for about two-thirds of the region (Figure 1).

The surficial geological materials are predominantly silts and clays deposited in Glacial Lake Edmonton, sand deposited by running water, and till. The soils are mostly Black Chernozemics with thick, black topsoil typical of prime agricultural soils. While large areas of natural vegetation cover have already been cleared (particularly in the east and east-central portions of the county), remnant aspen stands are usually found near wetlands, along stream courses, and on widely scattered upland sites.



LEGEND

INTERNATIONAL

I1

PROVINCIAL

P2 P3 P4 P5 P6

REGIONAL

R7 R8 R9 R10 R11 R12 R13 R14 R15 R16 R17

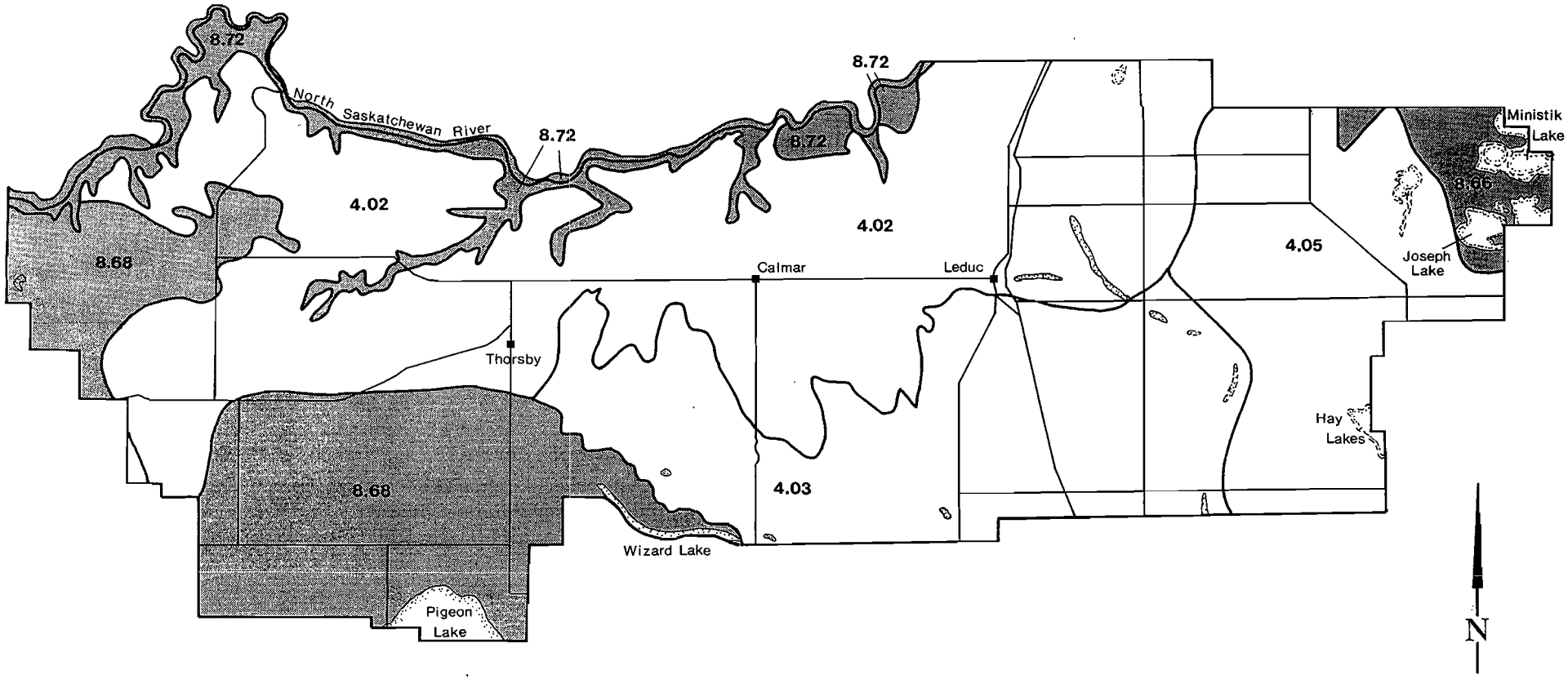
LOCAL

L18 L19 L20 L21 L22 L23 L24 L25 L26 L27 L28 L29 L30 L31

Figure 4. Distribution of environmentally sensitive areas in the County of Leduc, 1989-90.

Km 0 5 10 15 20 25

Pg. 15



LEGEND

4.0 Aspen Parkland
- 4.02 Edmonton Plain
- 4.03 Wetaskiwin Plain
- 4.05 Hays Lake Upland

8.0 Boreal Mixedwood
- 8.66 Cooking Lake Upland
- 8.68 Pigeon Lake Upland
- 8.72 North Saskatchenwan River Valley

Figure 1. Wildlife habitat regions/subregions for the County of Leduc (Source: Knapik and Westworth 1984)

km
0 10 15 20 25

5.1.1.2 The Wetaskiwin Plain

The Wetaskiwin Plain subregion (4.03) of the Aspen Parkland is mostly comprised of prime agricultural land. It occupies the south portion of the county from Wizard Lake to Coal Lake (Figure 1). The dominant landform is a low relief ground moraine where most of the natural vegetation has been cleared for agriculture. The soils are a mixture of Black and Eluviated Black Chernozemics. There are areas of Solonetzic soils that branch southward through the subregion.

5.1.1.3 Hay Lakes Upland

The Hay Lakes Upland subregion (4.05) of the Aspen Parkland occupies the southeast portion of the county extending from Coal Lake to an area just west of Joseph Lake (Figure 1). The landforms are a mixture of hummocky moraine of moderate relief and low relief ground moraine. A thin layer of wind-deposited sediments covers much of the area. Soils are characterized by Eluviated Black Chernozemics. Most of the natural vegetation has been cleared for agriculture.

5.1.2. The Boreal Mixedwood Ecoregion

Approximately 20% of the county lies within the Boreal Mixedwood Ecoregion (8.0), which is the largest ecoregion in Alberta. The county is located along the southern fringe of the Boreal Mixedwood Ecoregion and tends to be warmer and drier than the more northerly areas of the ecoregion. This ecoregion is typically found at higher elevations associated with the Cooking Lake Moraine in the east and on the Pigeon Lake Upland located at the south end of the county.

The Boreal Mixedwood Ecoregion is characterized by deciduous forests on Luvisolic (Gray Wooded) soils. White spruce and balsam fir are potential climax tree species but most stands are dominated by aspen or balsam poplar. An important characteristic of the dominant boreal tree species is that they have wide ecological amplitudes and can grow under a variety of site and growing conditions. Most boreal plants are also well adapted to disturbance. Boreal forests have been described in some detail by several authors (Raup 1981, Larsen 1980, Heinselman 1971, Rowe 1961, Kayll 1971, Dix and Swan 1971, Viereck and Schandelmeir 1980, Moss 1932, Russell et al. 1984). The short frost-free period and reduced energy

budget in the Boreal Mixedwood Ecoregion are limiting for maturing grain crops and as a result, agriculture operations tend to be forage-based.

5.1.2.1 Cooking Lake Upland

The Cooking Lake Upland subregion (8.66) of the Boreal Mixedwood Ecoregion occupies the northeast corner of the county (Figure 2). This represents a southerly extension of the Boreal Mixedwood into the Aspen Parkland.

The topography of the upland is a hummocky, 'knob and kettle' form typical of stagnant ice moraines. Wetlands and small waterbodies are abundant in the subregion, largely a function of poorly integrated drainage systems associated with morainal landscapes. Consequently, the mosaic of upland and wetland vegetation types provides considerable habitat diversity for wildlife.

Soils in the Cooking Lake Upland are characterized by a mosaic of Orthic Gray Luvisols and Gleysols on morainal materials with moderate to high relief, and hummocky land surfaces. Organic soils are also fairly common in the area. The soils and climate have severe limitations for agriculture, which generally limits their use to forage-based agricultural systems.

5.1.2.2 Pigeon Lake Upland

The Pigeon Lake Upland subregion (8.68) of the Aspen Parkland occurs in the west end and northwest corner of the county (Figure 1). This upland subregion is characterized by a moderately hummocky morainal landform with some thin till veneer over soft bedrock. Dominant soils in the subregion are Orthic Gray Luvisols although some Organics are also present. While most of the area is used as forage pasture, some annual cropping occurs. However, the relief and the climate regime provide severe limitations to cultivation. There are also numerous wetlands, bogs and ponds in the area.

5.1.2.3 North Saskatchewan River Valley

The North Saskatchewan River Valley subregion (4.72) forms a large proportion of the north boundary of the County of Leduc (Figure 1) and is deeply incised

approximately 60 m below the surrounding plains. The valley sides vary from being steep to rather gentle, depending on location relative to meander loops. The relief and land patterns provide high scenic values and recreational potential. Geological exposures, geomorphic features, and diverse soil-vegetation communities provide several environmentally significant features. The north-facing slopes are boreal in character but south-facing slopes are more similar to southern grasslands.

5.2 Geology

Deposits of seven general age groups outcrop or subcrop within the County of Leduc (Appendix I). From oldest to youngest, these comprise the:

- Cretaceous Horseshoe Canyon Formation (bedrock)
- Tertiary and Cretaceous Paskapoo Formation (bedrock)
- Preglacial Saskatchewan Sands and Gravels
- Glacial till and outwash (glaciofluvial)
- Glaciolacustrine deposits
- Aeolian deposits
- Postglacial or recent alluvial and colluvial materials

5.2.1 Bedrock

With the exception of the southwest portion of the county, the area is underlain by the Cretaceous-aged Horseshoe Canyon Formation. This formation is described as grey, feldspathic, clayey sandstone; grey bentonitic mudstone and carbonaceous shale; concretionary ironstone beds; scattered coal and bentonite beds of variable thickness, minor limestone beds and mainly non-marine (Green 1970).

The younger Cretaceous and Tertiary-aged Paskapoo Formation is the top bedrock unit in the southwest portion of the county (Appendix I) and is characterized by grey to greenish grey, thick-bedded, calcareous, cherty sandstone; grey and green siltstone and mudstone; minor conglomerate, thin limestone, coal and tuff beds.

5.2.2 Saskatchewan Sands and Gravels

Geologic investigations (Carlson 1967, Gabert 1968, Katholl and McPherson 1975, Tokarsky 1976) indicate that prior to glaciation of the Edmonton region, an extensive drainage system had developed. This drainage system was associated with relatively wide northeast draining valleys with gentle side slopes. During the evolution of the drainage system, fluviatile gravels and sands (Saskatchewan Sands and Gravels) were deposited as (i) high-level sediments on bedrock uplands, (ii) benches and terraces associated with the valley walls and (iii) channel fill at the base of the valleys (Katholl and McPherson 1975).

The Alberta Research Council has completed some mapping of these pre-glacial systems in the Edmonton region (Appendix I), however, the deposits associated with these systems appear to be relatively thin. Should future investigations locate significant thicknesses of pre-glacial sands and gravels, these deposits may be valuable as a groundwater supply. The potential for polluting the groundwater in such a deposit would likely be low because of the depths at which these deposits are generally located. However, in the event that contaminants are introduced into such an aquifer, contamination of groundwater over a large area is possible because of the volume of water which may move through the system.

5.2.3 Glacial Deposits

Glacial deposits of various types underlie most of the county. The north-central and northwest portions of the county are characterized by glaciolacustrine deposits associated with Glacial Lake Edmonton. Glaciolacustrine deposits are typically fine-grained sediments consisting of fine sands, interbedded silts and silty highly-plastic clays. Blocks of till-like material and pebbles may also be found near the base of these deposits (Bayrock and Hughes 1962, Westgate 1969). The glaciolacustrine deposits in this area are underlain by glacial till.

The uppermost glacial deposit in the northeast portion of the county is the Cooking Lake Moraine. This deposit is a hummocky, dead-ice moraine that developed during the stagnation of the last glacier. The till associated with this glacial deposit is composed of mixed clay, silt and sand with pebbles, boulders and local bedrock;

and contains many layers of sand, gravel and silt. Knobs and kettles are the most common features of the Cooking Lake Moraine (Bayrock and Hughes 1962).

Much of the central and southern portions of the county is underlain by glacial till. Westgate (1969) indicates that two till sheets are present in the area and are separated in places, by thin outwash sands and gravels. The lower till varies from a moderately stony, sandy to silty clay loam while the upper till is a moderately stony, sandy loam (Westgate et al. 1967, May and Thomson 1978). Geotechnically, the tills are relatively dense, high strength, competent materials.

Glaciofluvial deposits have been identified in the southeast portion of the county (Bayrock 1972) and are primarily characterized as outwash and fine- to coarse-grained sands and gravels. These materials were deposited as terrace or sheet deposits adjacent to major meltwater channels. Glaciofluvial deposits allow significant groundwater recharge since precipitation will soak in relatively quickly and will then percolate more slowly into underlying materials. Consequently, glaciofluvial deposits are highly sensitive to potential contaminant spills.

5.2.4 Aeolian Deposits

Aeolian deposits are located primarily in the southeast portion of the glacial outwash (glaciofluvial) deposits. Following the retreat of the last glacier and prior to vegetation establishment, strong northwest winds reworked the outwash sands depositing the sands in sheet and dune form. The dunes within the county are low relief, U-shaped, and comprised of fine- to medium-grained sand. Thin aeolian sheet deposits are typically found between the dunes (Bayrock 1972).

Aeolian deposits are considered environmentally sensitive for a number of reasons and include the following:

1. Aeolian deposits have high erosion potential if vegetation cover is disturbed or removed.

2. Where relatively thin aeolian deposits occur (particularly where they overlie less permeable materials), perched water table conditions may exist.

3. Because of the permeability of aeolian deposits, these areas serve an important recharge function for groundwater aquifers in the area.

4. Because of the permeability of aeolian deposits, contaminants can enter groundwater aquifers unless impermeable materials occur above the aquifer.

5.2.5 Post-Glacial Materials

Post-glacial alluvium within the county is typically associated with glacial meltwater channels. These channels are found throughout the county (Appendix I) and are thought to have drained Glacial Lake Edmonton. The most predominant and best known meltwater channel within the County of Leduc is the Gwynne Outlet which is presently occupied by the Blackmud Creek, Saunders Lake, Ord Lake, Coal Lake, several unnamed lakes and the Battle River. A number of other meltwater channels also exist in the area which include Wizard Lake, Log Lake, Looking Back Lake, Telford Lake and Pipestone Creek. Glacial meltwater channels are considered to be sensitive when one or more of the following conditions exist:

1. Where the meltwater channel is deeply incised, unstable slopes may exist. This potential problem is compounded in areas where groundwater discharge in the form of seeps or springs occurs along the slopes.

2. Groundwater discharge (seeps or springs) may occur along the side slopes of the valley or along the valley floor.

3. The floor of the channel may have a high water table.

4. The deposits along the channel floor may be soft and unsuitable for some types of development.

Recent alluvium is also present in the county and may range from silty clay to sandy silt and channel sands and gravels. These deposits are relatively minor and can be located along present day streams, lakes or ponds scattered throughout the county. Colluvial deposits are material that have accumulated on the valley side slopes as a result of either slow gravitational or relatively rapid mass movement of downwasting processes. The composition of these deposits reflects the local stratigraphy of the area.

5.2.6 Hydrogeology

The most important aquifers in the study area appear to be the relatively thick-bedded sandstones of the Paskapoo Formation which underlies the southwest portion of the county (Appendix I). These sandstones have a greater groundwater yield potential than the sandstones found within the Horseshoe Canyon Formation. The

Alberta Research Council has assigned yield potential values ranging from 2L/sec to greater than 8L/sec to the portion of the Paskapoo Formation found in the County of Leduc.

The higher groundwater yields associated with the Paskapoo Formation make the area attractive for future development, however, there is also increased potential for impacting the groundwater regime. Groundwater aquifers can be significantly impacted in several ways and include:

- lower water tables from over-pumping
- spread of contaminants over a large area from spills; or
- alteration of groundwater recharge areas.

The Horseshoe Canyon Formation, which is the uppermost bedrock formation throughout most of the county, has a lower groundwater yield potential than the Paskapoo Formation. It is, however, a major source of water for county farms and residential subdivisions. Groundwater yields from the Horseshoe Canyon Formation are extremely variable with the main water-producing zones associated with sandstone and coal lenses. Because of the bentonitic nature of the sandstones, yields tend to be low (less than 0.4L/sec). Groundwater supplies of this magnitude are generally adequate for individual domestic supplies or small residential subdivisions only.

There are, however, several areas within the county which appear to have higher potential yields from sandstones of the Horseshoe Canyon Formation. In the Millet and Calmar areas, aquifer yields of up to 8L/sec have been reported (Ceroici 1979). The higher yields may be a result of more extensive fracturing at these locations, a locally, more permeable sandstone facies, more recharge to the groundwater regime or a combination of these variables. The higher yielding areas are overlain by extensive dune fields and the higher permeability may be due to the solution of cementing material by persistent and relatively intense groundwater flow caused by high rates of infiltration of precipitation through the surficial deposits (Stein 1976).

Where higher yields are available, groundwater supplies in the Horseshoe Canyon Formation may be capable of supplying water for small towns and villages and some industrial developments. Limited quantities of groundwater may also be developed from sand/gravel lenses within the till or from the base of glaciofluvial (outwash) deposits where these deposits are thick enough.

With respect to groundwater recharge, the most important feature in the county is the glaciofluvial (outwash) and aeolian deposits located along the southeast boundary. As previously discussed, the coarser deposits associated with these features allows precipitation to percolate rapidly into the ground. At the same time however, the coarser deposits also allow for the rapid entry and dispersal of contaminants over a large area if a contaminant spill occurs in the vicinity of the deposits.

Another area of hydrogeological concern within the county is related to artesian groundwater conditions. Care should be taken when drilling in these areas since improper well construction techniques could significantly lower groundwater levels within the aquifer. Known springs within the county have been identified in Appendix I and are typically associated with low-lying areas such as the side slopes or floors of meltwater channels, along river and creek valleys and along lake shores where the water table in areas of permeable arterials intersects ground level.

5.3 Soils

5.3.1 Distribution of Soils

Most of the soils in the County of Leduc are in the Black Zone of Alberta and are comprised primarily of Black Chernozems. Although Solonetzic soils are also present, they are only found within a north-south corridor that passes through the Telford Lake-Kavanaugh area and in the vicinity of Wizard Lake. The western third of the county is located in the Dark Gray Soil Zone and is comprised of Dark Gray and Gray Chernozems and Dark Gray Luvisols.

5.3.2 Agricultural Lands

The Canada Land Inventory (CLI) groups mineral soils into seven classes according to their potentials and limitations for agriculture. The first three classes (1-3) are

considered capable of sustained production of common crops; the fourth class is considered marginal for sustained arable culture; Class 5 is suitable for permanent pasture and hay; while Class 6 is only suitable as unimproved pasture. Class 7 lands characterize waterbodies or bedrock that are typically unsuitable for arable culture or pasture.

Prime agricultural lands are those lands rated by the Canada Land Inventory as Class 1, 2 or 3. Class 1 lands have no significant limitations to the production of normal crops in the area while Class 3 lands have moderate to severe soil landscape limitations that reduce the range of crops that can be grown or require special conservation practices to overcome the landscape limitations.

The distribution of prime agricultural lands corresponds to the occurrence of Black and Dark Gray soils. Since Solonetzic soils are considered to be poor quality soil, they are rated as Class 4 lands. Prime agricultural lands occupy approximately 72% (195,000 ha) of the total area (270,900 ha) in the County of Leduc (Figure 2). This represents about 1.8% of the total prime agricultural land in Alberta. On a provincial basis, the County of Leduc contains a greater percentage of Class 1 lands than most other municipalities in Alberta.

Most of the prime agricultural lands rated as Class 1 are found in the central portion of the county (Figure 2). Class 2 lands are found on either side of the centrally located Class 1 lands in the county while Class 3 lands are primarily found along the east and west edges of the county. Small inclusions (representing approximately 10% of the county) of poor quality lands are also included with the prime agricultural delineation for the county (Figure 2). These occurrences of Class 4, 5 and 6 lands cannot be identified at the scale of mapping which the Canada Land Inventory was based on.

5.4 Wetlands, Waterbodies and Floodplains

A mapped inventory of wetlands, stream courses, steep river and stream banks, severely slumped areas, waterbodies and floodplains was produced by aerial photograph interpretation and is presented in Appendix I.

5.4.1 Peatlands

Wetlands with organic soils and distinctive vegetation are referred to as peatlands. Peatlands are found in the east and west thirds of the County of Leduc (Appendix I) and represent the southeastern limit of peatland occurrence in Alberta. There are two main types of peatlands: bogs and fens.

Bogs are peatlands situated on impermeable soil layers that inhibit groundwater movement. Bogs receive their nutrients from rain and snow melt and as a result, are nutrient poor. Because of the lack of nutrients and water flow, bogs are acidic in nature and support vegetation such as sphagnum mosses, ericaceous shrubs, and black spruce.

By comparison, fens are peatlands that receive nutrients from freshwater sources flowing into channels or depressions. Consequently, fens have a higher nutrient content and pH value than bogs. Although fens are vegetated with sedges and mosses, areas adjacent to waterbodies often support cattails and other emergents. Areas adjacent to waterbodies however, lack moss and are not found on organic soils. Therefore, these areas are not considered fens, but their appearance on aerial photographs is very similar. Because of the difficulty associated with differentiating between marsh and fen sites during air photo interpretation, these areas were grouped into a single fen category (Appendix I).

5.4.2 Waterbodies

Stream courses and waterbodies identified on the aerial photographs are presented in Appendix I. If an intermittent stream appeared to have a defined channel that was not cultivated it was included on the map. Other persistent waterbodies, such as storage ponds and dugouts were also noted.

5.4.3 Stream Banks

Stream banks that were very steep (16-30o) and contained dissected gullies formed by water erosion were mapped. A few of the steep river banks are susceptible to slumping. The areas depicted as slumps show evidence of previous deterioration and may not be currently active.

LEGEND

Class 1
Soils in this class have no significant limitations in use for crops.

Class 2
Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices.

Class 3
Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices.

Classes 4, 5, 6 and 7
Soils in this class have severe limitations that restrict the range of crops or require special conservation practices or both.

Figure 2. Distribution of prime agricultural lands (Classes 1, 2 and 3) within the County of Leduc (Source: CLI 1972).

km
0 10 15 20 25

5.4.4 Floodplains and Terraces

Floodplains are flat to very gently sloping areas adjacent to rivers and streams and are created by the deposition of material from the river when it has overflowed its channel. Annual flooding often occurs as the water levels rise during the spring-summer season. Terraces are old floodplains that are now at a higher elevation than active floodplains and are typically formed from the down-cutting and meandering action of the river or stream. These areas, like floodplains, are often used for agricultural cropping because of the fertile soil deposits. Terraces are also subject to periodic flooding if the water rises to an extreme level.

5.5 Sensitive Terrain and Hazard Lands

5.5.1 Agricultural Soils

The prime agricultural lands found within the county are its primary resource and as result, are environmentally sensitive to soil compaction and erosion. Most of the prime agricultural lands are comprised of fine-textured lacustrine soils. These silty loam and loamy soils are susceptible to compaction and may lead to poor drainage and water ponding. If compaction occurs, the number of working days on the land is reduced and special conservation practices are required to alleviate subsequent drainage problems. Because of their fine texture, prime agricultural lands are also susceptible to wind erosion. Proper cultivation practices must be used to minimize soil erosion.

Solonetzic soils are also environmentally sensitive since these soils are typically found on shallow saline-sodic bedrock and are susceptible to improper water and soil management practices. If soil degradation in these areas occurs, reclamation is extremely difficult.

5.5.2 Soils on Steep Topography

Water erosion of steep slopes will occur if the natural vegetation anchoring the soil is removed. Steep river banks and dissected gullies are often most vulnerable because of their extreme relief. Gullies will erode headward across terraces or plains if allowed to develop unchecked. The materials dislodged during the erosion process move downward with the flow of water and are deposited in

streams and rivers. This sedimentation reduces the productivity of streams and rivers and can contribute to a gradual rise in water level.

The loss of soils from fields affected by gullying is immense. The continual erosion of fertile topsoil results in a loss of soil fertility and capability. There will be increased management problems as the gully dissects a parcel of land and can reduce property value considerably. Gullies can also be very destructive to any structures, roads and bridges, as the erosion process weakens the foundations. Poor agricultural lands (i.e. those other than prime agricultural lands) are often susceptible to wind erosion because of poor soil structure and/or droughty conditions.

5.5.3 Peatlands

Because peatlands in the County of Leduc represent the southern limit of their distribution in Alberta, a number of research and educational opportunities to study these areas exist. In addition, peatlands are sensitive to any type of disturbance, particularly to changes in water flow, water level or water quality. Peat soils, if disturbed, are also highly susceptible to wind erosion.

5.5.4 Floodplains

Floodplains are annually subjected to floods and as result, crops, buildings or other structures located in these areas can be severely damaged or destroyed. The impact of a fifty-year flood or one hundred-year flood can be predicated from the boundaries of the floodplains and adjacent low-lying areas to the floodplains can expect flood damage. The extent of flooding and damage was documented during the 1986 flooding of the North Saskatchewan River. Because of the high water table and the various textures of soil from the deposition process, floodplains impose severe limitations for building construction.

5.5.5 Geology and Hydrogeology

From a geological and hydrogeological perspective, a number of units found in the County of Leduc are considered to be environmentally sensitive to surface disturbances or contaminant spills associated with agriculture, resource development or industrial and residential construction.

1. Paskapoo Formation Bedrock: The Paskapoo Formation is considered environmentally sensitive because of:

- its high groundwater yield potential and

- higher permeability of the sandstones.

Both characteristics make the Paskapoo Formation susceptible to the introduction and rapid spread of contaminants through a major source of groundwater supply in the County of Leduc

2. Cooking Lake Moraine: The Cooking Lake Moraine is a hummocky dead-ice moraine with a knob and kettle topography that provides a wide range of habitats for wildlife in the eastern portion of the county.

3. Aeolian Deposits: Aeolian deposits are considered to be environmentally sensitive because of:

- the potential for wind erosion if vegetation cover is disturbed,

- the presence of high water table areas which often occur between dunes and where thin aeolian deposits overlie less permeable material,

- the significant recharge potential to the groundwater system these deposits represent and the potential for the introduction and rapid spread of contaminants into a regional groundwater regime.

4. Glaciofluvial Sand and Gravel Deposits: These deposits have been designated as environmentally sensitive for reasons (iii) and (iv) described under aeolian deposits.

5. Artesian Groundwater Conditions: The areas of artesian (flowing well) conditions are of some concern since improper drilling practices or other disturbances could result in the depletion groundwater resources.

6. Springs: Springs represent groundwater discharge locations, usually associated with creeks rivers and lakes, etc..

7. Meltwater Channels: Glacial meltwater channels are considered environmentally sensitive for the following reasons:

- where deeply incised, valley slopes may be unstable, particularly when springs or seeps are present,

- may be groundwater discharge areas,

- the floors of meltwater channels may have a high water table, or

- soft soils along the floor of the meltwater channel may be unsuitable for certain types of development.

6.0 OVERVIEW OF CULTURAL AND HISTORIC FEATURES

Because of existing documentation and legislation dealing with cultural and historical features in Alberta, the level of control needed for the protection of many of these features during any proposed development is considered to be adequate at the present time (Mr. B. Newton, Archaeological Survey of Alberta, pers. comm., 3 May 1990). Therefore, only a brief overview of the cultural and historic features is presented here. For more detailed, site specific information within the County of Leduc, the Archaeological Survey of Alberta, Alberta Culture and Multiculturism should be contacted.

6.1 Archaeological Resources

The Archaeological Survey of Alberta, Alberta Culture and Multiculturism, maintains a current listing of archaeological sites throughout Alberta. A search of this information base indicates that approximately 200 archaeological sites have been located and described within the County of Leduc, many of which are associated with streams, rivers, lakes and other wetlands and with areas of ecological or topographic diversity. While the specific archaeological sites are to numerous to list, certain lands within the county are considered to have a high potential for the discovery of additional sites. These lands are typically associated with glacial features such as meltwater channels and glacial lakeshores or the Cooking Lake Moraine in the eastern portion of the county (Figure 3).

Areas such has meltwater channels and morainal landscapes contain a large number of archaeological sites generally associated with early native cultures. Following the recession of the glacial ice and melt waters 12,000 years ago, a number of different hunting cultures developed. The first people known to occupy the general area were referred to as Clovis, who hunted mammoth and other large mammals with spears. They were followed by several spear hunting (8500 - 7500 years ago) and throwing spear cultures (approximately 7500 years ago). Major changes in prehistoric settlement patterns occurred around 1000 B.C. and from

here, camps became more common and settlement was more intensive. The Avonlea culture saw the development of the bow and arrow around 100 A.D. and eventually evolved into the prehistoric Blackfoot culture approximately 1000 years ago.

Many of the sites within the county are associated with artifacts, structures and use areas of prehistoric cultures. For example, the activities of many prehistoric cultures were focused around camp sites. While the type of campsite varies with its prehistoric age, culture and season of use, most were typically associated with stream valleys, lakes and morainal landscapes that supported diverse flora and fauna. Camp sites are by far, the most common archaeological sites in the county.

6.2 Palaeontological Resources

Fossil finds of regional, provincial, national or international significance are relatively uncommon in the central Parkland region, largely a result of the lack of distributional information. However, the Archaeological Survey of Alberta periodically provides an updated palaeontological sensitivity map for the province. Sensitivity zones based upon the interrelationships between recorded site occurrences, fossiliferous formation outcrops, physiographic and hydrographic features and natural resource distribution (Alberta Culture 1984) were identified and placed into five categories. The five categories include high, medium, probable, low and unknown zones of sensitivity. However, because the sensitivity zonation only represents an approximation of the relative degree of probability that any particular land surface disturbance or modification will encounter significant palaeontological resources, the map should not be interpreted that no palaeontological features will be found in the low, medium or unknown zones of the area in question.

In the case of the County of Leduc, four sensitivity zones are found in the northwest and north-central portions of the county (Figure 4). The high sensitivity zone is associated with the fossiliferous bedrock outcrops found along the North Saskatchewan River valley. This zone contains the Genesee Natural Area, a site known for its 60-65 million year old fossil bed that dates back to the late Cretaceous and early

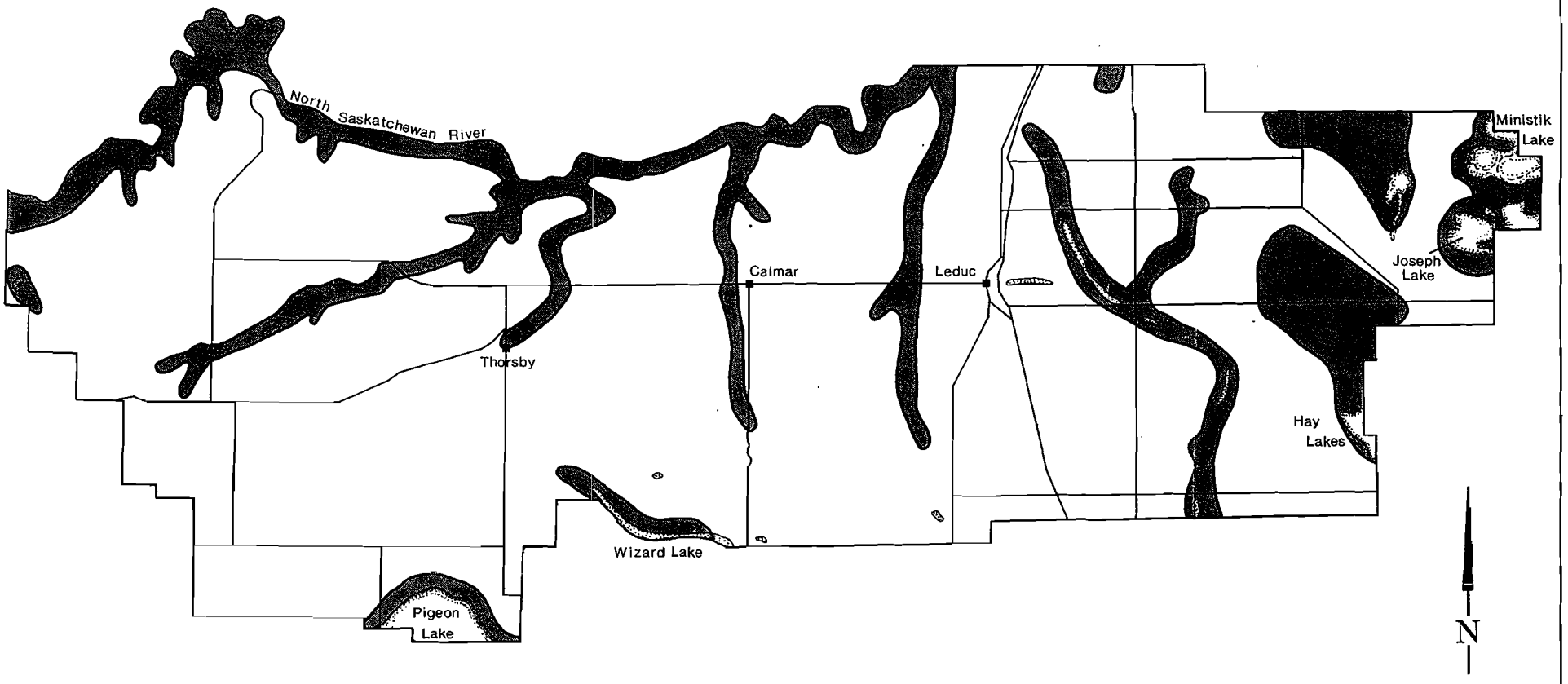


Figure 3. Areas of high archaeological site potential within the County of Leduc (Source: Archaeological Survey of Alberta).

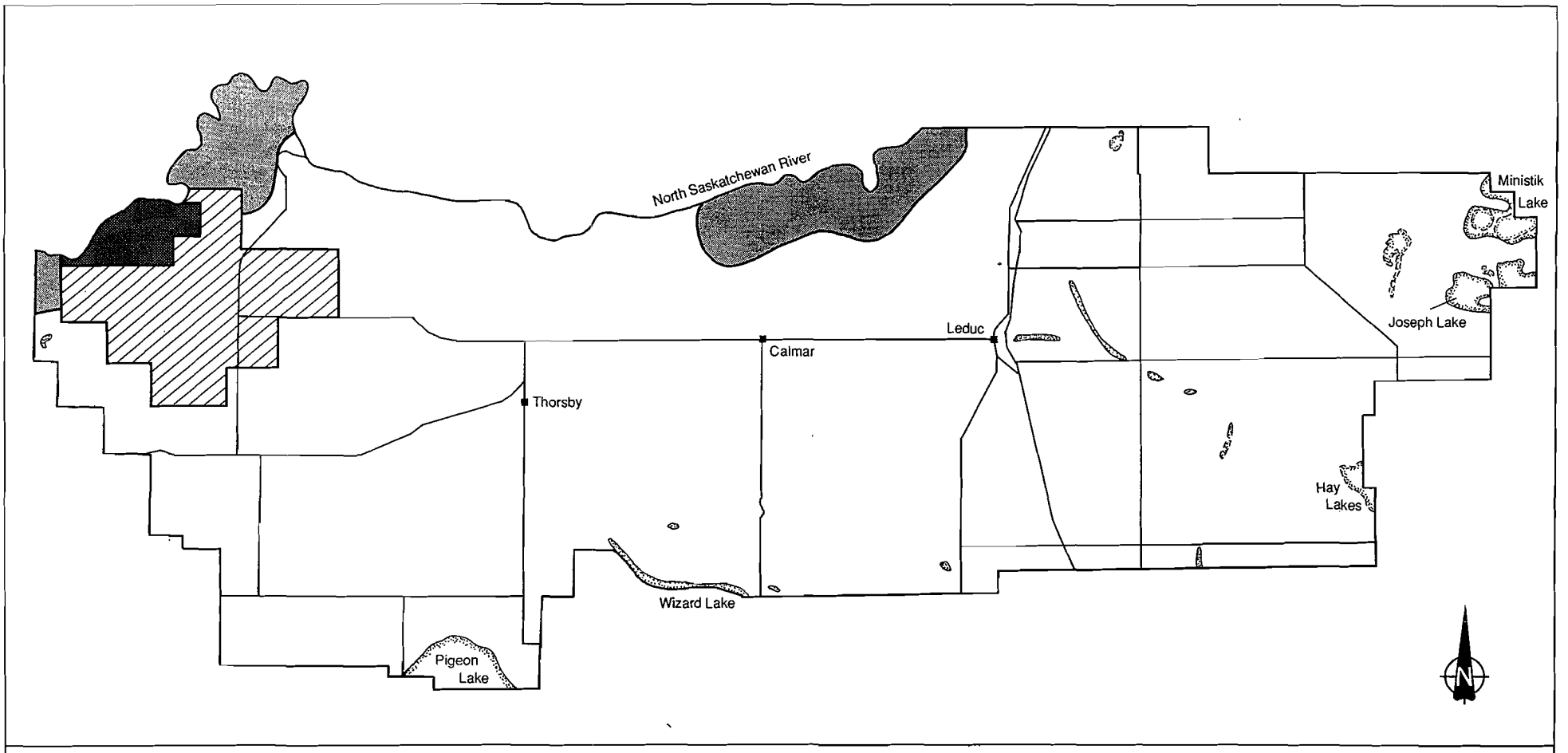


Figure 4. Palaeontological sensitivity zones in the County of Leduc (Source: Alberta Culture 1984).

Palaeocene periods. While development of the river valley has been limited to old floodplains and terraces and fossil removal is under a provincial government permit requirement, unstable banks along the North Saskatchewan River in the vicinity of the Genesee Natural Area makes the site susceptible to slumping.

6.3 Historic Resources

The Alberta Historical Resources Act provides the mechanism for designating historic sites of provincial importance in Alberta. In the County of Leduc, only one Provincial Historic Resource (Leduc Oilwell No. 1) and one registered Historic Resource have been designated. Because of the large number of potential historic sites within the county, no attempt was made to rate the significance of them. Detailed locations of these sites are maintained in Alberta Culture and Multiculturism's Historic Site Service files and should be consulted during any development that may affect the site.

6.4 Conclusions

The County of Leduc appears to contain a diverse range of archaeological, palaeontological and historic sites, varying widely in size, condition and significance. In many areas, potential sites have been disturbed or destroyed in the past by intensive agricultural activities (such as cultivating lands to the edges of wetlands, lakes, streams or other waterbodies and farming marginal agricultural lands) and expanding industrial and country residential developments. There are, however, some concerns that building permits for subdivision developments are sometimes issued before the government referral process is completed. As a result of site preparation and excavation activities associated with subdivision development, potentially significant archaeological and palaeontological sites have been occasionally destroyed in the past. Other developments that go to bedrock also have the potential for damaging fossil beds. Therefore, municipalities should not issue building permits until the government referral process has been completed and the site has been assessed. All potential archaeological or palaeontological discoveries should be reported to the Provincial Museum of Alberta.

7.0 OVERVIEW OF FISH AND WILDLIFE RESOURCES

7.1 Fish

Information that has been collected on the fishery resources of the County of Leduc indicates a limited distribution of naturally occurring sportfish populations. The North Saskatchewan River is known to support resident populations of northern pike, walleye, sauger, sturgeon, burbot and suckers, along with migratory summer populations of goldeye. The river is considered to have good fisheries potential primarily as a catch and release fishery (Watters 1987). No fisheries information is available for the smaller creeks in the County; however, surveys have been initiated by the Fish and Wildlife Division to determine the distribution of fish in these smaller watercourses. Low flows and low winter oxygen levels likely restrict the fisheries potential of the upper reaches of these streams, although the lower reaches of the larger creeks (eg. Strawberry Creek, Weed Creek) may support northern pike and suckers.

There are also very few lakes in the County that are capable of supporting sportfish populations. Only 6 of the 50 lakes listed on the Fish and Wildlife Division's fisheries data base (Mr. M. Sullivan, Fisheries Biologist, Fish and Wildlife Division, pers. comm., 27 March, 1990; Rhude, 1979) for the County of Leduc are known to support sport fish, with three of these constituting stocked populations. The most significant fishery is Pigeon Lake, which supports natural populations of northern pike, lake whitefish, walleye, yellow perch, burbot and white suckers. The lake supports heavy sportfishing as well as a commercial whitefish fishery, that has yielded a commercial harvest in the order of 135,000 kg per year. Other lakes containing sportfish include Wizard Lake which contains populations of northern pike, yellow perch, walleye, and white sucker; Coal Lake which contains northern pike, yellow perch, and white sucker; and Sardine Lake which contains rainbow trout and yellow perch. Leduc Reservoir is also stocked with Rainbow Trout. Joseph Lake, Ministik Lake and the other large lakes in the eastern part of the County that are associated with the Cooking Lake Moraine do not support sport-

fish, mainly as a result of their shallow depths, alkaline water, and substrates that are typically unsuitable for establishment of aquatic plant communities.

7.2 Wildlife

The County of Leduc contains a diverse assemblage of wildlife species, however the distribution of wildlife in the Country reflects the predominantly agricultural land use and the fragmented nature of remaining blocks of natural habitat. Habitat that does remain is typically associated with marginal agricultural lands. These areas include the steeply sloping lands associated with the North Saskatchewan River valley, incised valleys of several of the smaller creeks in the County, and several of the glacial meltwater channels, as well as some of the morainal landscapes in the eastern and western portions of the County where agricultural development has been limited by the poor drainage and lower soil fertility.

Data on wildlife are available for only a few locations in the County. Most of the research that has been conducted has focused on the Cooking Lake Moraine, reflecting the importance of this landscape as a production and staging area for migratory birds. The Alberta government conducted a number of extensive studies of this region in the 1970's, as part of a study of the technical and economic feasibility of stabilizing water levels in several of the larger lakes. These studies confirmed the importance of the moraine for waterfowl (Kemper 1976) and a wide diversity of terrestrial wildlife (Zelt and Glasgow 1975). More recent surveys conducted by the Fish and Wildlife Division (Gunderson 1985, 1986) indicate that forested portions of the Cooking Lake Moraine continue to support moderately high densities of white-tailed deer, along with smaller numbers of moose, elk and mule deer.

White-tailed deer, mule deer, moose and elk are also associated with the larger forested blocks in the western part of the County. A winter aerial survey of W.M.U. 334 conducted by the Fish and Wildlife Division in 1987 (Gunderson 1987) resulted in observed densities of 1.02 white-tailed deer, 0.60 moose, 0.40 mule deer, and 0.09 el/km^2. Although the survey area was principally outside of the County, these

densities are likely representative of predominantly forested areas in the western part of the County. Westworth and Brusnyk (1983) conducted detailed studies of ungulate distribution and winter habitat use in the vicinity of Edmonton Power's Genesee project area during 1981 and 1982. They also found that white-tailed deer were relatively abundant and widespread in the region with an observed density of 0.47 deer/km^2. Mule deer were the next most abundant species (0.15/km^2) while moose were relatively uncommon (0.08/km^2) in that area. These authors noted that while white-tailed deer were dispersed throughout the survey area in early winter, there was a pronounced shift toward the North Saskatchewan River valley in late winter. Mixedwood stands containing mature white-spruce, that were associated with the river valley and the lower portions of tributary valleys, represented important winter habitat areas for this species. Concentrations of mule deer were associated with riparian forest and floodplain shrub communities along the North Saskatchewan River.

Griffiths and Griffiths (1988) conducted a biological survey of the Coyote Lake area during 1987 and 1988. They recorded a high diversity of wildlife associated with the complex of terrestrial and wetlands habitats in this region, that included 21 species of mammals, 70 species of birds, and 3 species of amphibians.

8.0 ENVIRONMENTALLY SENSITIVE AREAS OF THE COUNTY OF LEDUC

8.1 Summary

Thirty-one environmentally sensitive areas comprised of one international, five provincial, nine regional and 13 locally significant sites were identified within the County of Leduc (Table 1). Of the thirty sites, 15 are located in the western third of the county (i.e. Conjuring Creek and west). This region of the county contains a large proportion of the remaining forested lands in the county. Environmentally sensitive areas in the remaining, predominantly cultivated areas of the county, represent remnant forested areas and relatively productive wetland sites and creeks.

Table 1. Summary of environmentally sensitive areas in the County of Leduc, 1989-90.

Site Name	ESA No.	Significant Features	Significance Level	Sensitivity Rating	Page No.
Genesee Natural Area	I1	• Important palaeontological site	International	High	53
North Saskatchewan River Valley	P2	• Important watercourse • Relatively undisturbed riparian habitats • Key wildlife area	Provincial	Moderate	57
Coyote Lake Natural Area	P3	• Rare plant species • Rare bird species • Diverse aquatic/terrestrial vegetation communities • Important ungulate habitat	Provincial	High	61
Pigeon Lake	P4	• Important sport/commercial fishery • Sensitive Great Blue Heron Colony • Relatively undisturbed remnant parkland habitat	Provincial	Moderate - High	65
Leduc Oilwell No. 1	P5	• Designated provincial historic resource	Provincial	Low	69
Ministik Lake and Area	P6	• Interesting geological feature • Relatively undisturbed parkland habitat • Key wildlife area • Important waterfowl production area • Important Tundra Swan staging area	Provincial	Moderate - High	73
Alsike-Bat Natural Area	R7	• Aquatic research and nature education potential • Waterfowl production area • Diverse breeding bird community	Regional	Moderate	79
Strawberry Creek	R8	• Key ungulate habitat • Diverse riparian habitats	Regional	Moderate	83
St. Francis Natural Area	R9	• Interesting hydrogeological features • Diverse breeding bird community	Regional	Moderate	87
Thorsby Natural Area	R10	• Relatively undisturbed parkland and riparian habitats • Diverse wildlife and vegetation communities	Regional	Moderate	91
Westlund House	R11	• Registered historical resource • Interesting architectural and historical background	Regional	Moderate	95
Weed Creek	R12	• Key wildlife area and travel corridor • Diverse vegetation communities	Regional	High	99

Table 1. .....Continued

Site Name	ESA No.	Significant Features	Significance Level	Sensitivity Rating	Page No.
Wizard Lake	R13	• Important regional sport fishery • Important wildlife habitat • Grebe nesting area	Regional	High	103
Bucking Horse Lake	R14	• Important waterfowl production area	Regional	Moderate	107
Gwynne Channel	R15	• Interesting geological and archaeological features • Important wildlife habitats • Important regional sport fishery	Regional	High	111
Cawes Lake	R16	• Important waterfowl production area	Regional	Moderate	117
Big Hay Lake	R17	• Important waterfowl breeding and staging area • Diverse aquatic and vegetation communities	Regional	Moderate	121
Telfordville Natural Area	L18	• Diverse upland and riparian habitats	Local	Moderate	125
Strawberry Creek Natural Area	L19	• Undisturbed aspen parkland • Wildlife habitat values	Local	Moderate	129
East Genesee	L20	• Old burn area • Diverse upland habitats	Local	Moderate	133
Conjuring Creek	L21	• Remnant wildlife habitat	Local	Moderate	137
Old Bendick Property	L22	• Rare introduced plant species • Historically interesting	Local	Moderate	141
Rollyview Marsh	L23	• Waterfowl breeding and staging area	Local	Moderate	145
Rollyview Wetland-Pothole Complex	L24	• Topographically interesting area • Diverse aquatic and terrestrial habitats • Great Blue Heron foraging area	Local	Moderate	149
Pita Marsh	L25	• Waterfowl staging area	Local	Moderate	153
Devon Ravine East	L26	• Nature education value • Ungulate over-wintering area	Local	Moderate	157
Oriole Marsh	L27	• Waterfowl breeding and staging area	Local	Moderate	161
Steer Marsh	L28	• Waterfowl breeding and staging area	Local	Moderate	165
Looking Back Lake	L29	• Waterfowl breeding and staging area	Local	Moderate	169
Donnan Lake	L30	• Wildlife viewing area • Waterfowl production and molting area	Local	Moderate	173
Telford Lake	L31	• Waterfowl production area	Local	Low	177

8.2 Environmentally Sensitive Area Checksheets

Environmentally sensitive areas identified within the county are organized by level of significance and are presented in a checksheet format. Each checksheet contains information on details of site location, land status, a description of major biophysical features, level of significance, environmental sensitivity rating, comments/management considerations and relevant references. An accompanying map and in most cases, a photograph are also provided for each environmentally sensitive area. A detailed description of the checksheet format is found in Table 2. Smaller scale maps (1:50,000) illustrating the location and distribution of environmentally sensitive areas within the County of Leduc are presented in Appendix II.

Table 2. Format and content of the Environmentally Sensitive Area check sheets for the County of Leduc, 1989-90.

Name:

Short name that readily identifies the site

Site Location:

- General description of site and where appropriate, legal description of site(Quarter, Section, Township, Range).

Land Status:

- Existing land status (i.e. patented, crown, crown-lease).

Description:

- General biophysical description of topographic, vegetative, floral, faunal, historic, palaeontological or archaeological features. Also includes general description of current land uses.

Significance:

- Level of significance (local, regional, provincial, national or international) and reasons and/or features used to derive the level of significance.

Sensitivity:

- Level of environmental sensitivity (low, moderate or high) of the site in relation to various types of disturbance.

Comments/Management Considerations:

- Description of potential impacts of current or proposed land uses and any management strategies that may be useful in maintaining or improving existing features of the site.

References:

Personal contacts and/or literature used to describe the biophysical resources, potential management and significant features of the site.

Genesee Natural Area

County of Leduc - ESA I1

Site Location:

- North-facing bank of North Saskatchewan River
- 29-TP50-R3-W5

Land Status:

- Crown - reserved as an Educational Natural Area
- 183 ha (452 ac) of land under protective notation since 1985
- 55 ha (136 ac) of land under Order-in-council since 1971

Description:

- The site has moderately undulating topography and contains two creeks.
- Adjacent to the North Saskatchewan River, a provincially important watercourse.
- Relatively undisturbed upland aspen forest characterized by an aspen-dominated overstory with occurrences of white spruce, balsam poplar and paper birch.
- Dense understory characterized by lowbush cranberry, rose and red-osier dogwood.
- Provides important seasonal habitats for a variety of wildlife species.

Significance: *International*

- Site contains part of an important 60-65 million year old fossil bed dating back to the late Cretaceous and early Palaeocene periods, located along the northwest facing bank of the North Saskatchewan River
- One of the finest examples of a coal seam compression fossil bed in the world.

Sensitivity: *High*

- Steep banks of creeks and North Saskatchewan River subject to erosion and slumping
- Some disturbance of the fossil bed from amateur fossil collectors has occurred in the past.
- Located in a high palaeontological resource sensitivity zones.

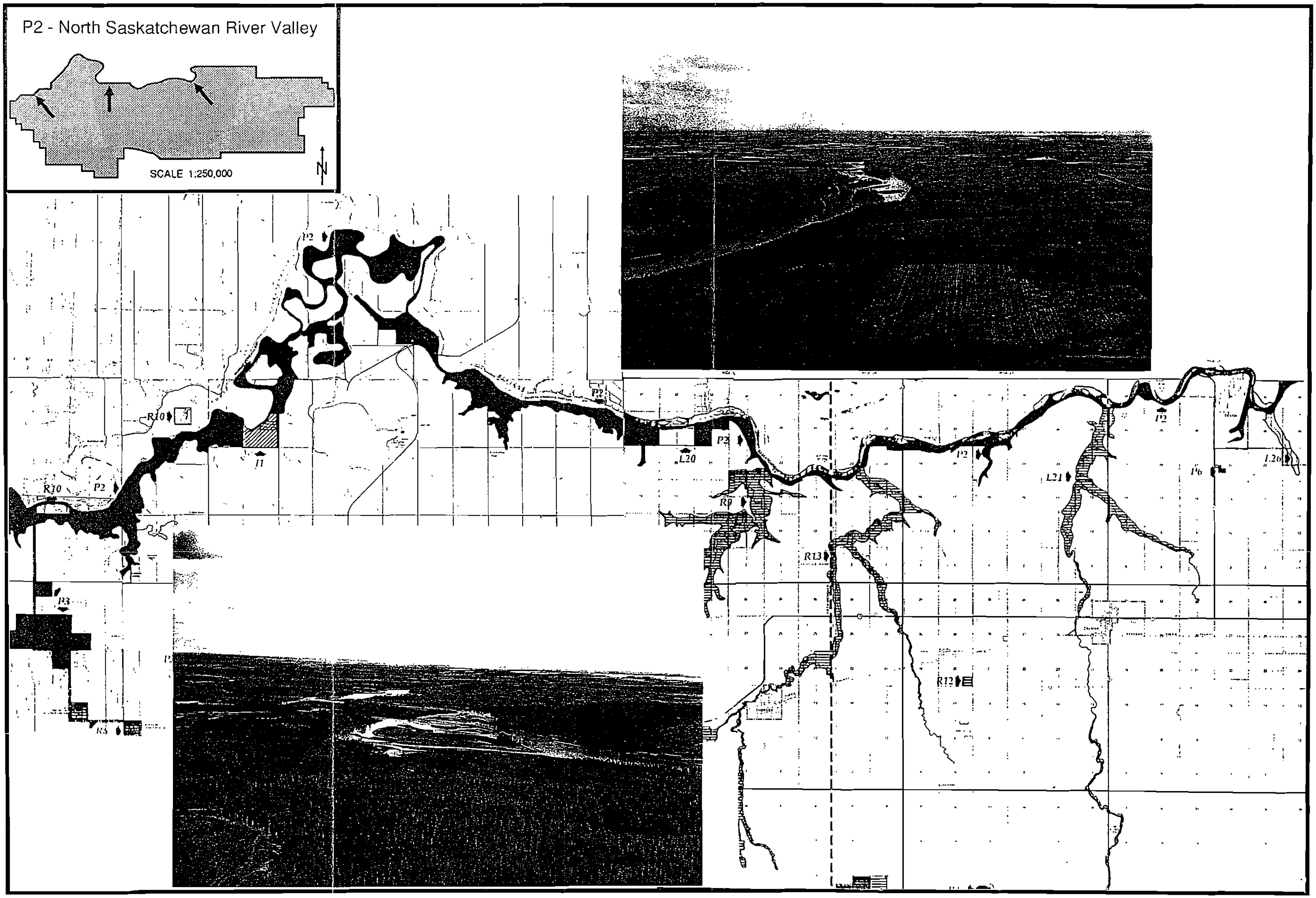
Comments/Management Considerations:

- Extent and exact location of the fossil bed should be determined so that adequate protection of the site can be achieved. Possible options include expanding the size of the natural area by outright purchase or acquisition of a conservation easement for lands not already included within the natural area.
- Because of the palaeontological significance of the Genesee Natural Area, increased protection of the site is required by altering the status of the entire site from Protective Notation to Order-in-Council.

- Current permit requirements by Alberta Forestry, Lands and Wildlife for access and fossil removal and Alberta Multiculturism should be maintained.

References:

Mr. J. Burns, Alberta Provincial Museum, pers. comm.
Mr. J. McNeil, Alberta Forestry, Lands and Wildlife, Public Lands Division
Alberta Culture (1984)
Alberta Natural Areas Summary (1986)


P2 - North Saskatchewan River Valley
SCALE 1:250,000
N
P2
R10
I1
L20
P3
R9
R13
L21
R12
P6
L26
R3

North Saskatchewan River Valley

County of Leduc - ESA P2

Site Location:

- Forms most of the north and northwest boundary of the county.
- Land Status:
- Crown, Patented

Description:

- The sides of the river valley vary from moderately to steeply sloping depending on location relative to meander loops.
- The diverse plant communities associated with the river valley are strongly influenced by slope position, aspect and moisture regime. Cool, moist, north-facing slopes are characteristic of the boreal forest, and are dominated by white spruce or conifer-dominated mixedwood communities. Grassland-shrub communities tend to characterize the drier and warmer south-facing slopes.
- The river valley forms an important travel corridor for a variety of wildlife, including furbearers (mink, beaver, weasel), carnivores (coyotes, fox), white-tailed deer, mule deer and moose.
- The portion of the river valley adjacent to the County of Leduc contains 11 known peregrine and prairie falcon historical nest sites. Four of these occur along the south bank while the remaining sites are located along the north bank of the river valley within the County of Parkland. The peregrine falcon is an endangered species in Canada.
- The river supports an abundant beaver population and is considered to be a regionally important staging and resting area for migrating waterfowl.
- Large numbers of pike, goldeye, walleye and sauger inhabit the river as well as small numbers of mountain whitefish, bull trout, rainbow trout, brown trout and sturgeon.
- Recreational-based activities such as fishing, canoeing, boating and camping are common uses of the river and river valley.

Significance: *Provincial*

- Provincially and inter-provincially important watercourse.
- Because of its use as a transportation route during the fur trade era, the river valley is considered to be historically important.
- The river valley contains several significant geological and palaeontological features.

Sensitivity: *Moderate*

- Very sensitive to most land uses.
- Some steep valley slopes and terraces are erodible or unstable.
- Palaeontological features are highly susceptible to human disturbance and natural erosion.
- Historical nest sites are important habitat components for peregrine and prairie falcons and are easily destroyed. Both species are known to recolonize historical sites first.

- Floodplains are susceptible to flooding during highwater periods.

Comments/Management Considerations:

- Preservation of the river valley's natural character is important in maintaining existing palaeontological, recreational, floral and faunal features.
- Reducing or eliminating recreational activities that increase erosion potential of valley slopes (i.e. all-terrain vehicles, dirt bikes) should be considered).
- Future recreational development of the river valley may include construction of boat launches, hiking trails, interpretive areas, day-use sites and overnight camp sites. However, care should be taken in the selection and management of these sites so that disturbance of important and sensitive riparian habitats is minimized.
- Any developments on floodplains should recognize the fact that these areas may be subject to flooding during highwater years.
- A buffer zone should be established around historical falcon nesting areas and existing nest sites should be maintained in a relatively undisturbed condition if possible.

County of Leduc - Historical nest site locations:

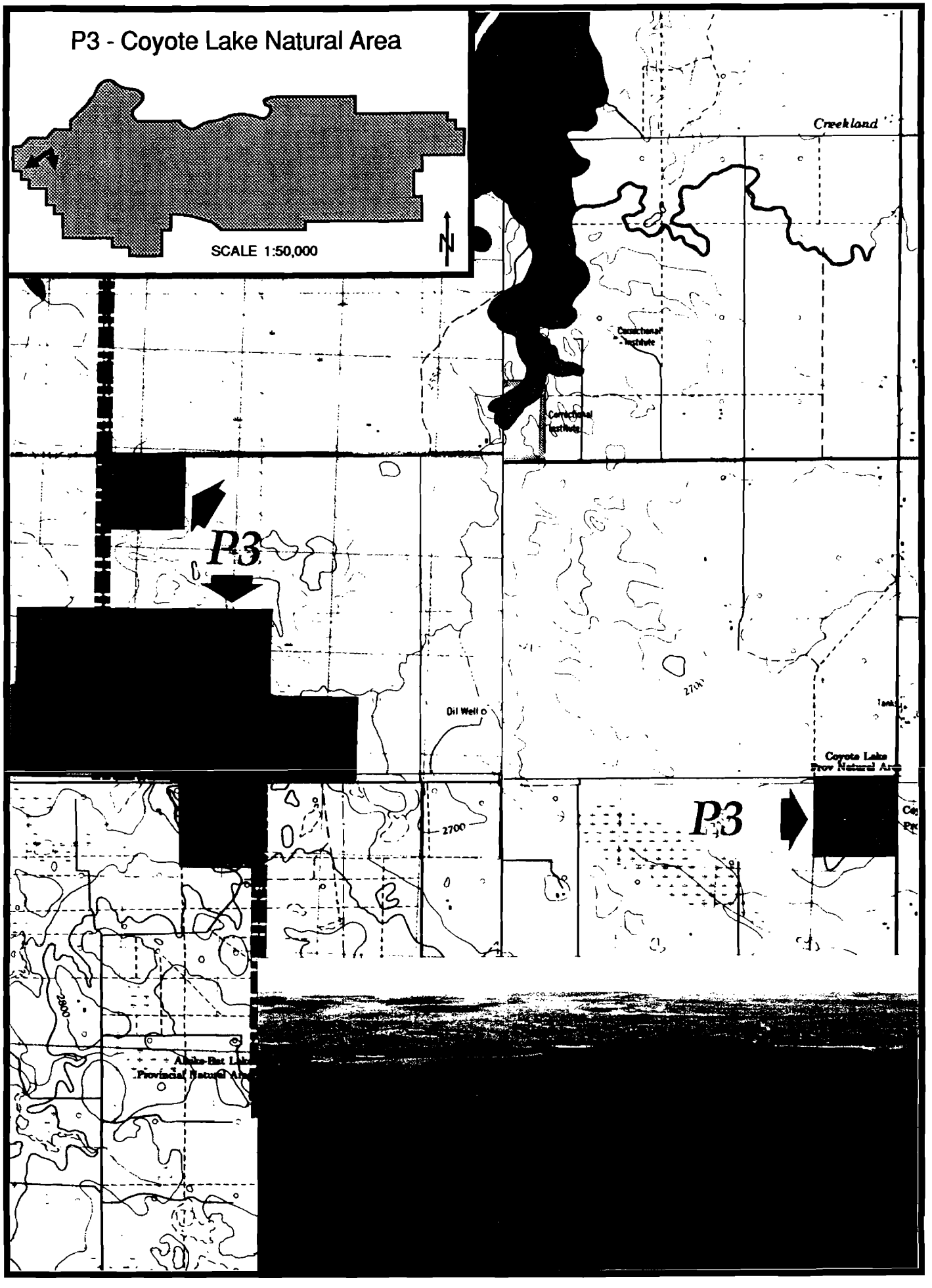
E33-TP47-R7-W5: Peregrine Falcon
S14-TP50-R6-W5: Peregrine Falcon
S23-TP50-R1-W5: Peregrine Falcon
N14-TP50-R1-W5: Peregrine Falcon

County of Parkland - Historical nest sites locations:

SE6-TP51-R3-W5: Peregrine Falcon
SW5-TP51-R3-W5: Peregrine Falcon
W16-TP51-R3-W5: Peregrine Falcon
NW35-TP50-R2-W5: Prairie Falcon
SW25-TP50-R28-W4: Peregrine Falcon
NW35-TP50-R26-W4: Peregrine Falcon
S7-TP51-R21-W4: Peregrine Falcon

References:

Alberta Natural Areas Summary (1986)
Westworth and Brusnyk (1983)
COSEWIC (1985)
Mr. D. Moore, Alberta Fish and Wildlife Division, pers. comm.
Mr. and Mrs. E. Hopkins, pers. comm.


P3 - Coyote Lake Natural Area
SCALE 1:50,000
N
Creekland
P3
P3
Oil Well
2700
2800

Coyote Lake Natural Area

County of Leduc - ESA P3

Site Location:

- Located approximately 14.5 km (9 mi) west of St. Francis.
- NE20, NW24, SW28, 29, S1/2 and NE30, NW32-TP49-R4-W5
- NW13, N1/2 24, NE25, S1/2 25, S1/2 and NE36-TP49-R50-W5
- Order-in-Council Natural Area (NW24, SW28, S1/2 of 30-TP49-R5-W50
- Protective Notation 29-TP49-R4-W5
- Note: Only NW24, SW28, 29, NW32 in County of Leduc

Land Status:

- Crown, Patented

Description:

- The 648 ha (1610 ac) natural area contains a 55 ha (136 ac) waterbody known as Coyote Lake which has a maximum depth of 2.5 m.
- Because of its relatively small drainage basin and the low fertility of catch basin soils, the lake is oligotrophic.
- Surrounding upland vegetation consists mainly of aspen with some balsam poplar and white spruce, while low-lying areas are comprised of larch-black spruce/sphagnum bogs, birch-willow shrublands or sedge meadows.
- The site supports a diverse fauna as well as a number of rare plant species. Twenty-two species of mammals; 154 species of birds; 3 species of amphibians; 2 species of fish; 1 species of reptile ; and 266 species of vascular plants have been recorded in the area.
- Many large mammals such as moose, elk, deer and black bear occur in the region.
- Various species of breeding and migrating waterbirds use the lake.

Significance: *Provincial*

- Significance status is a result of the occurrence of *Wolffia columbiana* (Family Lemnaceae), a new plant species recorded in the province. This species is only found in one beaver pond in the area. Many orchid species, which are uncommon in Alberta, also occur in the area.
- The presence of nine bird species that are considered at risk by the Committee on the Status of Endangered Species in Canada (COSEWIC), including the rare Cooper's hawk.
- The presence of extremely diverse aquatic and terrestrial plant communities.
- Nesting and staging area for aquatic avifauna.
- Provides excellent habitat for ungulates such as white-tailed deer, mule deer, elk and moose.

Sensitivity: *High*

- Rare orchids and other plants are susceptible to loss due to plant collectors as well as to trampling damage from recreational users.

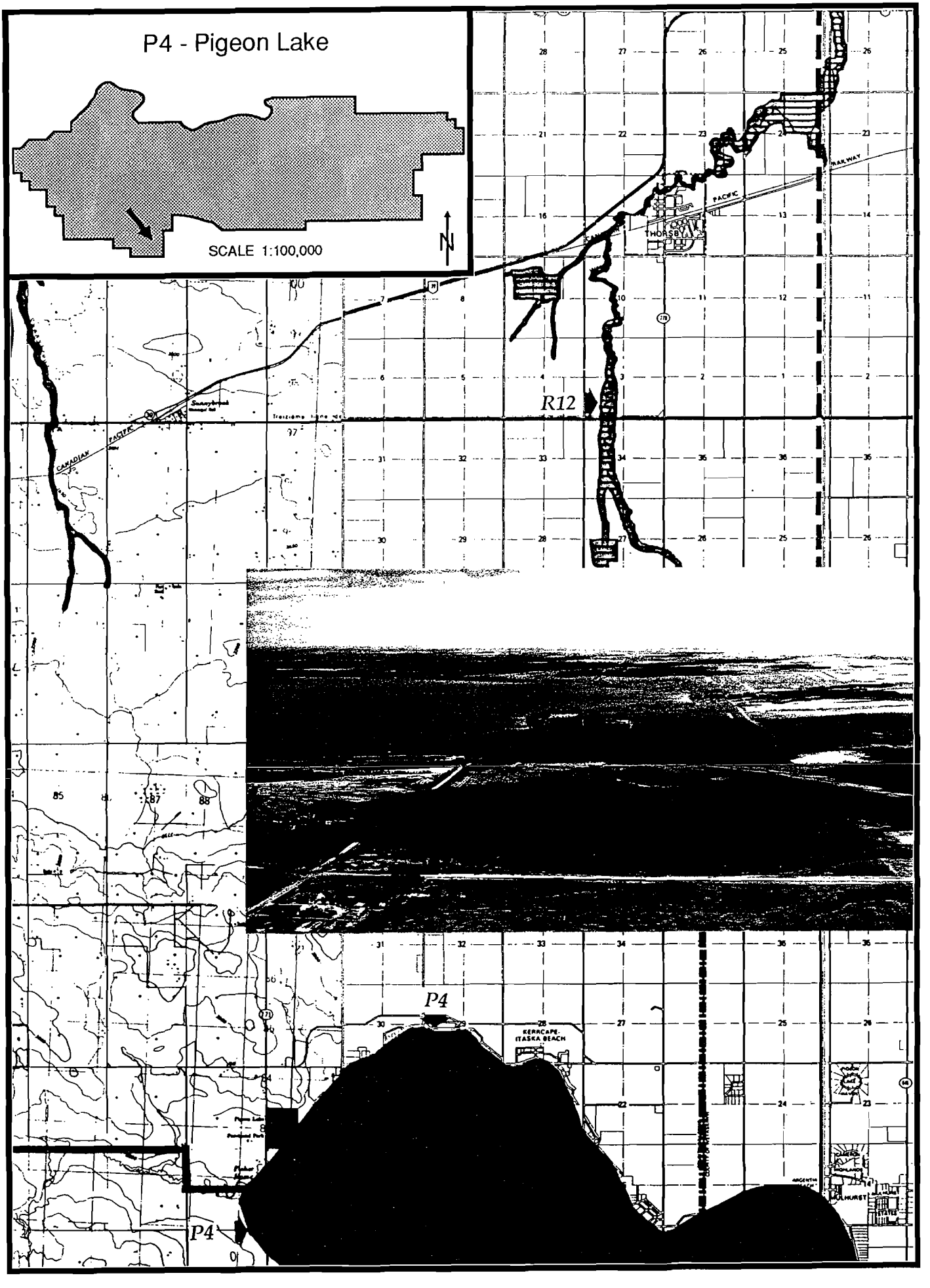
- Many bird species such as the Common Loon and Western Grebe are sensitive to human disturbance, particularly during the nesting period.
- Creeks and steep-sloped banks are susceptible to soil erosion.
- The trophic status of Coyote Lake can be significantly altered by runoff from nearby agricultural lands (i.e. pastures) if further clearing in the area occurs.
- Groundwater recharge areas (i.e. bogs and fens) are highly sensitive to surface disturbances and contaminants.

Comments/Management Considerations:

- A comprehensive and integrated management plan for the Coyote Lake Natural area, Greater Coyote Lake Management Area and adjacent lands should be developed. The management plan would delineate fragile or sensitive areas, identify education and interpretive opportunities, recommend conservation measures, and provide an assessment of the long-term protection requirements for the entire area.
- The demands and capacity for recreational use should be determined and if warranted, trails and wildlife viewing facilities could be constructed and interpretive signs erected.
- Sensitive habitats or wildlife species should be protected by restricting or eliminating access during critical times of the year.
- A basic hiking and cross-country ski trail is already present, however, useability of the trail and interpretive opportunities could be enhanced considerably by adding a marsh trail/boardwalk system.
- Purchase of NW28 and SE32-TP49-R4-W5 would ensure a stable, undisturbed shoreline protected against any clearing or development that may occur in the future. Outright purchase or acquisition of a long-term conservation easement in these areas would ensure that the area around Coyote Lake will remain in its natural state in perpetuity.
- Any clearing or development of bogs and fens in the vicinity of site should be discouraged if possible, since these areas serve as important groundwater recharge areas. A landowner education program (i.e. brochures or pamphlets) could provide information to landowners about the importance of these forest types.

References:

Alberta Natural Areas Summary (1986)
Griffiths and Griffiths (1987)
Griffiths and Griffiths (1988)
Mr. and Mrs. E. Hopkins, pers. comm.


P4 - Pigeon Lake
SCALE 1:100,000
N
R12
P4
P4
THORSBY
KERACAPE-ITASKA BEACH
CANADIAN PACIFIC RAILWAY

Pigeon Lake

County of Leduc - ESA P4

Site Location:

- Located approximately 10 km (6 mi) south of Thorsby. Only northern portion of lake extends into county.
- N1/2 13, NE14, SW24, SE24, NE24-TP47-R2-W5

Land Status:

- SW24 and a portion of NW13 are crown lands. Remaining shoreline is patented.

Description:

- The 9,591 (23,700 ac) lake is surrounded by a ridge of hills which slope toward the lake and as a result, Pigeon Lake acts as a catchment basin for approximately 187 km^2 (72 mi^2) of surrounding land.
- Water flows into the lake from several intermittent streams and is drained by Pigeon Lake Creek which eventually flows into the Battle River. The lake is approximately 9 m deep and has a shoreline length of 46 km, 30% (14 km) of which is located within the County of Leduc.
- Agriculture and high density recreational developments are the predominant land uses in the vicinity of the lake. Pigeon Lake Provincial Park and the municipally operated Zeiner Park are located on the northwest shore of the lake.
- Aspen is the predominant tree species of remnant forest blocks in the vicinity of the lake, however, white spruce, mixedwood stands (white spruce, balsam poplar and white birch) and several black spruce bogs and sedge fens are also interspersed throughout the area.
- The area supports numerous wildlife species including moose, white-tailed deer, beaver, muskrat and over 130 species of birds.
- An active great blue heron colony is also present (NW6-TP47-R1-W5).
- Although the lake receives some use by waterfowl, production capability is considered to be low because of water depth and lack of marsh edge vegetation.
- The lake supports an active sport and commercial fishery. Whitefish, northern pike, yellow perch and walleye comprise the main fishery. Several species of minnows and suckers are also found in the lake.

Significance: *Provincial*

- Supports a provincially important sport and commercial fishery.
- Presence of a great blue heron colony.
- Remnant forest blocks located in the vicinity of the lake provide important habitats and travel corridors for wildlife in the region.

Sensitivity: *Moderate - High*

- While previous water quality studies have indicated that the quality of water in Pigeon Lake compares favourably with other similar recreational lakes in the region, further development of the shoreline for cottages and

other recreational activities may pose some problems in the future. Eutrophication of the lake may be accelerated by cottage development and loss of upland vegetation cover.

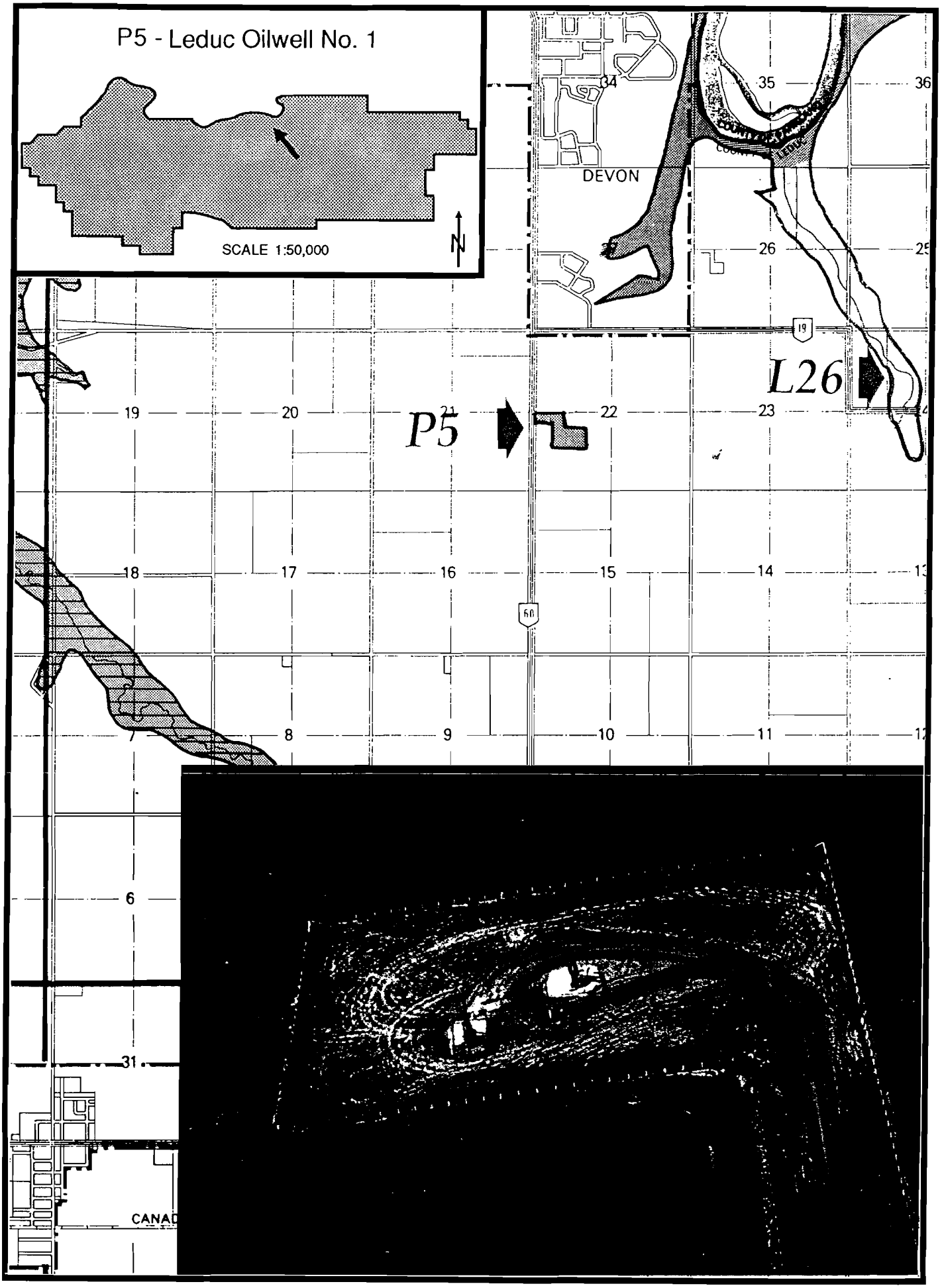
- Over-fishing by commercial and sport fisherman may deplete the important fisheries resource.
- Increasing demands for recreational developments and activities along with concomitant intensification of agricultural activities in the vicinity of the lake will seriously affect habitat availability and suitability for wildlife.

Comments/Management Considerations:

- Vegetation cover along inflow streams and within groundwater recharge areas (i.e. black spruce bogs or sedge fens) should be maintained as municipal reserve lands as indicated in the Pigeon Lake Management Plan. Identification of these ground water recharge areas may be important in maintaining future water supply and water quality since studies by Alberta Environment and the Alberta Research Council indicate that shoreline and underwater springs are an important element of the lake.
- Relatively undisturbed shoreline buffer zones should be maintained around the lake and septic systems of cottages close to the lakeshore should meet proper standards to minimize eutrophication and potential water quality problems in the future.
- Maintaining remaining tree cover is important for watershed protection, particularly since at least 50% of the watershed has already been cleared.
- Losses of fish spawning and rearing habitats through removal of aquatic vegetation, increased siltation and/or reductions in water quality should be minimized to prevent irreparable damage to the lakes fishery. Previous studies (early to mid-1970s) have indicated that destruction of spawning habitats due to clearing of rooted aquatic vegetation in front of cottages was a probable cause of fishing declines recorded in the lake. At that time, only three significant areas of spawning habitat remained, one of which included a small area on the north shore. Since then, there have been no new subdivision developments and fish populations appear to have stabilized.
- However, recent concerns about the potential effects of overfishing in the lake have been raised. Declining fish stocks and the higher economic returns associated with sport fisherman suggest that continued commercial fishing in the lake be examined closely. The proximity of Pigeon Lake to major urban centres such as Edmonton, Red Deer, Leduc and Wetaskiwin provides numerous opportunities for year-round use by sport fisherman.

References:

Alberta Environment (1989)
Bidgood (1972)
Brechtal (1981)
B.R.R.P.C. (1966)
B.R.R.P.C. (1974)
B.R.R.P.C. (1984)
B.R.R.P.C. (1985)
E.R.P.C. (1974)
Haag and Noton (1981)
Pigeon Lake Study Group (1975)
Mr. J. Martin, Biologist, Ducks Unlimited, Camrose, pers. comm.


P5 - Leduc Oilwell No. 1
SCALE 1:50,000
N
DEVON
L26
P5
34
35
36
26
19
20
21
22
23
18
17
16
15
14
60
8
9
10
11
6
31
CANAD

Leduc Oilwell No. 1

County of Leduc - ESA P5

Site Location:

- Located approximately 4.8 km (3 mi) south of Devon.
- Lot A, Plan 762 1921
- SW22-TP50-R26-W4

Land Status:

- Crown

Description:

- Although the original equipment used to drill the site has been removed, the 1.5 ha (3.5 ac) site still contains two active pumps.
- Provides a historical record of the first major oil discovery in central Alberta.
- Initiated one of Canada's largest resource booms and signalled a period of rapid economic growth in Alberta.

Significance: *Provincial*

- Designated provincial historic resource.

Sensitivity: *Low*

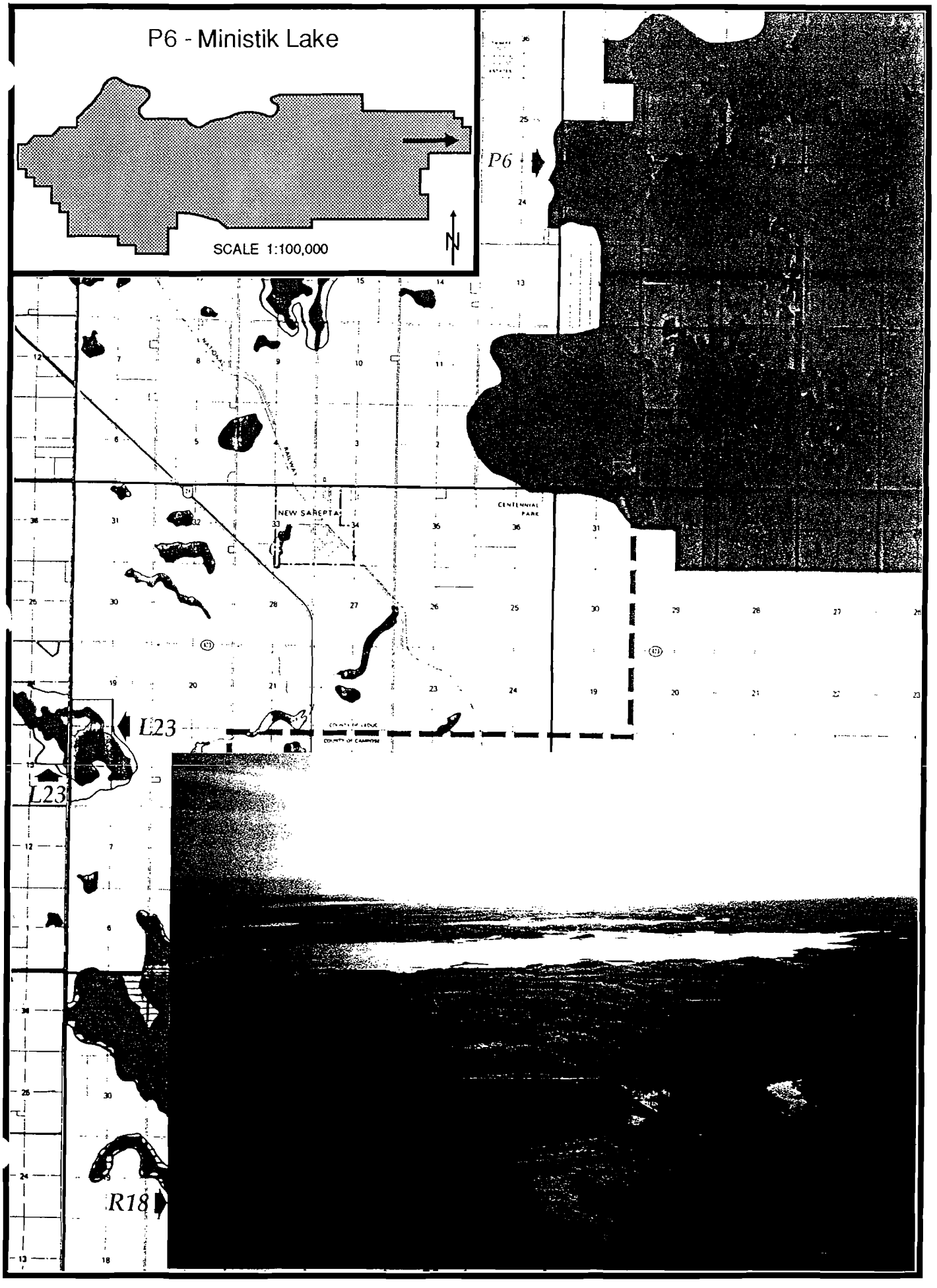
- From a natural environment perspective, site already has been disturbed extensively. Cultivated lands surround the site and the site itself have been seeded to grass.

Comments/Management Considerations:

- Although a sign designating the location is present, no effort has been made to date to landscape the site or install interpretive displays.
- As a local initiative, the site has potential for some tourism development.

References:

Myers and Gilpin (1985)


P6 - Ministik Lake
SCALE 1:100,000
N
P6
L23
L23
R18
NEW SAREPTA
CENTENNIAL PARK

Ministik Lake and Area

County of Leduc - ESA P6

Site Location:

- Located approximately 8 km (5 mi) northeast of New Sarepta.
- Portions of the site located within the county including: parts of NE7, 8, part of NW9, S1/2 9, N1/2 16, SE16, 17, N1/2 19, SE19, 20, 21, 29, SW30, part of SW30, part of SE30, SE31-TP50-R21-W4.
- Remaining lands located within the Counties of Beaver, Camrose and Strathcona.

Land Status:

- With the exception of SE16 and the N1/2 of 9 which are patented, all lands within the county are crown

Description:

- The area lies within the Aspen Parkland region of Alberta and comprises part of the Cooking Lake moraine. The variable topography and moisture regime affect the diversity, distribution and structure of plant communities and wildlife habitats.
- Includes the Ministik Bird Sanctuary, the first recognized bird sanctuary in Alberta, established in 1911.
- Site contains 3 large lakes (Ministik Lake, Joseph Lake, Oliver Lake) along with large numbers of smaller ponds and marshes.
- Approximately one-third of the 7,349 ha (18,160 ac) sanctuary is located within the county.
- Although the addition of other lands to the sanctuary is pending, most of the surrounding habitats have been lost to increasing agricultural expansion and intensification.
- Some privately-owned farms and grazing leases are still present within the sanctuary's boundaries.
- Trapping of furbearers within the sanctuary is permitted.
- Large numbers of islands, small interconnecting ponds, beaver dams, undisturbed marshy shorelines and abundant sources of food make the Ministik area an important area for waterfowl.
- Seven dabbler and six diving duck species, as well as Canada geese and numerous shorebird species use the sanctuary for breeding and nesting.
- The area is also an important migration/staging area for tundra swans.
- Area supports a large variety of terrestrial birds and mammals, including abundant populations of white-tailed deer and moose, small numbers of mule deer and elk, mink, beaver, muskrat, lynx, coyote, and red fox.
- Considered to be a key wildlife area for moose, white-tailed deer and waterfowl by the Alberta Fish and Wildlife Division.

Ministik Lake

- Has an approximate surface area of 1,153 ha, a maximum depth of 3.9 m and averages 1.0 m deep. The southern portion of Ministik Lake falls within the County of Leduc.

Joseph Lake

- Is approximately 696 ha (1720 ac) in size, has a maximum depth of 3.4 m and averages 2.4 m in depth.
- A small island located just off of the west shore supports a large ring-billed gull and a Double-crested Cormorant colony (approximately 20 pairs located on north end of island).
- The west shore is also under intensive agricultural development and supports several producing oil/gas wells. Several sumps present along shoreline.

Oliver Lake

- The other major lake within the sanctuary, has a surface area of 494 ha(1221 ac), a convoluted shoreline and is very shallow.
- Attempts to stock Joseph Lake with perch were made prior to 1960. Like Ministik and Oliver Lakes, however, fish populations could not be established or maintained because of shallow water depths and subsequent oxygen depletion during the winter period.

Significance: *Provincial*

- Excellent undisturbed example of remnant parkland habitat.
- Important for spring and fall migration, molting and production of waterfowl.
- Important spring and fall staging area for migrating tundra swans.
- Because of topographic diversity (i.e. Cooking Lake moraine), the area supports a high diversity of mammals and birds.
- High level of recreation uses including birdwatching, hiking, horseback riding, all-terrain vehicle use (dirt bikes, ATV's, snowmobiles), canoeing, photography, picnicing and hunting.

Sensitivity: *Moderate - High*

- The predominance of crown lands, low degree of disturbance and small drainage area reduces the risk of contamination by runoff (containing fertilizers and pesticides) from adjacent agricultural lands for areas located within the sanctuary. However, areas of the site bordering agricultural lands are susceptible to the effects of agricultural runoff.
- The importance of the sanctuary to migrating birds and the sensitivity of aquatic ecosystems to chemical contaminants results in a moderate sensitivity rating.
- Joseph Lake is extremely sensitive to existing land uses along most of its shoreline. Proximity of an oil/gas field to the cormorant colony and presence of sumps along the shoreline results in the high sensitivity rating.

Comments/Management Considerations:

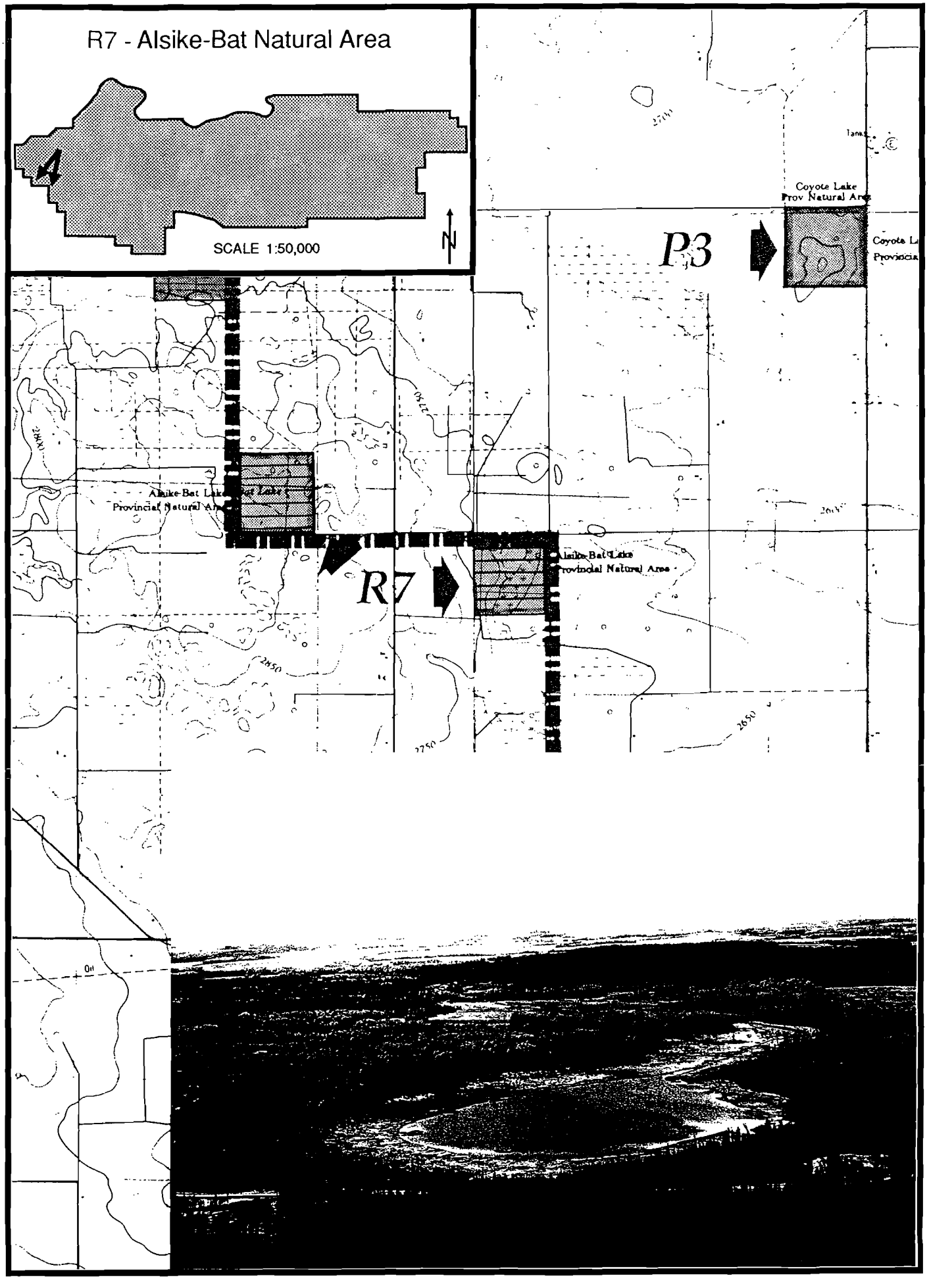
- Ducks Unlimited initiated a control project in 1938 to stabilize water levels.

- Shoreline communities should be protected from disturbance by creating a buffer zone of natural, undisturbed habitat around water bodies.
- Measures such as maintaining vegetation cover on sloping topography are required to prevent contamination of streams and wetlands from agricultural runoff from adjacent agricultural lands.
- Sumps associated with active oil/gas wells along southwest and west side of Joseph Lake and the presence of a high water table suggest that some leakage or runoff into the lake may be occurring. This should be monitored closely and appropriate measures taken to eliminate any potential for water contamination or pollution from these sumps.
- Because of the high potential for waterfowl habitat enhancement along the west and southwest shores of Joseph Lake, the area should be fenced to exclude grazing by cattle.
- Acquisition of private lands within sanctuary boundaries as well as lands surrounding the lakes is recommended (as outlined in the Ministik Lake Management Plan) to prevent shoreline development and subsequent habitat losses.
- Livestock grazing should be reduced or eliminated to return plant communities in the sanctuary to their natural state and to reduce competition with native ungulates.
- E.M.R.P.C. and the County of Leduc should consider active input in implementing the Ministik Lake Management Plan that was recently prepared by the Alberta Fish and Wildlife Division and Ducks Unlimited.

References:

Aerial Photographs
Brechtal (1981)
Field Notes (1990)
Fish and Wildlife Division (1989)
Infotech (1989)
Kemper (1976)
Westworth and Knapik (1987)
Zelt and Glasgow (1976)

R7 - Alsike-Bat Natural Area



Alsike-Bat Lake Natural Area

County of Leduc - ESA R7

Site Location:

- Located approximately 6.4 km (4 mi) northwest of Alsike.
- SW16-TP49-R4-W5
- NE10-TP49-R4-W5 located in the M.D. of Brazeau.

Land Status:

- Crown
- Natural Area reserved for education under Order-in-council since 1971.

Description:

- The 115 ha (285 ac) site contains small marshy lakes with well-vegetated shorelines consisting of cattails, willows and sedge.
- Vegetation diversity in the area is influenced by moisture regime and includes such abundant species as aspen and balsam poplar interspersed with some white spruce and paper birch on rolling uplands and black spruce-larch/sphagnum bogs in poorly drained areas.
- Provides productive deer, moose, waterfowl and furbearer habitat.

Significance: *Regional*

- Site exhibits a high degree of diversity of landscapes and habitats.
- Excellent habitat for many species of terrestrial and aquatic wildlife.
- An excellent site for aquatic ecosystem research.

Sensitivity: *Moderate*

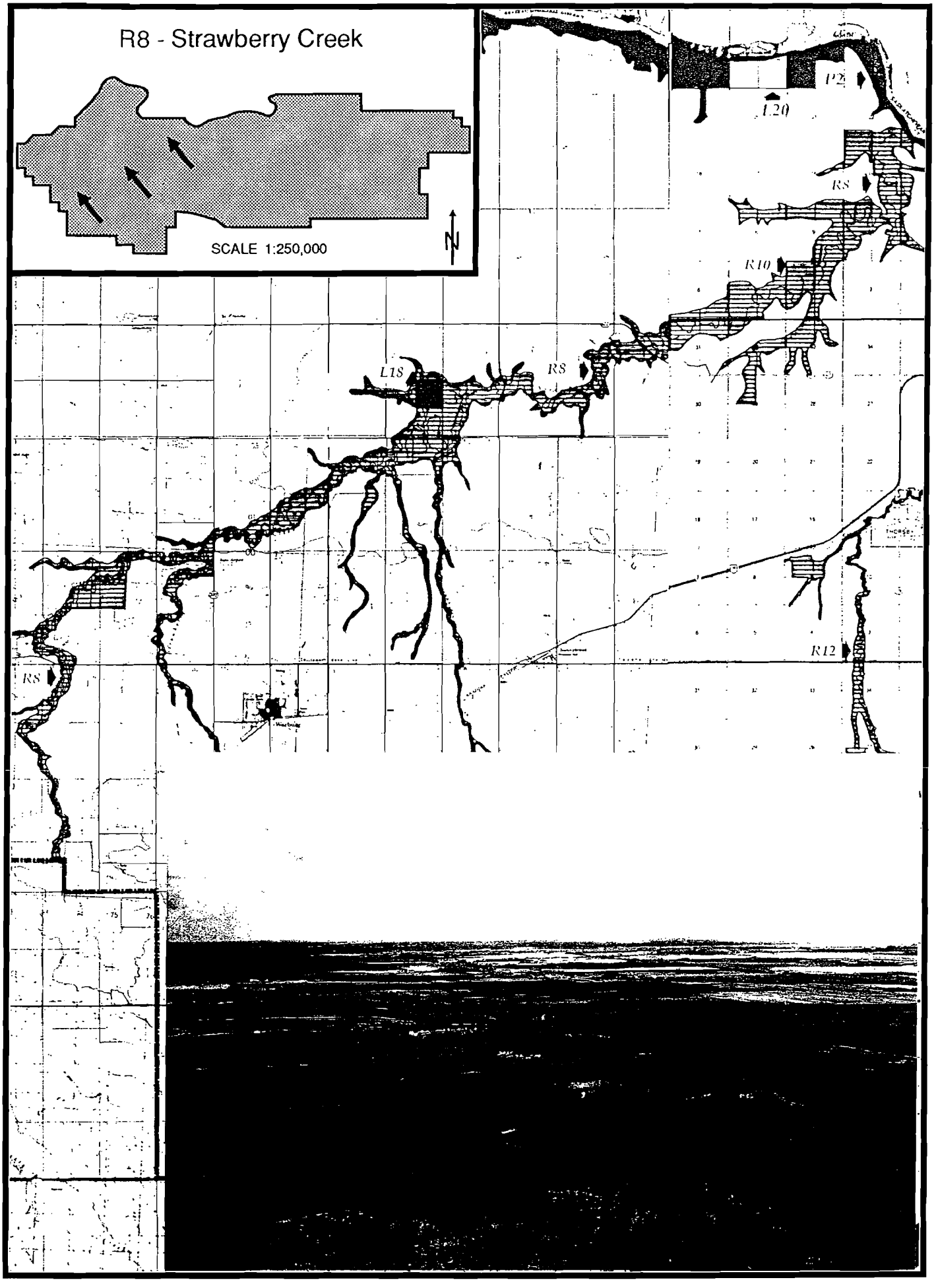
- Lakes in the natural area are sensitive to various agricultural chemicals that may be used on adjacent lands.

Comments/Management Considerations:

- The relatively undisturbed character of the area and its proximity to Drayton Valley suggests that the Alsike-Bat Natural Area can provide residents in the area with excellent nature viewing and nature education opportunities.
- Construction of permanent trails to reduce damage should be considered if recreational demand warrants it.

References:

Alberta Natural Areas Summary (1986)


R8 - Strawberry Creek
SCALE 1:250,000
N
P2
L20
R8
R10
L18
R8
R12
R8

Strawberry Creek

County of Leduc - ESA R8

Site Location:

- Flows through the western part of the county.

Land Status:

- With the exception of two natural areas (NE29-TP49-R2-W5 and NW4-TP50-R1-W5) lands along Strawberry Creek are patented.

Description:

- Meander scars, terraces, steep banks and floodplains contribute to the topographic diversity observed along the length of the creek.
- A 100 km, relatively undisturbed creek valley with diverse flora/fauna and topographical features bisecting a predominantly agricultural landscape.
- Vegetation along creek dominated by white spruce or conifer-dominated mixedwood on north-facing slopes, open grassland and saskatoon communities on drier south-facing slopes and willow/alder communities on the wetter floodplains.
- Area used for hiking, horseback riding, fishing, hunting and swimming.

Significance: *Regional*

- The creek provides a continuous band of relatively undisturbed habitat through an area dominated by agriculture. Consequently, it provides important habitat for a variety of wildlife species and serves as an important travel corridor for wildlife in the area.
- Creek produces zooplankton important for walleye fry survival in the North Saskatchewan River and is an important spawning area for pike and other species of fish in the lower reaches.

Sensitivity: *High*

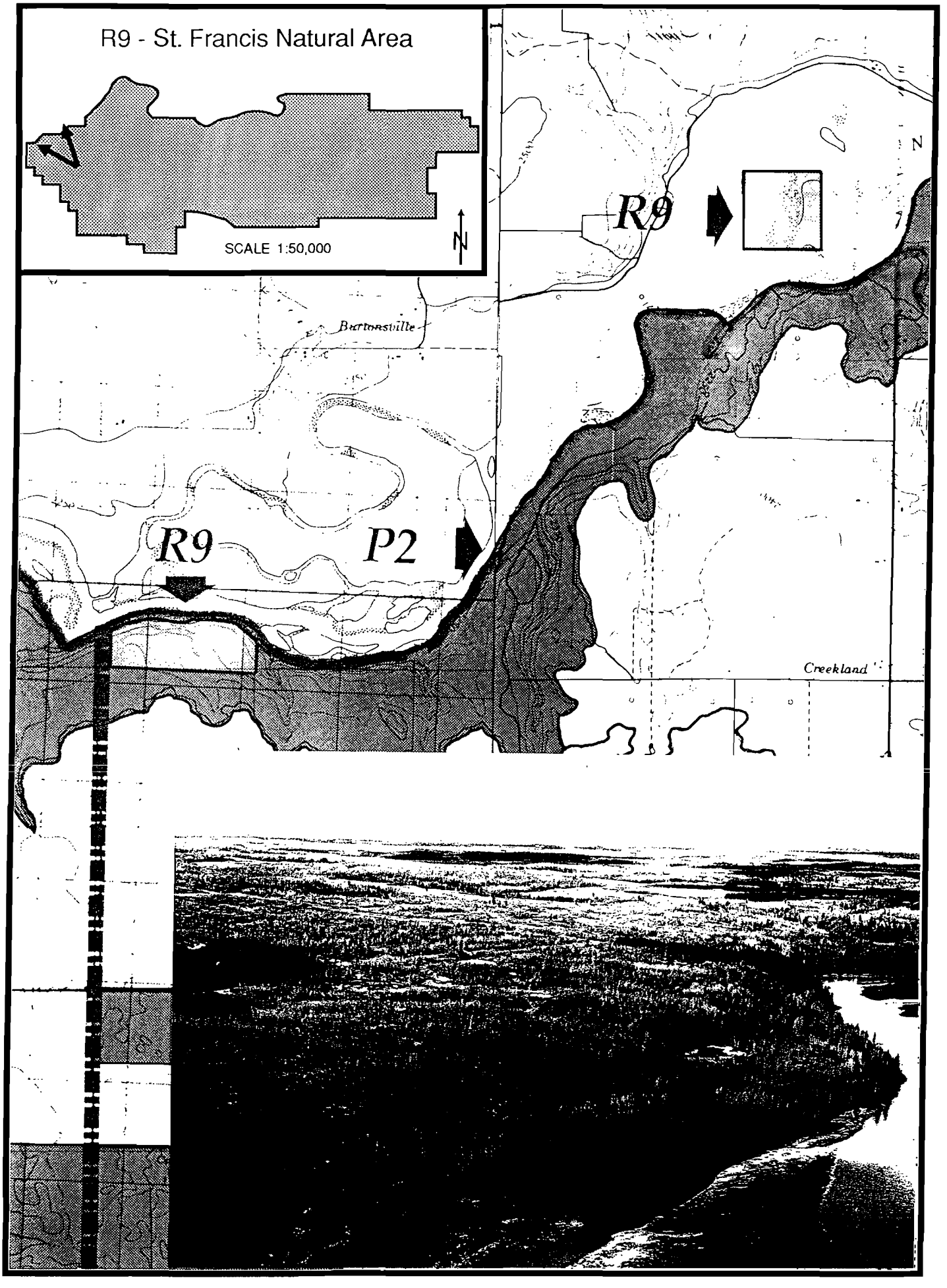
- Creek side slopes subject to disturbance and erosion from vegetation cover removal or use by all-terrain vehicles.
- Because of the wildlife values associated with the creek, noise-associated disturbance could have adverse effects on wildlife, particularly during periods of severe winter weather or during the nesting season.
- Creek sensitive to agricultural runoff containing pesticides and fertilizers from adjacent lands.

Comments/Management Considerations:

- Use of off-road vehicles should be restricted to minimize noise disturbance and soil erosion (particularly on steep slopes). This may be accomplished through landowner education.
- Existing habitats along and within the creek valley should be maintained (landowner education/habitat retention agreements) and banks where vegetation cover has been removed, a buffer zone comprised of native vegetation species should be re-established.

References:

Air Photos
Alberta Natural Areas Summary (1986)
Mr. G. Kilgour, pers. comm.
Mrs. D. Hopkins, pers. comm.


R9 - St. Francis Natural Area
SCALE 1:50,000
N
R9
R9
P2
Bartonsville
Creekland

St. Francis Natural Area

County of Leduc - ESA R9

Site Location:

- Located approximately 17.6 km (11 mi) south of St. Francis.
- S1/2 17, NW25-TP50-R4-W5

Land Status:

- Crown
- S1/2 17 included in Order-in-council in 1971
- NW25 reserved by Protective Notation in 1984

Description:

- This 89.7 ha (222 ac) site is located along south bank of the North Saskatchewan River.
- Several small perched wetlands located on a river terrace adjacent to the North Saskatchewan River.
- Steep banks, mainly occurring on north-facing slopes, are vegetated by white spruce-dominated stands. Uplands are dominated by aspen and balsam poplar while scattered white spruce are found along the North Saskatchewan River.
- Scattered shrubby areas also found along the top of the river bank.

Significance: *Regional*

- A relatively undisturbed area with high scenic value found along a provincially and interprovincially important waterway.
- Presence of two small perched wetlands on a terrace of the North Saskatchewan River is an interesting hydrogeological feature.

Sensitivity: *Moderate*

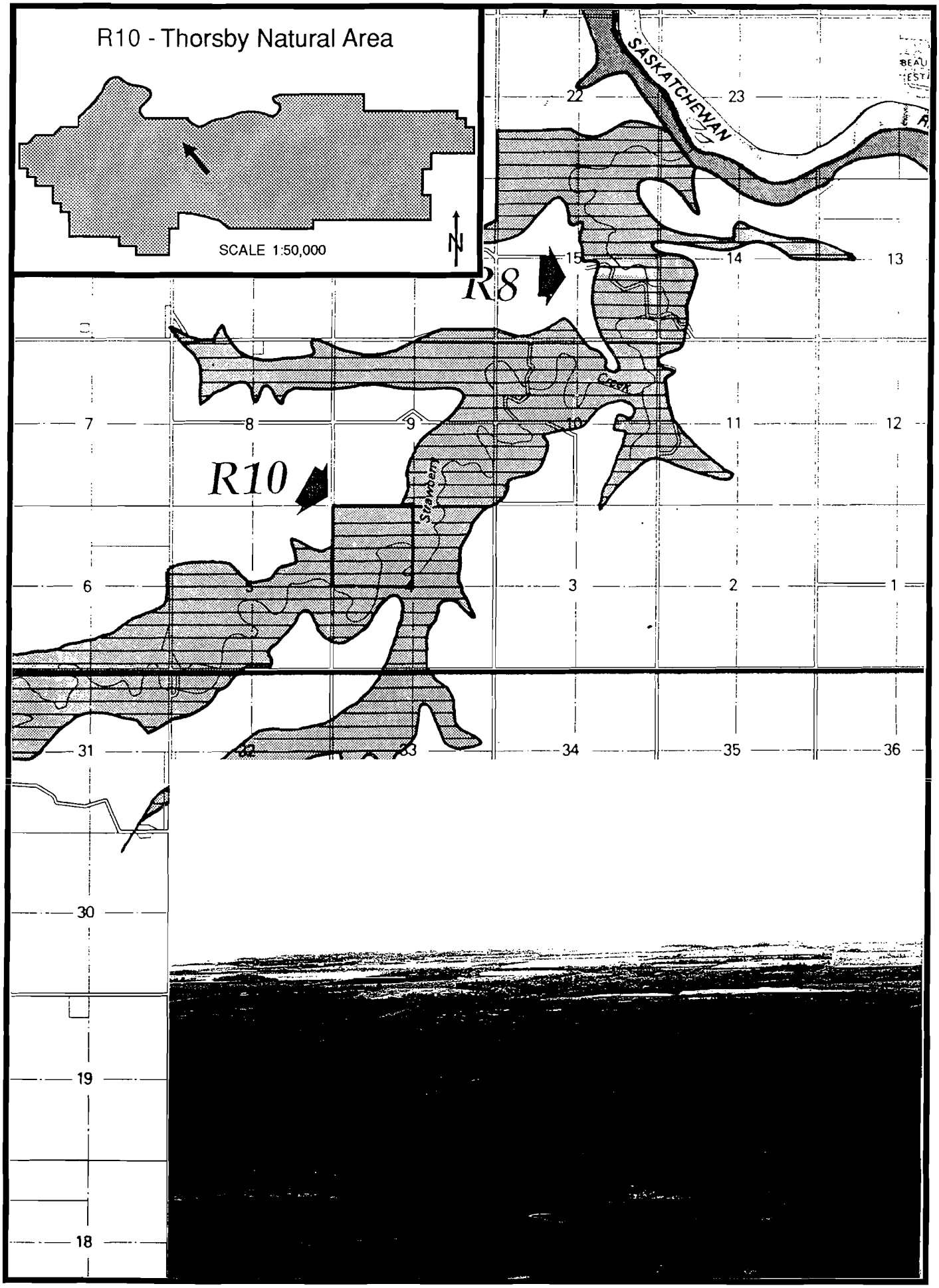
- Steep banks and intermittent creek beds are vulnerable to erosion from surface disturbances.

Comments/Management Considerations:

- Because the site is relatively undisturbed and is protected as a natural area, it requires minimal management at the present time. However, the site has potential for low intensity recreational uses such as hiking and wildlife viewing.

References:

Air Photos
Alberta Natural Areas Summary (1986)
Field Notes (1990)


R10 - Thorsby Natural Area
SCALE 1:50,000
N
SASKATCHEWAN
R8
R10
Creek
Stauffer
22
23
15
14
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Thorsby Natural Area

County of Leduc - ESA R10

Site Location:

- Located approximately 4.8 km (3 mi) east of Telfordville.
- NW4-TP50-R1-W5

Land Status:

- Crown
- Order-in-council Natural Area

Description:

- Strawberry Creek, which flows through the site, contains several interesting fluvial features including floodplains and meander scars.
- A relatively undisturbed, 65 ha (160 ac) site predominantly covered with aspen forest, with a diverse shrub and herb component.
- Some white spruce occurs along the ravine bottoms and on north-facing slopes while shrub communities are common on the creek bottom and south-facing slopes.
- Cultivated lands located to the west and north of site.

Significance: *Regional*

- An excellent example of undisturbed aspen parkland and riparian habitat.
- Site provides excellent habitat for a diversity of wildlife species including moose and white-tailed deer.

Sensitivity: *Moderate*

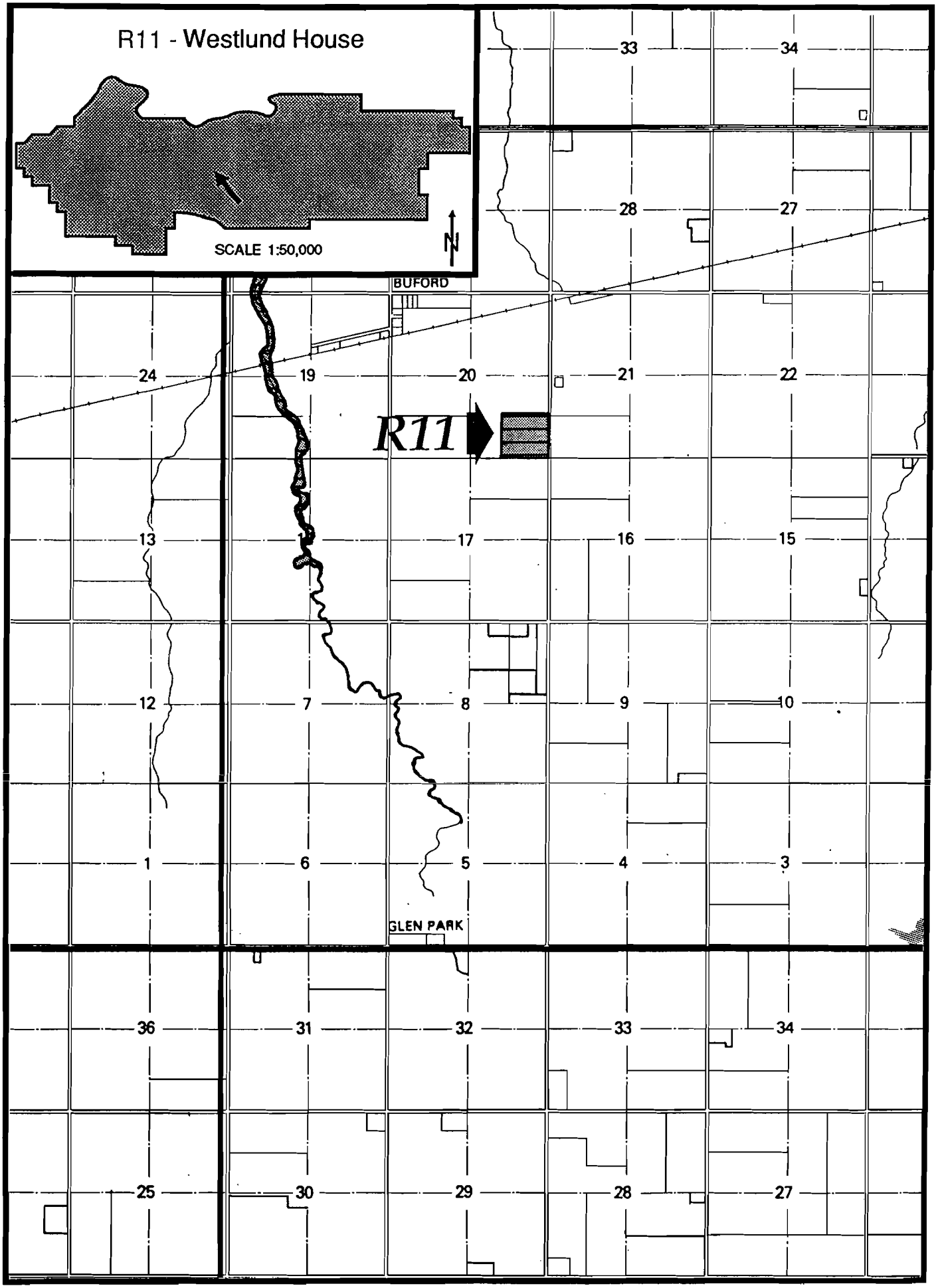
- Creek bed and steep slopes are subject to erosion caused by surface disturbances and vegetation removal.
- Susceptible to agricultural runoff (pesticides/fertilizers) from adjacent cultivated lands.

Comments/Management Considerations:

- Status as a natural area should be maintained.

References:

Alberta Natural Areas Summary (1986)
Field Notes (1990)


R11 - Westlund House
SCALE 1:50,000
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Westlund House

County of Leduc - ESA R11

Site Location:

- 4.8 km (3 mi) southwest of Calmar.
- SE20-TR49-R27-W4

Land Status:

- Patented

Description:

- A well-maintained, two-storey wood frame residential structure that was originally built in 1899.
- Although the residence has been significantly altered, its present appearance dates from renovations undertaken in 1930.
- Westlund House is a good example of the Canadian Four-Square house, a popular residential design that appeared throughout Canada during the first part of the 20th century.

Significance: *Regional*

- This site is a registered historical resource.
- The site is considered to have architectural (because of its early Canadian design), and historical significance. From a historical perspective, the Westlunds played an important part in the development of the area and were closely associated with Scandinavian settlement of central Alberta during the expansion of the settlement era (1896-1915).

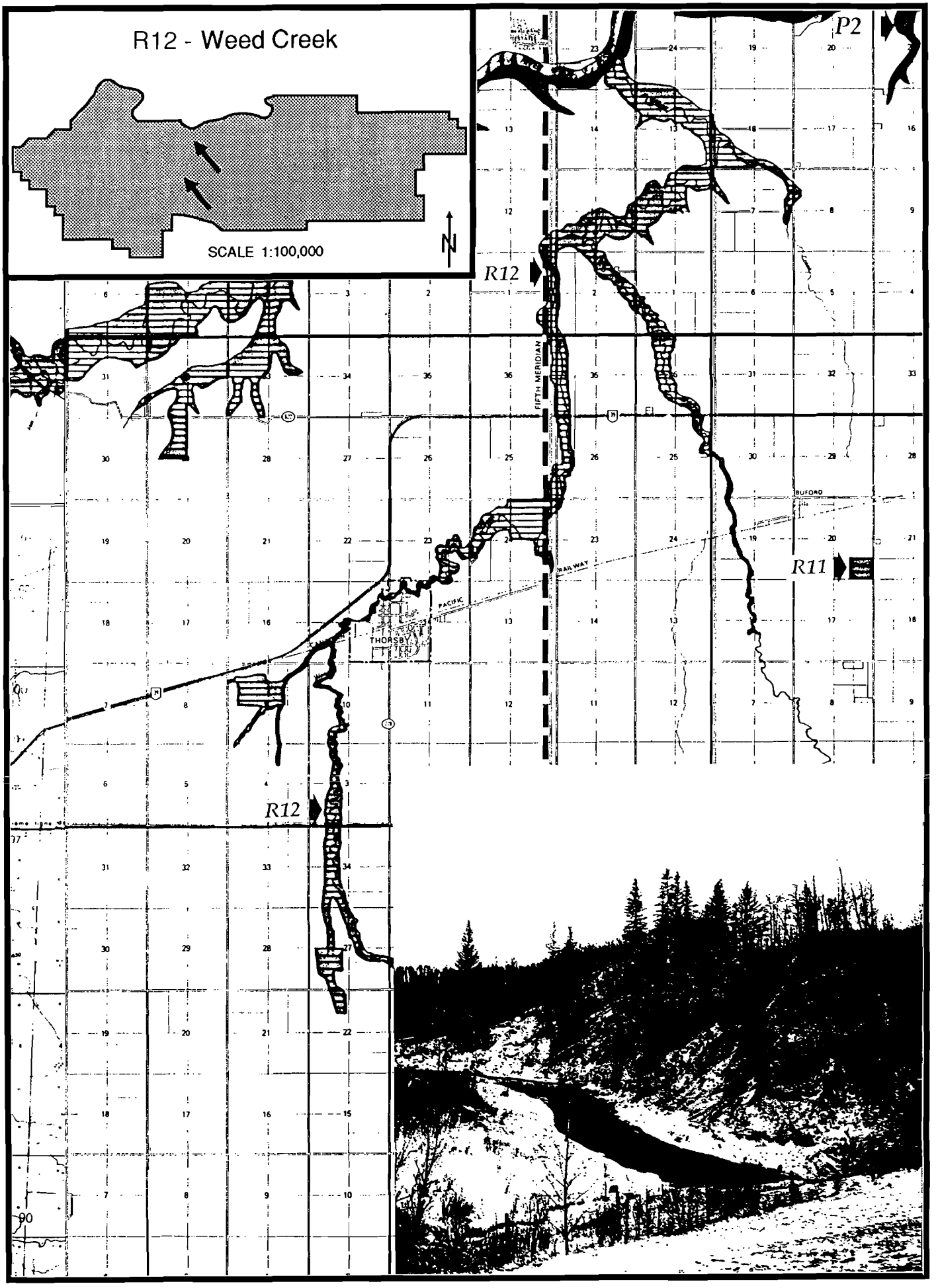
Sensitivity: *Moderate*

Comments/ Management Considerations:

- Although the significance of the site would be diminished through extensive alteration or incompatible uses, the structure is already afforded a level of protection through its designation as a provincially registered historical site.

References:

Gilpin (1986)


R12 - Weed Creek
SCALE 1:100,000
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R11
R12
FIFTH MERIDIAN
THORSBY
BUFORD
RAILWAY
PACIFIC

Weed Creek

County of Leduc - ESA R12

Site Location:

- Originates approximately 10 km (7 mi) south of Thorsby and enters Willow Creek just before Willow Creek flows into the North Saskatchewan River.

Land Status:

- Most of the land is patented although the portion of the creek flowing through Thorsby is municipally owned.

Description:

- Approximately 50 km (31 mi) of relatively undisturbed creek valley, providing an important habitat and travel corridor for wildlife in an area dominated by agriculture.
- The deeply incised valley is characterized by white spruce and mixedwood forests on north-facing slopes and shrub-grassland communities on south-facing slopes. Willow/alder and balsam poplar stands are found on the wetter floodplain along the creek.

Significance: *Regional*

- Important wildlife habitat and travel corridor. Provides a linking function for wildlife between agricultural areas of the county and the North Saskatchewan River Valley.
- Lower reaches of the creek important for zooplankton production necessary for survival of walleye fry in North Saskatchewan River.

Sensitivity: *High*

- Creek valley and adjacent uplands are subject to erosion and disturbance from agricultural activities, particularly near the North Saskatchewan River.
- Susceptible to contamination from agricultural runoff containing pesticides and fertilizers from adjacent cultivated and pasture lands.
- Noise disturbances associated with use of off-road vehicles and snow-mobiles may affect wildlife during critical period of the year (nesting/breeding, periods of severe winter weather).

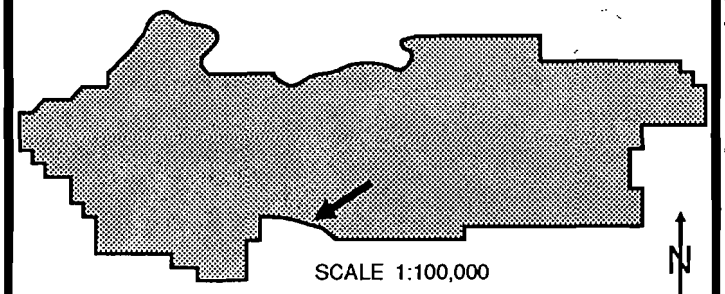
Comments/Management Considerations:

- Use of off-road vehicles should be restricted.
- Existing habitats should be maintained and areas of the valley where habitat losses have occurred should be revegetated.
- Section of creek that passes through Thorsby has good potential for nature trail/interpretive centre development focusing on wildlife in agricultural areas.
- Floodplain of Weed Creek susceptible to flooding during years of high rainfall.

References:

Field Notes (1990)
Mr. and Mrs. E. Hopkins, pers. comm.

R13 - Wizard Lake



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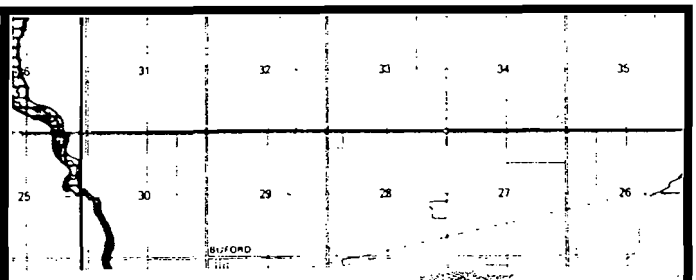
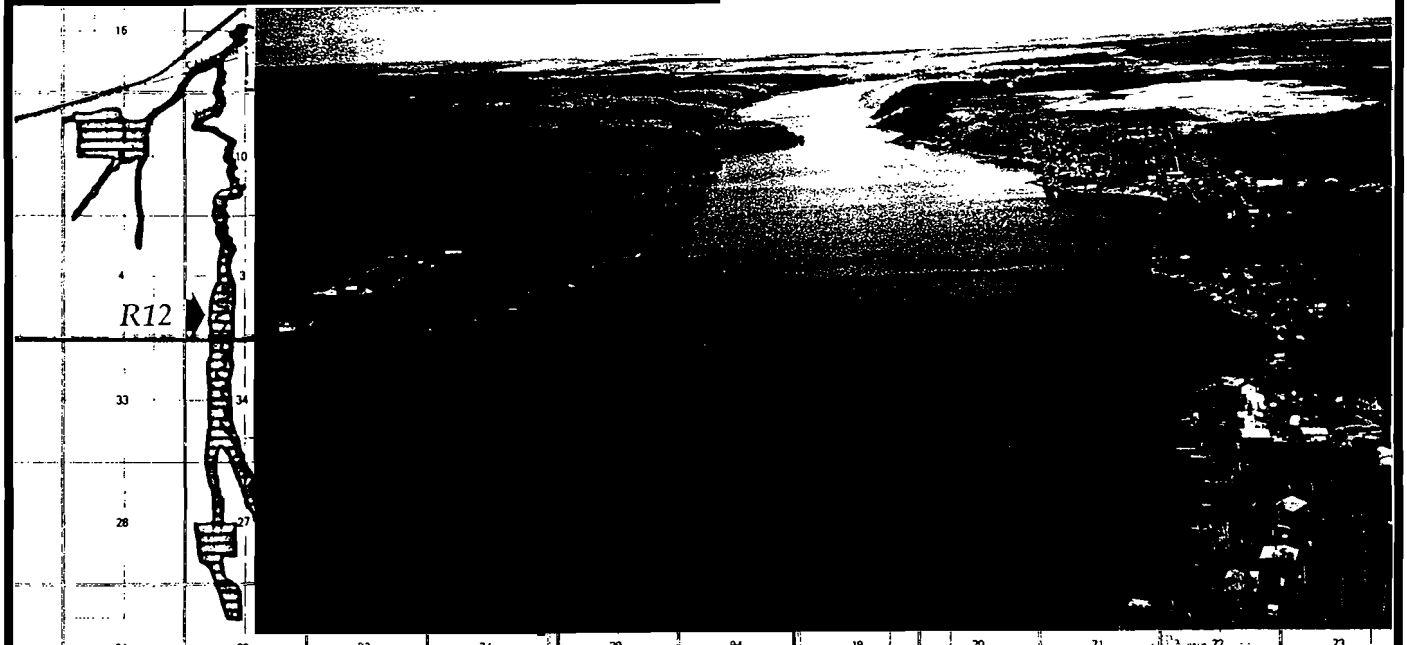
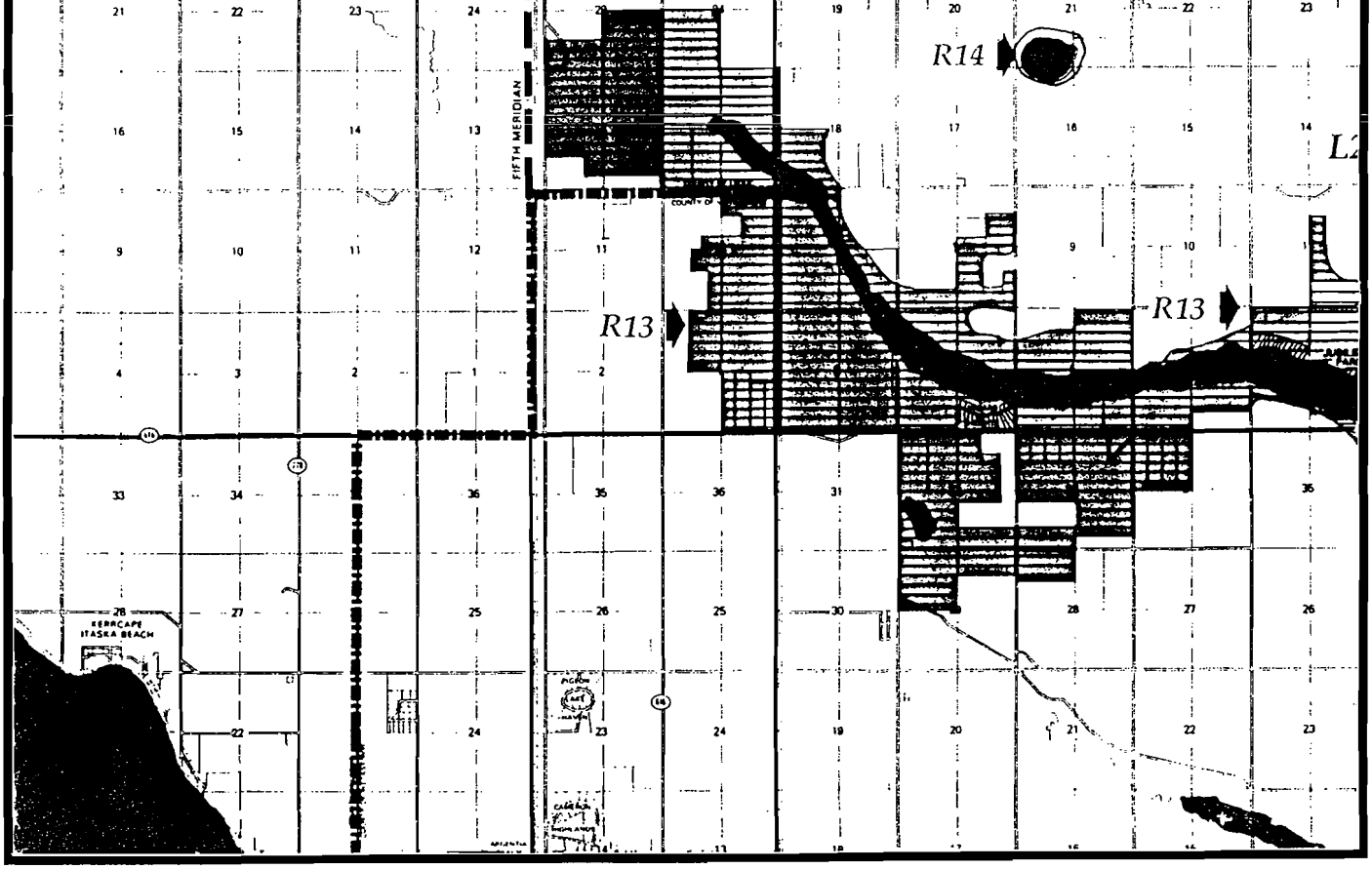






Wizard Lake

County of Leduc - ESA R13

Site Location:

- Located approximately 13 km (8 mi) southeast of Thorsby
- 13, N1/2 14, S1/2 23, SW24-TP48-R28-W24
- SW1, 2, 4, 5, 6, S1/2 3, W1/2 7, SE7, SW18, NW28, S1/2 29, 32 33, NW34-TP48-R27-W4

Land Status:

- NE2, and portions of SW4 and SW8-T48-R27-W4 Municipal
- Portions of SW3 Crown
- Remaining lands patented

Description:

- The 312 (770 ac) lake is located within a pre-glacial drainage channel and serves as a catchment basin for approximately 14 sections of surrounding land. The lake is primarily spring or groundwater fed, and in conjunction with runoff from adjacent lands, an average water depth of 5 m (maximum depth = 11 m) is maintained.
- Drained by Conjuring Creek which eventually flows into the North Saskatchewan River.
- Forms part of the boundary between the Counties of Leduc and Wetaskiwin.
- Vegetatively, the 21.5 km lake shoreline is characterized by aspen stands interspersed with shrub communities and improved pastures. A black spruce bog, typically found in the foothills and northern boreal forest regions of Alberta, is located at the northwest end of the lake (NW13, NE14 and S1/2 23). Because of the presence of relatively undisturbed forest cover, area supports many wildlife species including white-railed deer, muskrat, beaver and squirrel, although the occasional mule deer or moose may also be observed in the area. A marsh located at the northwest end of the lake provides some waterfowl habitat.
- Northern pike, yellow perch, walleye, white suckers and spottail shiners are found in the moderately eutrophic lake.
- County park located at east end of lake.

Significance: *Regional*

- Supports an important sport fishery and provides important habitat for a number of wildlife species in an area dominated by agriculture.
- Provides important waterfowl habitat and is used for nesting by several species of grebes which are sensitive to disturbance, particularly during the nesting season.

Sensitivity: *High*

- Recent trends toward agricultural/recreational intensification and expansion and increased recreational activities (i.e. cottages) in the vicinity of

Wizard Lake has contributed to some habitat loss and increased disturbances to wildlife, particularly along the east side of the lake.

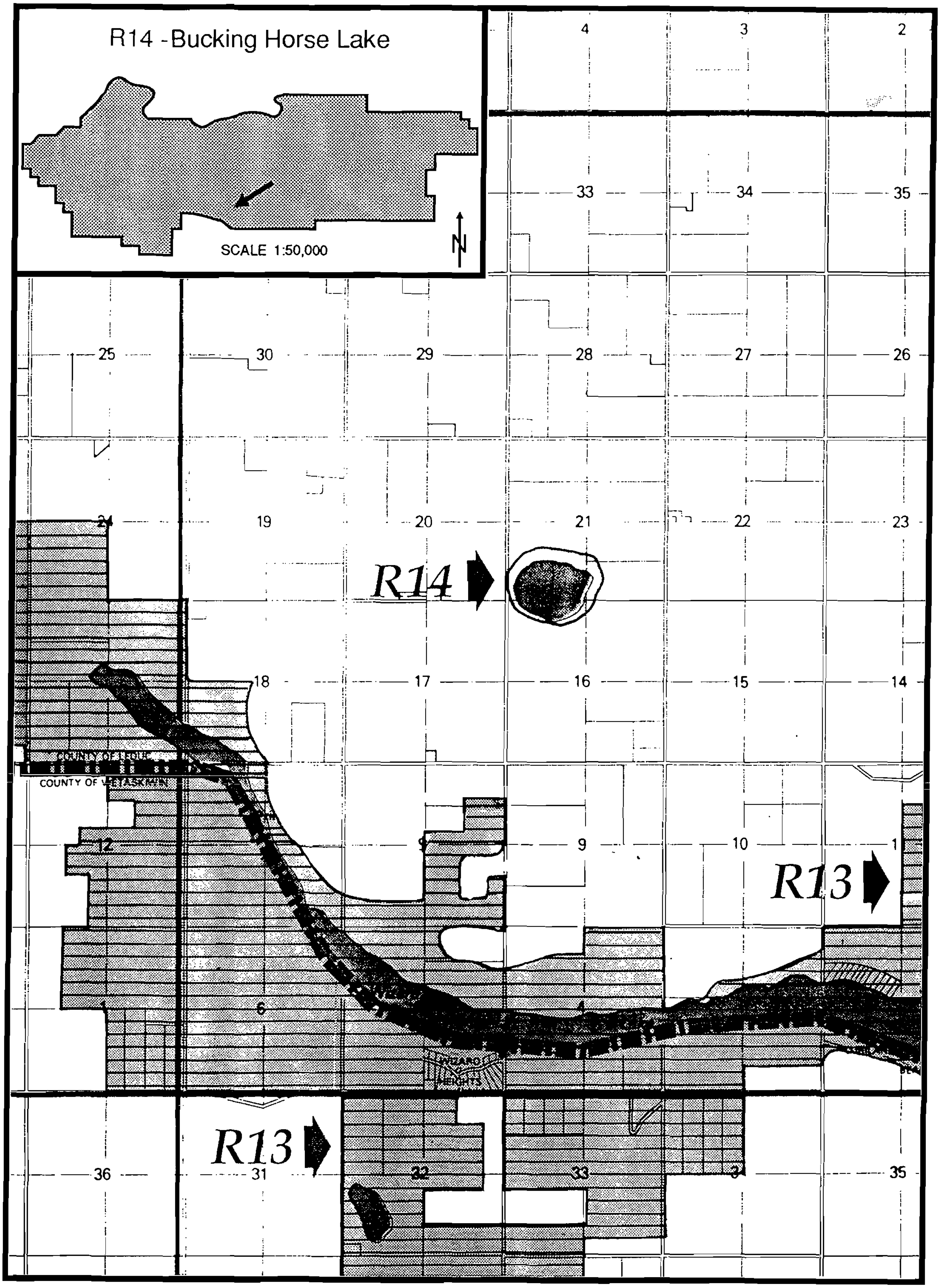
- Past water quality concerns regarding elevated coliform levels in the lake should be addressed.
- Potential water contamination from increased recreational activities and agricultural runoff may accelerate eutrophication of the lake.

Comments/Management Considerations:

- Is one of the main recreational areas in the county.
- As outlined in the Wizard Lake Management Plan, remaining habitats around the lake will be protected from further losses by eliminating further recreational or agricultural developments along the shoreline.
- Consideration should be given to maintaining a travel corridor for wildlife between Wizard Lake and Pigeon Lake. This area contains a considerable amount of forest cover and with proper management, could provide an important linking function for wildlife in the region. With close cooperation between the Counties of Leduc and Wetaskiwin, it may be possible to expand this area towards Pigeon Lake. Portions of this area already fall within the Natural Enhancement Agricultural District of the Wizard Lake Management Plan.
- Native vegetation buffer zones should be established and existing vegetation cover should be maintained along lake margins to minimize runoff from adjacent agricultural and recreational lands. This particularly true at the east end of the lake where extensive clearing associated with agricultural and high density resort development has already taken place.
- Forest cover and wildlife habitats could be maintained by providing information packages, education opportunities and/or monetary incentives (i.e. tax base adjustments) through the Alberta Fish and Wildlife's Landowner Habitat Program.

References:

Alberta Environment (1985)
E.M.R.P.C. and B.R.R.P.C. (1979)
E.M.R.P.C. and B.R.R.P.C. (1980)
Fish and Wildlife Division (1981)
Field Notes (1990)


R14 - Bucking Horse Lake
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Bucking Horse Lake

County of Leduc - ESA R14

Site Location:

- Located approximately 10 km (6 mi) southeast of Thorsby
- SW21, NW16-TP48-R27-W4

Land Status:

- Crown land bordering lake. Remaining area patented.

Description:

- The 29 ha (72 ac) lake is located in a shallow basin and has an average depth of less than 1 m. There is a cost-shared project between Ducks Unlimited and the county to secure waterfowl habitat on the lake.
- Aspen, balsam poplar and willow are common woody species while various species of grasses are found in the open areas.
- With the exception of approximately 16 ha (40 ac) of shrubland located just southeast of the lake, remaining lands are cultivated.

Significance: *Regional*

- Provides breeding habitat for waterfowl and is one of the few lakes in the western part of the county capable of producing waterfowl.

Sensitivity: *Moderate*

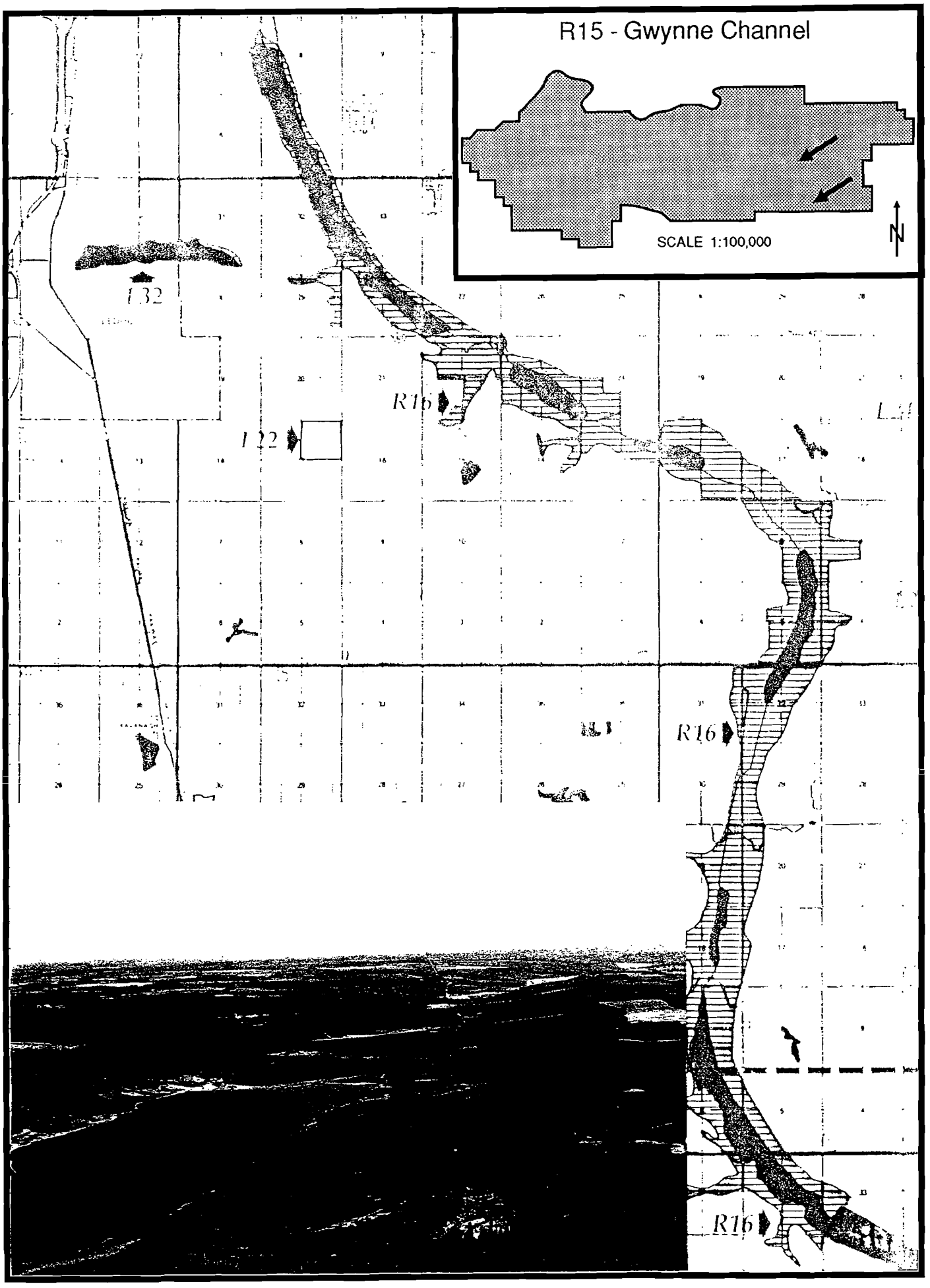
- Shoreline communities (emergent and upland) susceptible to disturbance from clearing and grazing activities.
- Potential for water quality contamination from agricultural runoff exists.

Comments/Management Considerations:

- Presence of crown lands around lake provides an adequate buffer zone around the lake which functions in protecting upland nesting cover and aquatic and semi-aquatic vegetation communities.
- Muskrat population present.

References:

Ducks Unlimited (1983)


R15 - Gwynne Channel
SCALE 1:100,000
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132
122
R16
R16
R16

Gwynne Channel

County of Leduc - ESA R15

Site Location:

- Northern portion of site is located approximately 3 km (2 mi) east of the City of Leduc and extends southward, through the County of Leduc and into the County of Wetaskiwin.

Land Status:

- With the exception of crown lands located on NE24-TP49-R24-W4 and SE19, and portions of E1/2 18-TP48-R23-W4, the remaining lands are patented.

Description:

- Is a post-glacial meltwater channel and outlet of historical Lake Edmonton.
- The channel averages approximately 1 km in width and contains steeply sloped banks as high as 46 m (150 ft). Valley depth increases significantly as the channel progresses southward from Blackmud Creek to Coal Lake.
- Intermittent creeks entering the valley have carved deep coulees into the side slopes of the channel and have created large fluvial fans within each of the channel lakes.
- Seepage areas and springs are commonly seen along the entire length of the channel.
- Portions of the floodplain are either under cultivation or are being grazed by cattle.
- The channel contains five lakes including Saunders Lake, Ord Lake, Coal Lake and two unnamed lakes.
- Contains a large proportion of remaining wildlife habitat in the east-central portion of the county and is considered to be a key wildlife area for white-tailed deer and waterfowl by the Alberta Fish and Wildlife Division.
- Forms part of the 200 km Waskehegan Trail system, an important regional recreation hiking trail.

Saunders Lake

- Is a 285 ha (704 ac) lake located 3 km east of Leduc and is drained by Blackmud Creek. Water sources include intermittent creeks and streams from Ord and Telford Lakes.
- A regional landfill is present on the top bank of the lake and a country residential development is located just north of the lake.
- Portions of the lake margins are vegetated by aspen, however, most of the forest cover has been cleared for agricultural uses.
- Is an important waterfowl lake and water levels are managed by Ducks Unlimited.
- Provides important habitat to other wildlife species including muskrats, beaver, shorebirds, passerines and white-tailed deer.

Ord Lake

- Is a small (60 ha or 150 ac), shallow (1.1 m or 3.5 ft) lake located south of Saunders Lake. Ord Lake drains toward Saunders Lake and is fed by a small stream from the southeast.
- Southeast and northwest facing slopes are densely wooded with aspen and balsam poplar, while the floodplain northwest and southeast of the lake is under cultivation.
- Emergent plant species such as cattails and sedges border the lake while the aquatic plant community is dominated by various species of pondweed, star duckweed, water milfoil and stone wort. A well-developed marshy area is located at the northwest end of the lake.
- Lake and adjacent uplands support a variety of wildlife species.

Unnamed Lakes

- Two unnamed lakes located south of Ord Lake provide important habitat for several wildlife groups including muskrat, beaver, shorebirds, waterfowl and white-tailed deer.
- The north end of the small 28 ha (69 ac) lake contains a well-developed zone of cattails, rushes and a wet sedge meadow. The larger 77 ha (190 ac) lake is found in a bend of the Gwynne Channel and possesses a marshy area located at its south end. Lands adjacent to both lakes contain aspen forest interspersed with open pastures/grasslands.

Coal Lake

- Located approximately 16 km (10 mi) southeast of Leduc and extends into the County of Wetaskiwin.
- Banks along Coal Lake are generally steep, with slopes averaging 40%.
- Dam at south end of Coal Lake maintains water levels at approximately 4 m (14 ft).
- Deep coulees present on the west side of the lake provide important year-round habitats for deer and birds while the lake itself has some waterfowl production capability.
- Supports a Great Blue Heron colony.
- Source of water for the Wetaskiwin.
- New recreation area recently developed alongside Secondary Highway 616.

Significance: *Regional*

- Important habitat area and travel corridor for deer, upland game birds, breeding and staging waterfowl, beaver, muskrat and other wildlife.
- Lakes located within the channel support populations of northern pike, yellow perch, white suckers and various species of minnows. One of the few areas in the county that support fish.
- One of the major geological and archaeological features in the county.

Sensitivity: *High*

- Steep slopes susceptible to erosion if disturbed or if vegetation cover is removed.

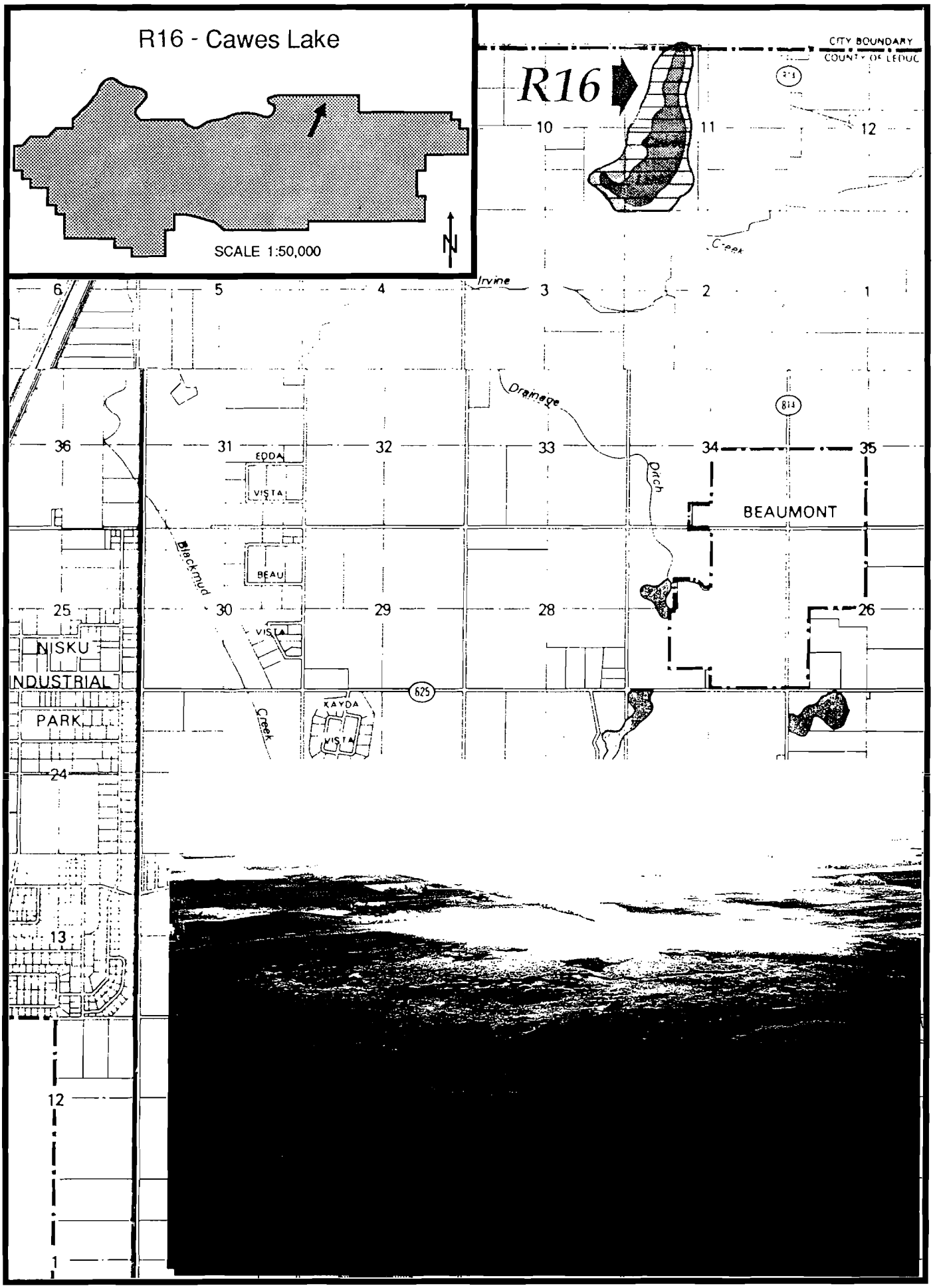
- Because of low flushing rates within the channel, lakes are susceptible to accumulations of toxins contaminant (from runoff from adjacent agricultural lands or in the case of Saunders Lake, proximity to a regional landfill) and are vulnerable to increase eutrophication.
- Great Blue Herons nesting in the southern portion of Coal Lake are vulnerable to disturbance during the nesting period.

Comments/Management Considerations:

- Portions of the channel used recreationally for fishing, hunting and hiking (Waskehegan Trail).
- Proper watershed management practices (i.e. maintaining existing vegetation cover with at least 6 m (20 ft) of the top of the channel banks) should be considered to maintain water quality throughout the channel and in particular, Coal Lake, since this lake is the source of water for Wetaskiwin.
- Restrict use of off-road vehicles to minimize bank erosion and noise disturbances to wildlife during critical times of the year (eg. during periods of severe winter weather or nesting/breeding periods).
- Much of the area has already been grazed by cattle and on steep slopes, grazing should be minimized or eliminated.
- Existing wildlife habitats should be protected and a buffer zone comprised of native vegetation species along the slopes and the top of the channel banks should be maintained. Erosion potential of steep banks and coulees will be reduced and important year-round wildlife habitats will be retained.
- Because of its importance as a waterfowl production area, Ducks Unlimited is maintaining a water control structure at Ord Lake.
- Because of steep slopes, excessive weight, such as farm equipment, buildings or debris should be kept at least 6 m (20 ft) from the top of the channel.

References:

B.R.R.P.C. (1974)
Ducks Unlimited (1976)
Ducks Unlimited (1983)
E.R.P.C. (1974)
Field Notes (1990)
Fish and Wildlife (1981)
WTA (1987)
Mr. G. Charlton, pers. comm.
Mr. M. Sullivan, Fish and Wildlife Division, pers. comm.


R16 - Cawes Lake
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Cawes Lake

County of Leduc - ESA R16

Site Location:

- Located approximately 2 km (1 mi) northwest of Beaumont.
- W1/2 11-TP51-R24-W4

Land Status:

- Crown

Description:

- The 105 ha (260 ac) lake represents one of the few remaining marshes in the area and is used by many species of waterfowl and shorebirds for breeding, staging and molting.
- Excellent development of emergent and aquatic communities along the lakes' 4.6 km (3 mi) shoreline.
- Land use around lake is predominantly agricultural.
- Significant proportion of herbaceous vegetation around lake has been mowed (hay) and grazing by cattle along the southwest portion of the lake is reducing the amount of upland nesting cover available for waterfowl.

Significance: *Regional*

- Because of its size, its location in an area dominated by agricultural activities, and its importance to waterfowl, the lake is considered to be regionally important.
- Used for birdwatching and hunting.

Sensitivity: *Moderate*

- Upland and shoreline communities sensitive to agricultural activities (eg. cultivation and grazing) on adjacent lands.

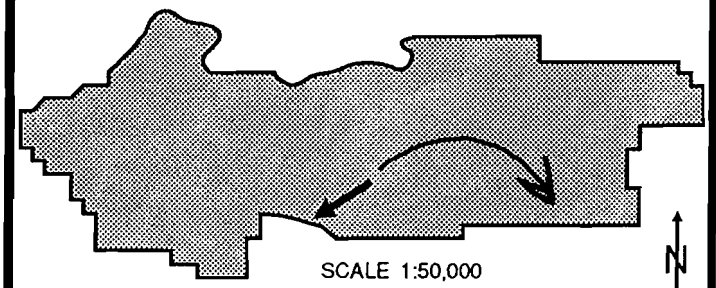
Comments/Management Considerations:

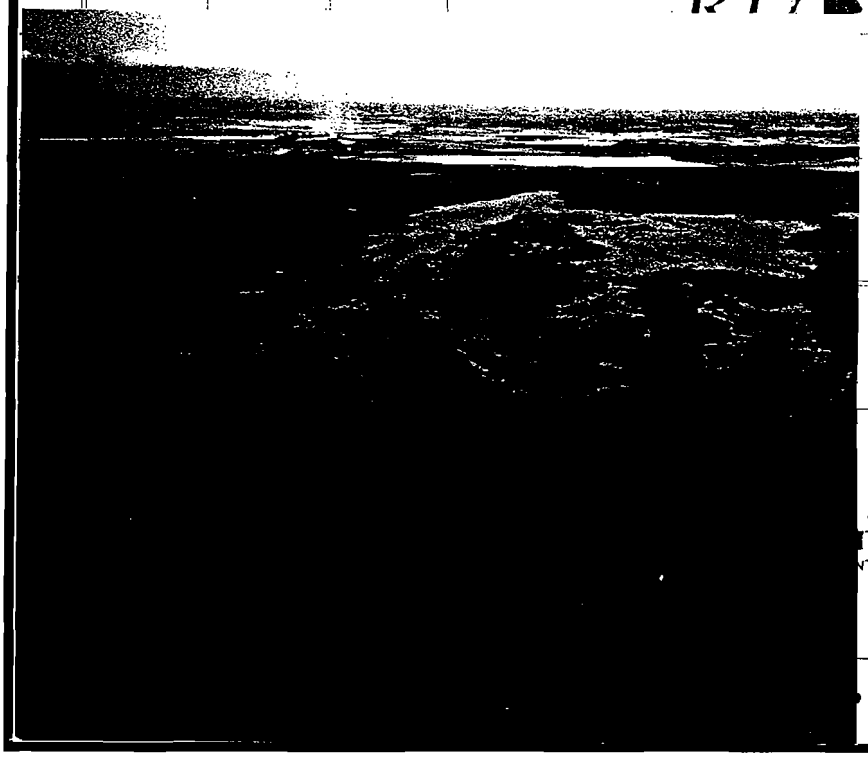
- Substrate and hydrology of the lake appear to restrict management options, however restricting haying, mowing and either implementing a rest-rotational grazing system or eliminating cattle grazing will improve nesting cover for waterfowl availability considerably.
- Level-ditching to deepen parts of the lake will ensure an adequate amount of water for waterfowl will remain throughout the summer period.
- Buffer zone of undisturbed native vegetation should be maintained around the lake.

References:

Field Notes (1990)
Ducks Unlimited (1985)

R17 - Big Hay Lake





Big Hay Lake

R17

COUNTY OF LEDUC

COUNTY OF WETASKIWIN

Adrian Lake

Big Hay Lake

County of Leduc - ESA R17

Site Location:

- Located southwest of Leduc.
- E20, NE30, E1/2 31, W1/2 32, 29-TP48-R22-W4

Land Status:

- Crown Lease

Description:

- Covering almost 526 ha (1300 ac), Big Hay Lake is a marshy area dominated by dense stands of emergent bulrushes and cattails. Wet meadow grasses and sedges are typically found along margins of the lake.
- Agriculture is the dominant land use, accounting for 85% of the surrounding land base.
- Unit extends into the County of Camrose.
- Drainage ditch present at north end of lake.

Significance: *Regional*

- Presently, Big Lake is of regional significance to waterfowl. Because of fluctuating water levels, waterfowl production is limited, however, a proposed Ducks Unlimited project to stabilize water levels may increase use of the lake by breeding and staging waterfowl. If waterfowl use of the lake increases, a reclassification of the site to the provincial level may be warranted.
- Diverse aquatic vegetation community.

Sensitivity: *Moderate*

- Increasing catchment area could affect water quality by increasing agricultural runoff (containing fertilizers and pesticides).

Comments/Management Considerations:

- Wetland enhancement measures being considered by Ducks Unlimited would have significant wildlife benefits and would increase future significance of Big Hay Lake as a wildlife viewing and recreation area in the region.

References:

Mr. I. McFarlane, Ducks Unlimited, pers. comm.
Duck Unlimited (1984)
Fish and Wildlife Division (1981)

Telfordville Natural Area

County of Leduc - ESA L18

Site Location:

- 6.4 km (4 mi) southwest of Telfordville
- NE29-TP49-R2-W5

Land Status:

- Crown
- Natural area reserved for recreation.

Description:

- The 65 ha (160 ac) site contains several interesting topographical features associated with Strawberry Creek including steep banks, meander scars and terraces.
- Vegetatively, the site is characterized by diverse herb and shrub communities and a dense aspen stand containing some balsam poplar and white spruce.
- The north and west edges of the site are bordered by cultivated and pasture lands.

Significance: *Local*

- Good example of upland aspen and adjacent riparian habitats associated with the Strawberry Creek valley.

Sensitivity: *Moderate*

Creek features such as terraces and steep banks are susceptible to erosion.

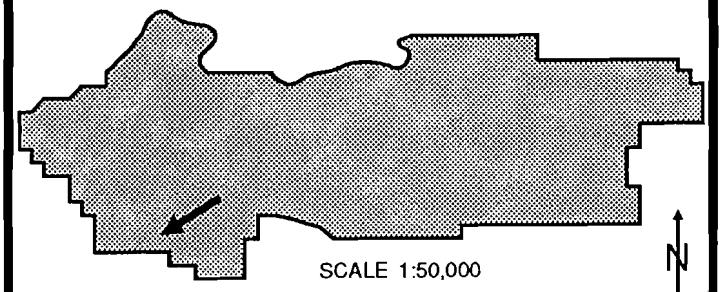
Comments/Management Considerations:

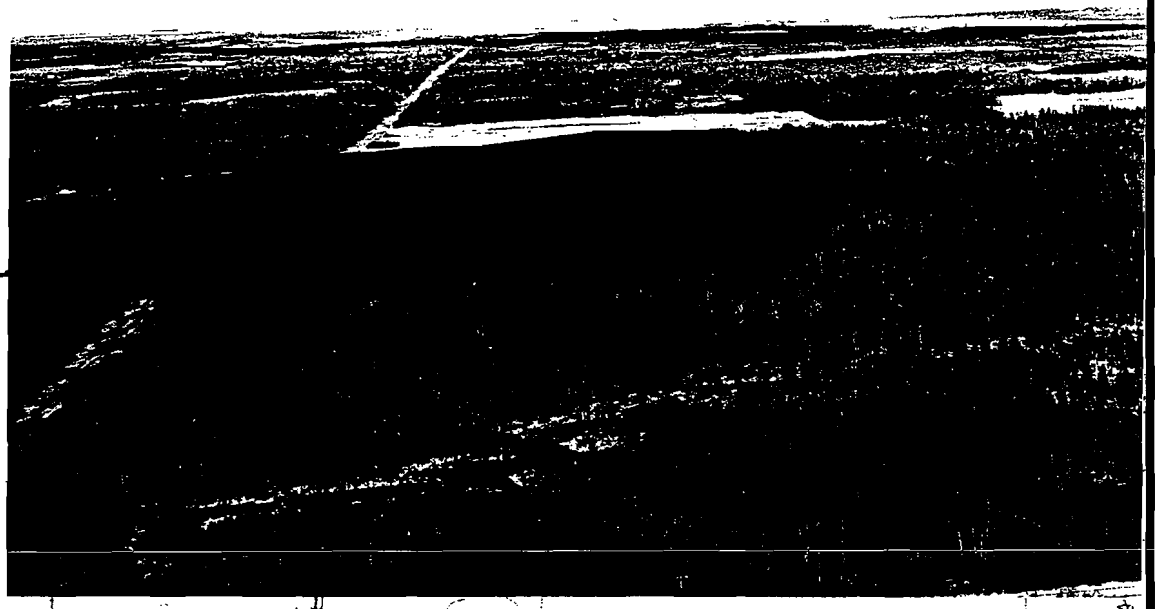
- Because of some of the topographic features of the site (eg. steepbanks), use of the area by all-terrain vehicles should be closely monitored so that vegetation cover and soil stability is maintained.

References:

Alberta Natural Areas Summary (1986)

L19 - Strawberry Creek Natural Area





L19

P5

Strawberry Creek Natural Area

County of Leduc - ESA L19

Site Location:

- Located approximately 12.8 km (8 mi) southeast of Warburg.
- S1/2 29-TP47-R2-W5

Land Status:

- Crown
- Reserved by Protective Notation as a Recreational Natural Area

Description:

- This 130 ha (320 ac) site has a diverse range of plant communities ranging from early successional stands of willow and alder along the creek to mature mixedwood (aspen-white spruce) and white spruce stands on upland areas.
- A small mature stand of lodgepole pine is also present, however, forest cover on the site is dominated by aspen.
- Abundant beaver sign present along creek located along the east side of the site.

Significance: *Local*

- Because of its size and location, the Strawberry Creek Natural Area provides excellent wildlife habitat in a relatively undisturbed setting.
- Good example of undisturbed aspen parkland.

Sensitivity: *Moderate*

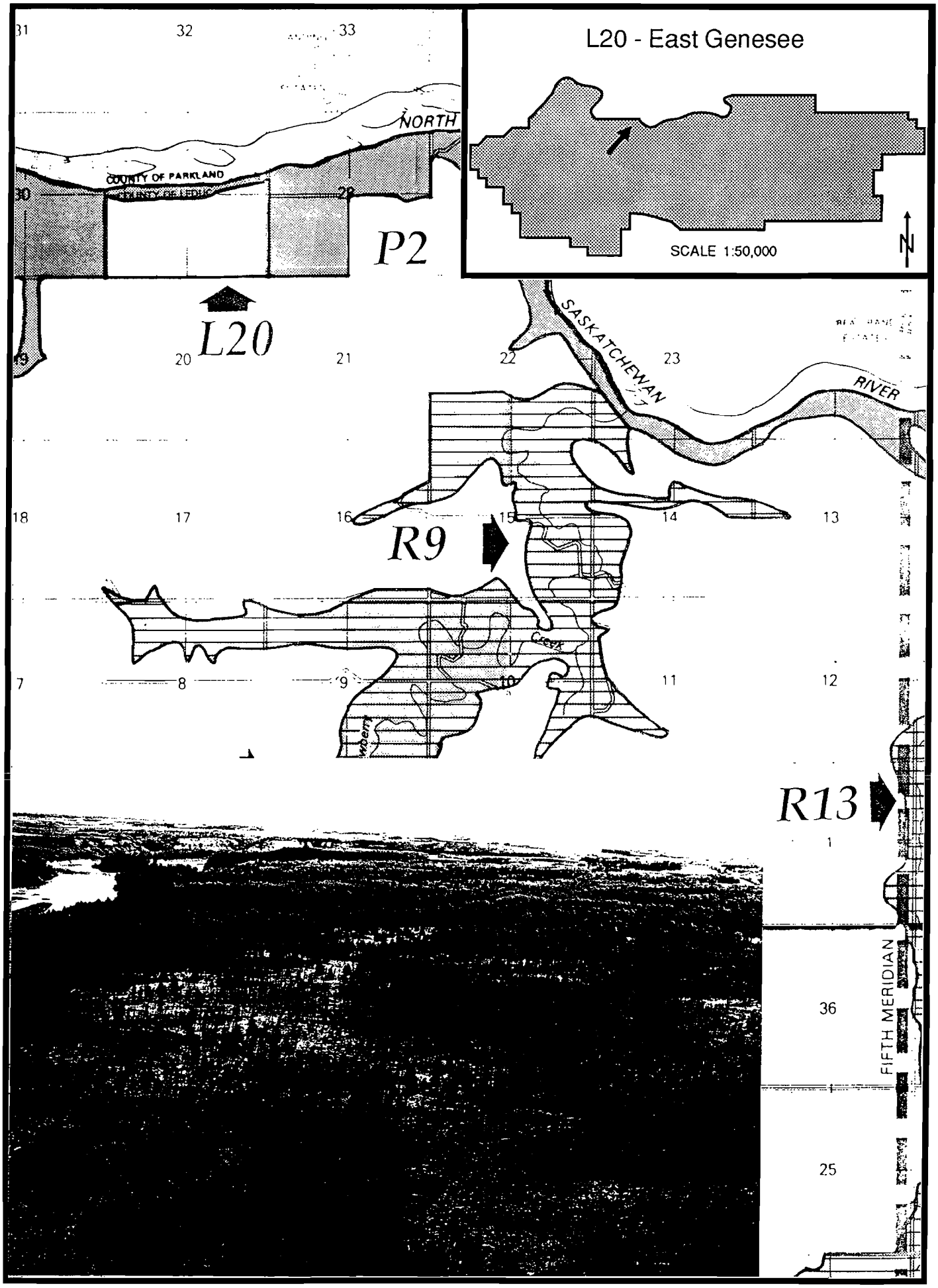
- There is some potential for contamination of the creek from agricultural runoff, particularly to the northeast where agricultural lands slope towards the creek.

Comments/Management Considerations:

- A 1 ha clearing located in the northeast corner of the site may serve as an access point from Range Road 24 for any future recreational development (i.e. interpretive trails) that may occur on the site.
- Vegetation cover along the creek outside of the natural area should be maintained.

References:

Alberta Natural Areas Summary (1986)
Field Notes (1990)


L20 - East Genesee
SCALE 1:50,000
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RIVER
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East Genesee

County of Leduc - ESA L20

Site Location:

- Adjacent to the North Saskatchewan River, 9.6 km (6 mi) northeast of Telfordville.
- S1/2 29 and part of N1/2 29-TP50-R1-W5

Land Status:

- Crown

Description:

- The 130 ha (320 ac) site is dominated by white spruce on north-facing slopes (adjacent to the North Saskatchewan River) with early to mid-successional stands of aspen occurring on the adjacent upland area. Upland area previously burned.
- Feathermoss and red-osier dogwood dominate the herb and shrub strata in moist white spruce stands while red-osier dogwood and lowbush cranberry are the dominant shrub species in young aspen stands.
- Islands in the river support distinctive communities comprised of balsam poplar and willow wetlands.
- Although a livestock grazing permit exists for the area, it is also under provincial watercourse protection.

Significance: *Local*

- Varied and diverse forest communities supports a large number of bird species.
- Provides a good example of several successional stages ranging from young seral aspen forests to climax white spruce stands.
- Supports an abundant population of deer and moose along with black bears and a few elk. Provides important over-wintering habitats for white-tailed deer and mule deer.

Sensitivity: *Moderate*

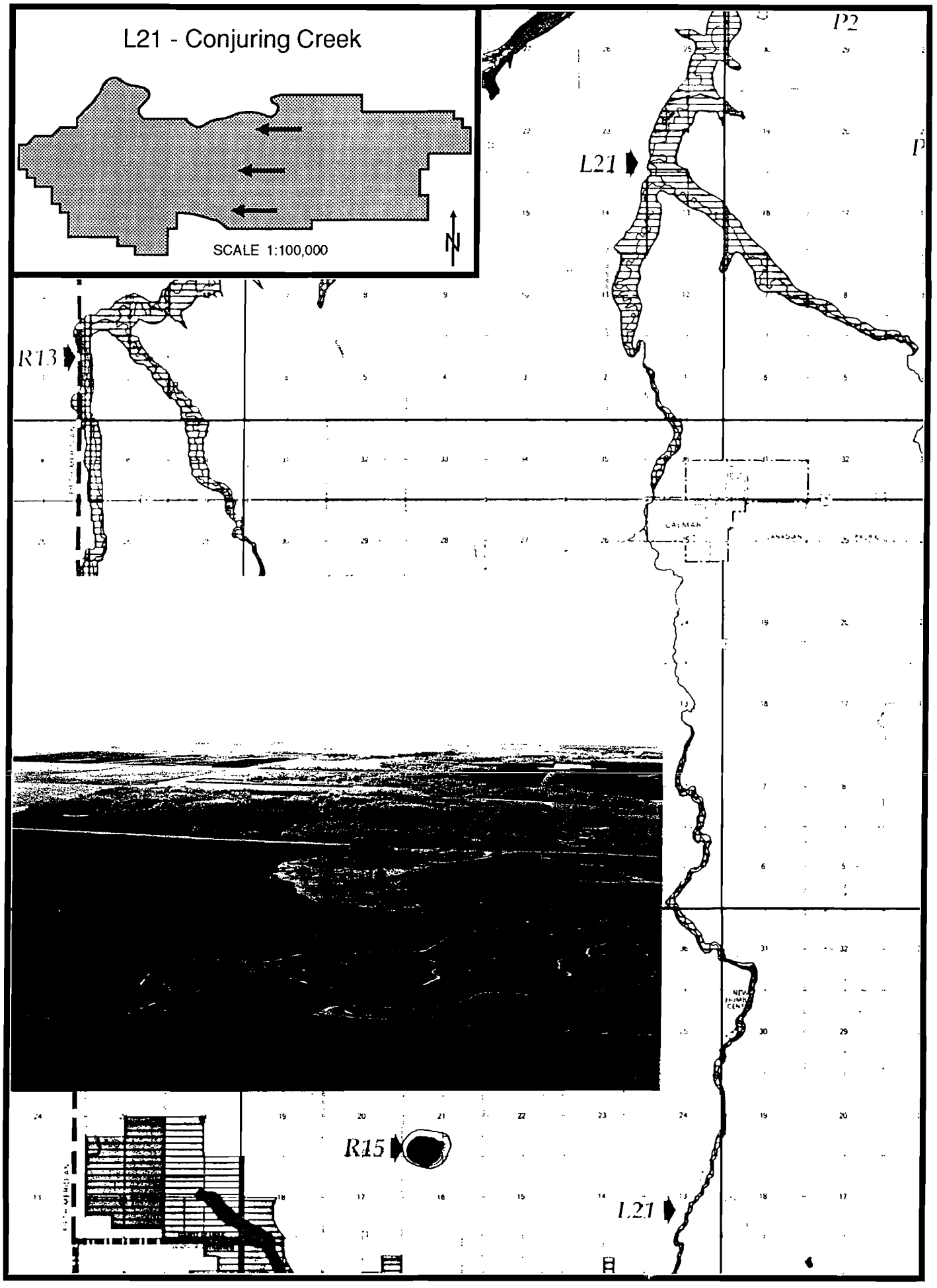
- Steep slopes vulnerable to erosion from surface disturbance and removal of vegetation cover.
- Feathermoss communities associated with mature white spruce stands susceptible to excessive human disturbance and trampling.
- Susceptible to overgrazing by livestock.

Comments/Management Considerations:

- Determine the amount of livestock grazing and if necessary restrict or eliminate future grazing to minimize disturbance of sensitive feathermoss communities and other vegetation types.
- Maintain site for wildlife habitat.

References:

Field Notes (1990)
Mr. J. Rintoul, Alberta Natural and Protected Areas, pers. comm.
Westworth and Brusnyk (1983)


L21 - Conjuring Creek
SCALE 1:100,000
N
P2
L21
R13
R15
L21

Conjuring Creek

County of Leduc - ESA L21

Site Location:

- Drains Wizard Lake and flows northward into the North Saskatchewan River, bisecting the county.

Land Status:

- Patented

Description:

- An approximately 45 km long creek dominated by aspen along the upper reaches and by white spruce mixedwood stands along the lower reaches of the creek. Willow/alder clumps are found along the creek bottom.
- Central portions of the creek are heavily grazed by cattle and remaining trees along creek experiencing significant amount of blowdown.
- Beaver activity present along entire length of creek.

Significance: *Local*

- Provides some wildlife habitat in an intensively farmed area of the county and serves as travel corridor between Wizard Lake area and the North Saskatchewan River Valley.

Sensitivity: *Moderate*

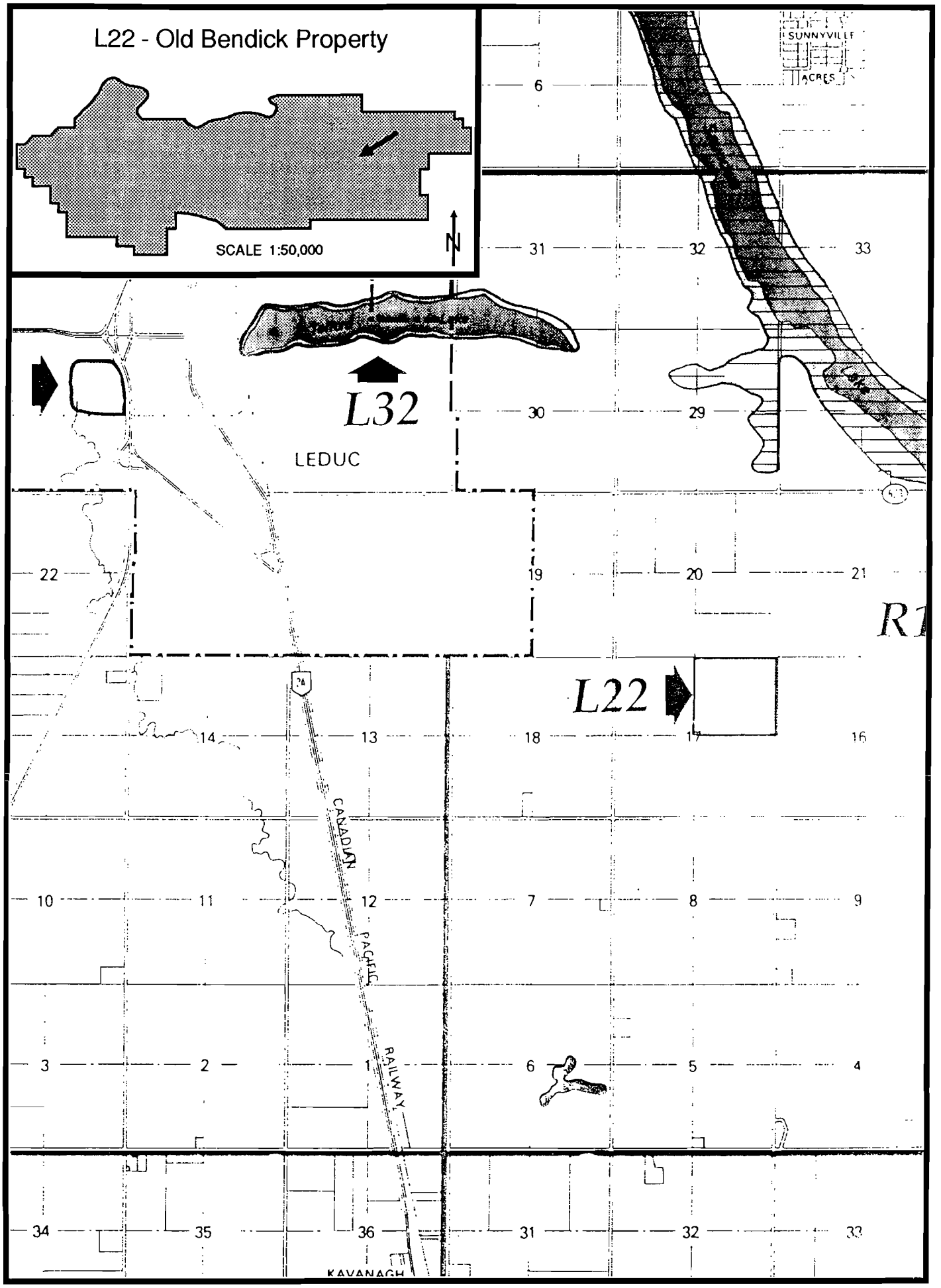
- High erosion potential, particularly along steep banks associated with the lower reaches of the creek.
- Highly susceptible to contamination from agricultural runoff (containing pesticides and fertilizers) along reaches of the creek where agricultural activities extend to the creek banks.
- Vegetation communities sensitive to overgrazing and trampling by cattle.

Comments/Management Considerations:

- Stream banks could be stabilized in areas where cultivation or grazing has occurred to the creek edge by establishing a buffer zone of native trees and shrubs and by fencing to minimize or eliminate grazing and trampling by cattle.
- Restrict use of off-road vehicles along areas susceptible to erosion and in areas of important wildlife habitat, particularly along in the vicinity of Wizard Lake and the North Saskatchewan River valley.

References:

Field Notes (1990)
Mrs. E. Hopkins, pers. comm.


L22 - Old Bendick Property
SCALE 1:50,000
N
L32
LEDUC
L22
SUNNYVILLE
ACRES
CANADIAN PACIFIC RAILWAY
KAVANAGH
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Old Bendick Property

County of Leduc - ESA L22

Site Location:

- Located approximately 3.2 km (2 mi) southeast of Leduc.
- SE17-TP49-R24-W4

Land Status:

- Patented

Description:

- Although there are no buildings on the site at the present time, the original homestead was settled by G. Bendick in 1892. The site was inherited by his son, Dave Bendick, who started a bird farm.
- The site presently contains a mature stand of introduced trees and shrubs where the homestead buildings once stood, and a series of small ponds. The ponds are supplied with water by a system of excavated canals from nearby natural springs.
- When the site was visited in 1981, two or three of the ponds were filled with a dense colony of yellow iris (also called yellow water flag, Iris pseudacorus) which spread eastward into a roadside ditch.

Significance: *Local*

- The site is considered to be of historical-horticultural significance because of the presence of the introduced yellow iris, a species that is not found elsewhere in the province.

Sensitivity: *Moderate*

- As of 1981, land around the homestead was being farmed and therefore the trees and shrubs associated with the homestead may be cleared for future agricultural uses.

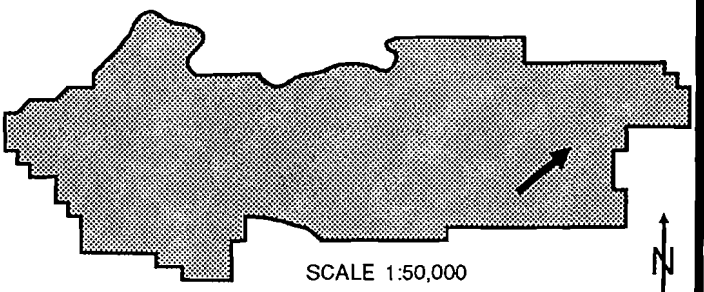
Comments/Management Considerations:

- The site could be protected if the current landowner participates in the heritage Farmstead Program operated by the Alberta Fish and Game Association. This program helps to retain and protect original farmsteads as important habitats for wildlife species in agricultural areas of the province while at the same time recognizing the contributions of landowners who helped develop the land.

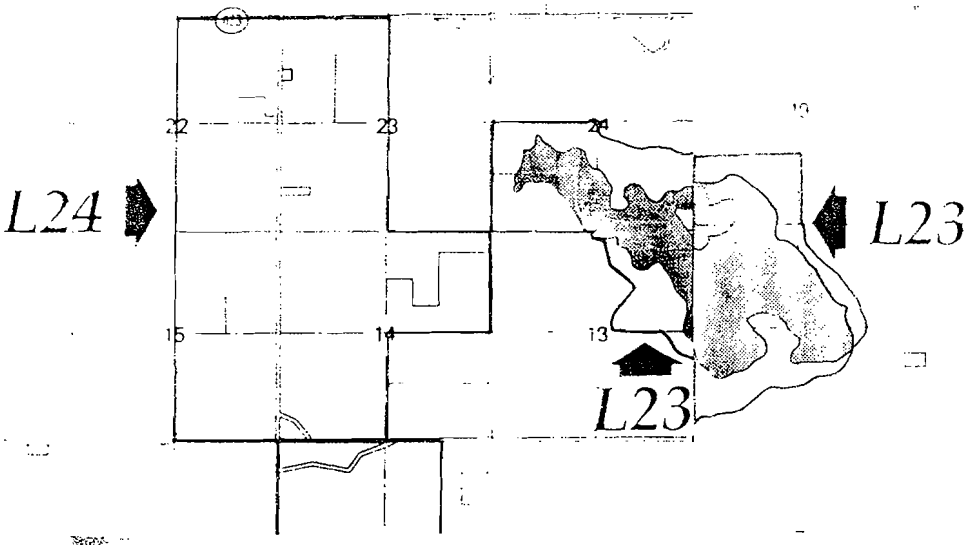
References:

Mrs. J. Hrapko, Alberta Provincial Museum, pers. comm.

L23 - Rollyview Marsh



SCALE 1:50,000



Rollyview Marsh

County of Leduc - ESA L23

Site Location:

- Located approximately 6.4 km (4 mi) east of Rollyview.
- NE13, S1/2 24-TP49-R23-W4
- Portions of 18, SW19-TP49-R22-W4

Land Status:

- Approximately 50% crown and 50% patented lands.

Description:

- Part of large meltwater channel.
- Approximately 130 ha (320 ac) in size and divided by Range Road 230 into a main marsh covering about 105 ha (260 ac) and a shallow 24 ha (60 ac) bay.
- Average depth ranges from 31 cm (1 ft) in the bay area to 76 cm (2.5 ft) in the main marsh.
- Characterized by aspen parkland on gently undulating topography, 75% of which is comprised of agricultural land.
- Well developed aquatic and emergent plant communities around marsh.
- Habitat improvements made by Ducks Unlimited include nesting islands and other nest structures.
- East side of marsh heavily grazed by cattle.

Significance: *Local*

- Very productive wetland supporting a large number of waterfowl and shorebird species and muskrats.

Sensitivity: *Moderate*

- Shoreline communities are fragile to disturbances (overgrazing) and to chemical contamination from agricultural runoff from adjacent lands.

Comments/Management Considerations:

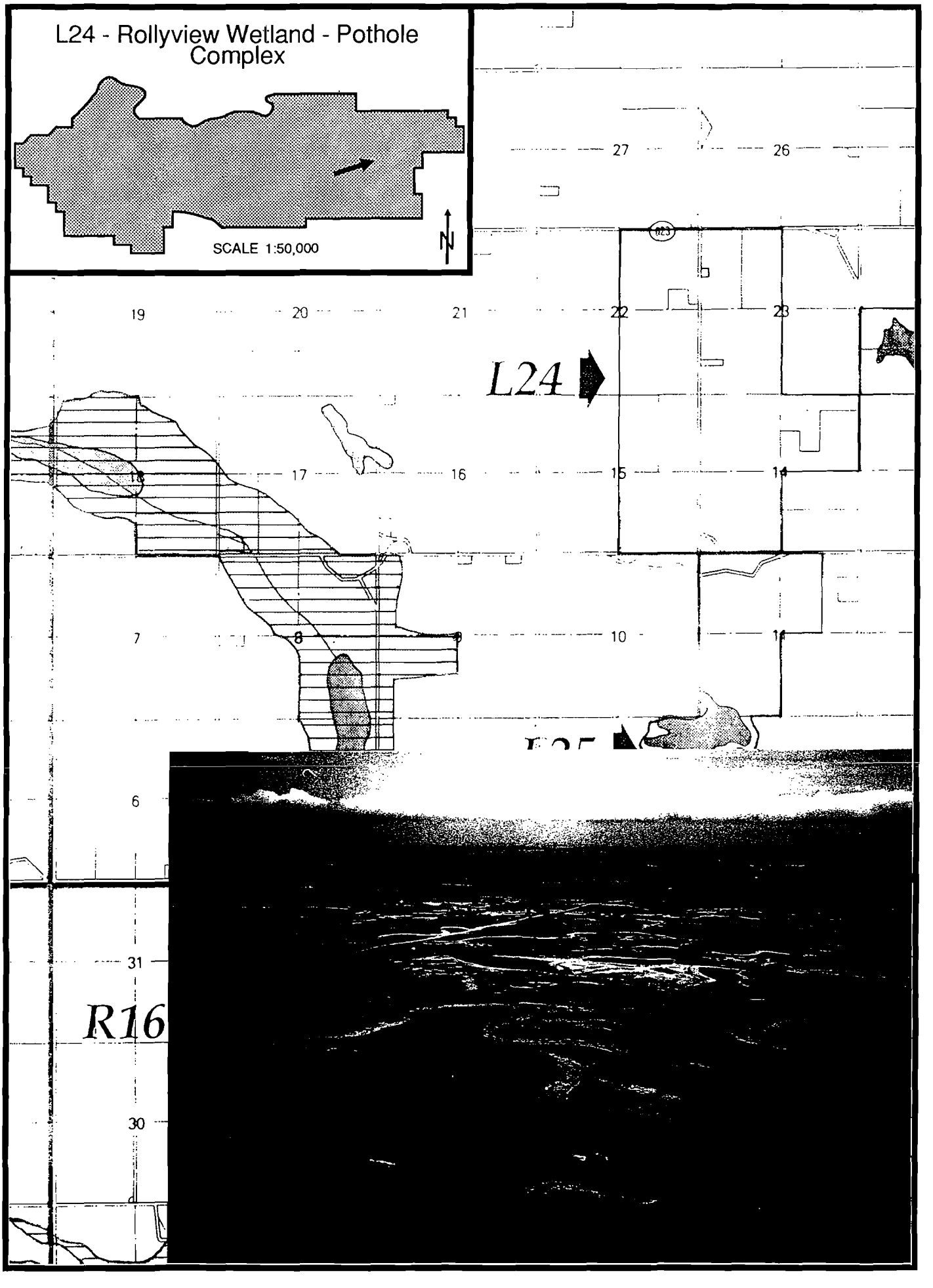
- Ducks Unlimited has level-ditched the western portion of the marsh and constructed several nesting islands.
- Measures should be taken to secure a permanent undisturbed buffer zone around the marsh (through landowner education and conservation agreements), particularly at the east end of the lake. Grazing by cattle should be restricted in this area.
- Because of its wildlife viewing potential, an interpretive centre and viewing platform or boardwalk could be constructed.

References:

Ducks Unlimited (1985)
Field Notes (1990)

L24 - Rollyview Wetland - Pothole Complex

SCALE 1:50,000



Rollyview Wetland - Pothole Complex

County of Leduc - ESA L24

Site Location:

- Located approximately 5.6 km (3.5 mi) southeast of Rollyview.
- E1/2 22, E1/2 15, W1/2 23, W1/2 14, portion of NW14-TP49-R23-W4

Land Status:

- With the exception of NW14 (crown), the remaining lands are under private ownership (patented).

Description:

- Adjacent to Rollyview Marsh.
- Area is characterized by an ablation moraine formation containing more than 50 small ponds and marshes.
- Aspen stands, hay lands and some cultivated lands are found on upland knolls while the open water areas are surrounded by dense communities of bulrushes, willow and alder.

Significance: *Local*

- Locally significant staging area for waterfowl.
- Foraging area for Great Blue Herons and may contain a heron colony.
- Provides a good mosaic of habitats for a variety of terrestrial, semi-aquatic and aquatic bird species, moose and deer and other wildlife species.
- Good example of an ablation moraine formation.

Sensitivity: *High*

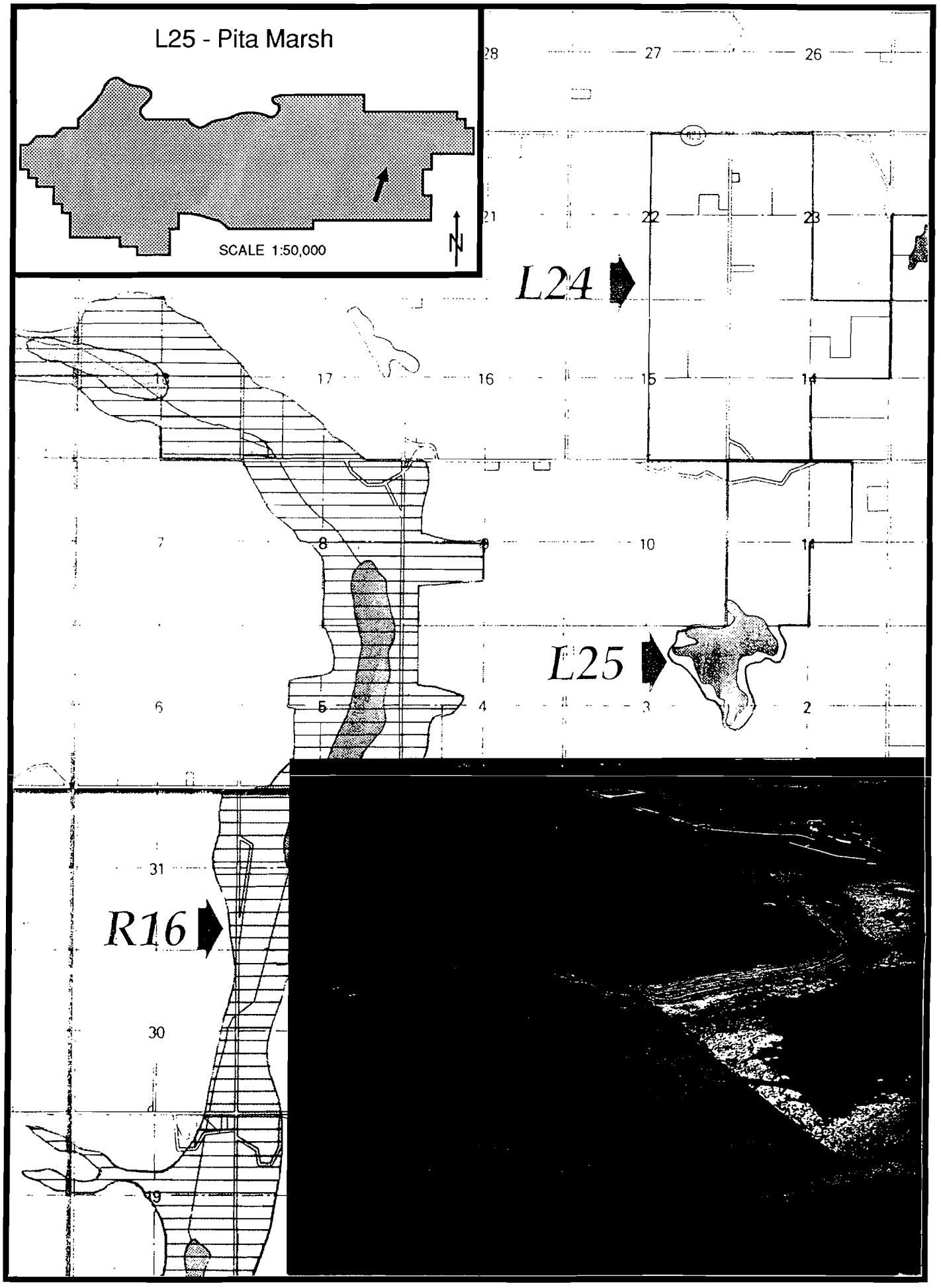
- Because of the low flushing rate of small potholes, these wetlands tend to be more susceptible to over-grazing by cattle and to runoff (containing fertilizers and pesticides) from nearby agricultural lands than larger wetlands with well-defined inlets and/or outlets.
- Frequent sightings of foraging great blue herons in the area by local landowners. This species is sensitive to disturbance.

Comments/Management Considerations:

- Site should be protected because of its importance for waterfowl production and interesting geological formation.
- The area also appears to be an important foraging area for great blue herons from the nearby Coal Lake colony.
- Protection could be initiated by encouraging landowners to participate in the Landowner Habitat Project that is administered by the Alberta Fish and Wildlife Division or with the Alberta Fish and Games Volunteer Habitat Steward Program.
- Shorelines should be protected from over-grazing and accelerated eutrophication from agricultural runoff by re-establishing vegetation buffer zones around wetlands that have been disturbed or cleared. This will also increase the value of the wetlands to nesting waterfowl.

References:

Brechtel (1981)
Field Notes (1990)
Fish and Wildlife Division (1981)
Ms. L. Cowan, landowner, pers, comm.


L25 - Pita Marsh
SCALE 1:50,000
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L24
L25
R16
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Pita Marsh

County of Leduc - ESA L25

Site Location:

- Located approximately 8 km (5 mi) southeast of Rollyview.
- NW2, NE3, SW11-TP49-R23-W4

Land Status:

- NE3 and NW2 are patented lands.
- SW11 is crown land.

Description:

- Occupies an area of 41 ha (101 ac) and has a mean depth of 0.5 m (1.5 ft) and a maximum depth of 0.75 m (2.4 ft). Abundant aquatic and emergent communities present throughout marsh.
- Area around the marsh characterized by a mixture of aspen parkland, pasture and cultivated lands. SW11 and NE2 used for grazing and contain three watering dugouts.
- Area important staging area for waterfowl. Nesting islands and loafing bars have been constructed by Ducks Unlimited.

Significance: *Local*

- Staging area for waterfowl.

Sensitivity: *Moderate*

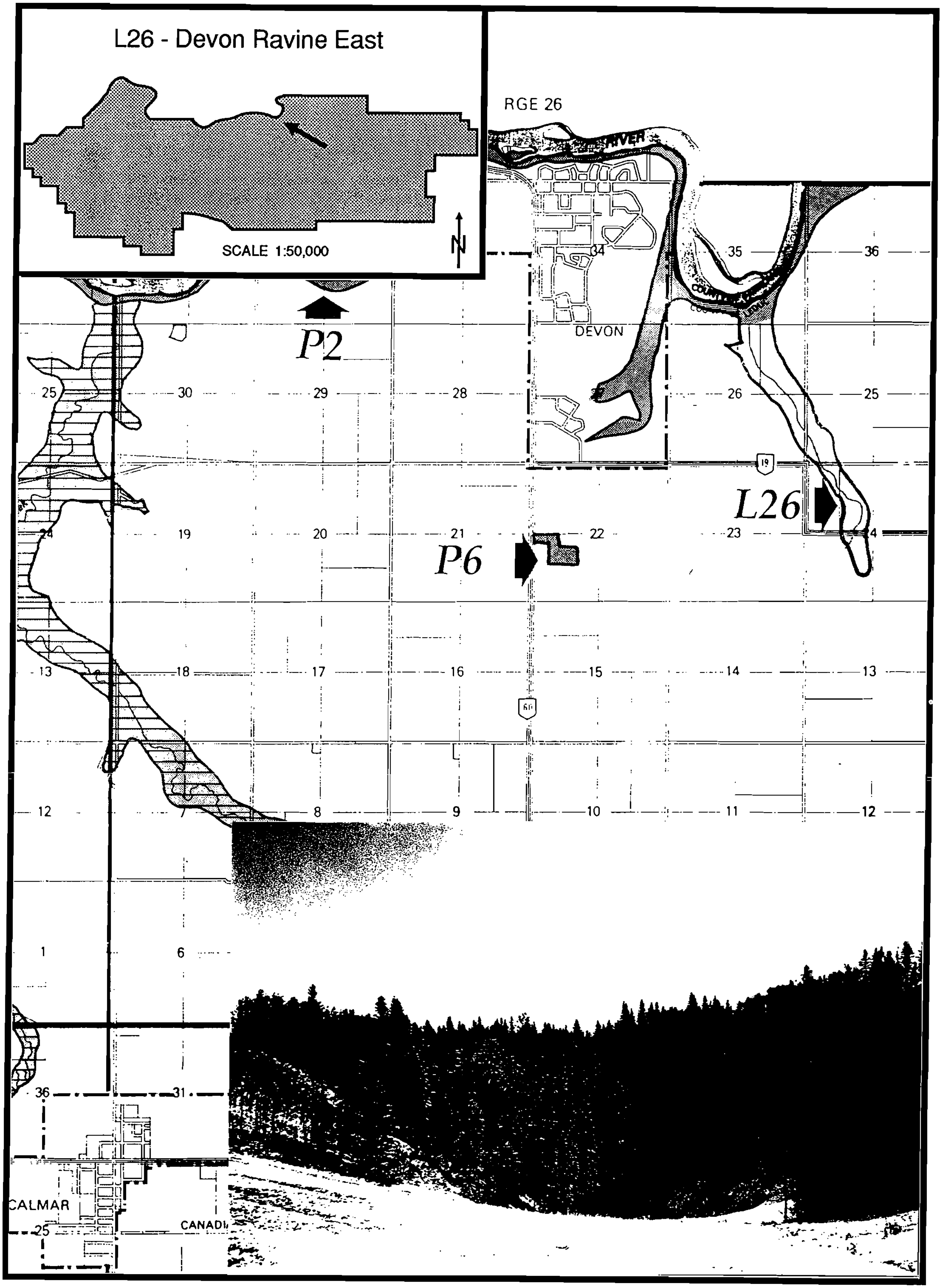
- Susceptible to runoff (containing pesticides and fertilizers) from adjacent agricultural lands.
- Shoreline vegetation communities and adjacent uplands susceptible to over-grazing by cattle.

Comments/Management Considerations:

- Need for a buffer zone between agricultural lands and marsh to reduce the effects of agricultural runoff on aquatic ecosystems.
- East portion of marsh could be fenced to exclude grazing and maintain upland nesting cover for waterfowl.
- Forested land located north of marsh provides an excellent linking function for wildlife to habitats associated with the Rollyview Wetland-Pothole Complex and Rollyview Marsh. Good wildlife habitat corridor.

References:

Ducks Unlimited (1985)
Field Notes (1990)


L26 - Devon Ravine East
SCALE 1:50,000
N
RGE 26
RIVER
DEVON
CALMAR
CANADI
P2
P6
L26
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26
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Devon Ravine East

County of Leduc - ESA L26

Site Location:

- Located approximately 3 km (2 mi) east of Devon.
- Passes through portions of W1/2 24, SW 25, E1/2 26, SE35-TP50-R26-W4.

Land Status:

- Patented

Description:

- Intermittent creek that flows into the North Saskatchewan River.
- Dense mature stands of aspen, white spruce and balsam poplar provides good seasonal habitat for deer and other wildlife species.
- Scenic area.

Significance: *Local*

- Dense clumps of white spruce provide important over-wintering habitats for local deer populations and functions as a travel corridor for wildlife moving to and from the North Saskatchewan River valley.
- Has some nature education value for schools in Devon

Sensitivity: *Moderate - High*

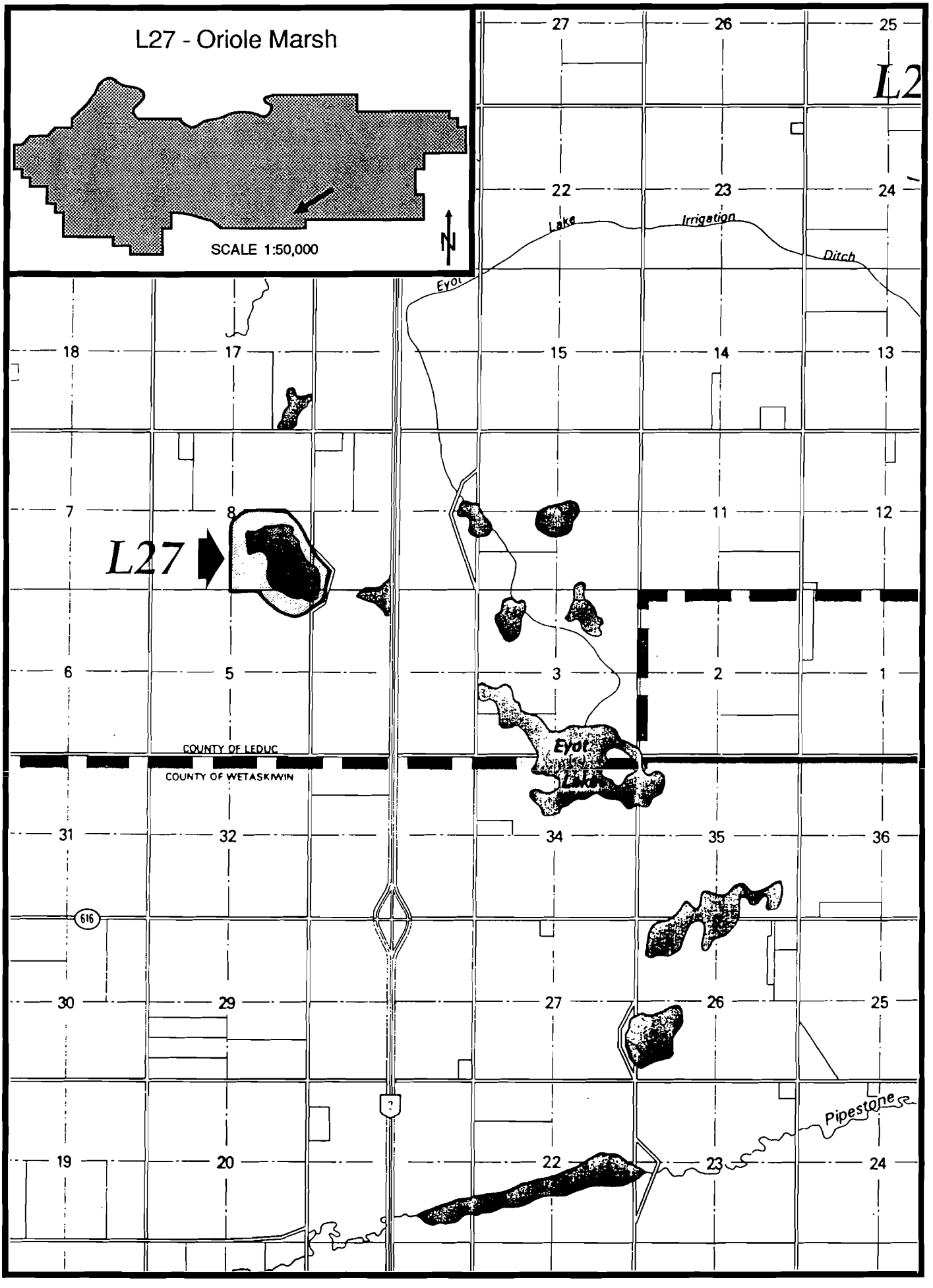
- Steep banks susceptible to erosion disturbance from off-road vehicles and vegetation removal.

Comments/Management Considerations:

- Off-road vehicle use of the creek bed and banks should be minimized
- Because of its proximity to Devon, site could support a low-intensity use and walking trail system for educational or interpretive purposes.
- Additional removal of bank vegetation should be eliminated.

References:

Field Notes (1990)


L27 - Oriole Marsh
SCALE 1:50,000
N
L27
L2
Lake
Irrigation
Ditch
Eyot
Eyot Lake
COUNTY OF LEDUC
COUNTY OF WETASKIWIN
616
Pipestone
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26
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Oriole Marsh

County of Leduc - ESA L27

Site Location:

- Located approximately 14 km (9 mi) southwest of Leduc.
- SE8, and portion of SW9-TP48-R25-W4

Land Status:

- Patented

Description:

- Surrounding land uses include 41% cultivated, 30% pasture and 23% hayland.
- The 21 ha (52 ac) marsh contains a dense emergent vegetation zone comprised of sedge and cattail communities.
- Provides good habitat for waterfowl and shorebirds. Nesting rafts have been placed in the area by the county and a water control structure has been installed by Ducks Unlimited.

Significance: *Local*

- Used as a breeding and staging area by waterfowl.

Sensitivity: *Moderate*

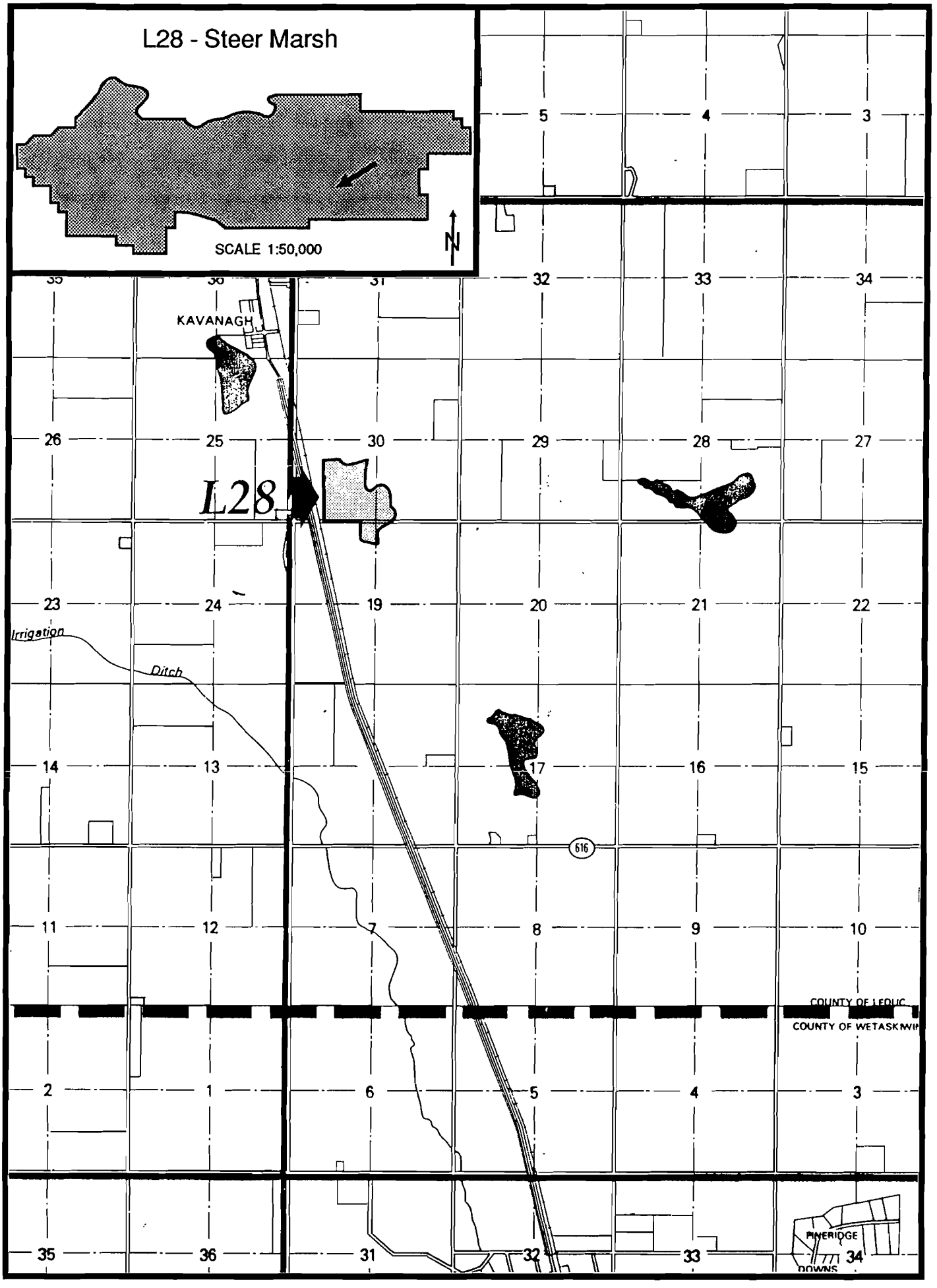
- Susceptible to agricultural runoff (containing pesticides and fertilizers) and accelerated eutrophication.
- Shoreline vegetation may be overgrazed and trampled by cattle.

Comments/Management Considerations:

- Upland nesting cover for waterfowl could be improved by maintaining a buffer zone comprised of native vegetation species and by fencing to restrict or exclude cattle grazing from shoreline margins.

References:

Ducks Unlimited (1985)
Field Notes (1990)


L28 - Steer Marsh
SCALE 1:50,000
N
KAVANAGH
L28
Irrigation
Ditch
616
COUNTY OF LEDUC
COUNTY OF WETASKIWIN
PINERIDGE
DOWNS

Steer Marsh

County of Leduc - ESA L28

Site Location:

- Located approximately 0.5 km east of Kavanagh
- 19-TP48-R24-W4

Land Status:

- Patented

Description:

- Surrounding landscape consists of flat to gently undulating topography with pasture, hayland and cultivation as the major land uses.
- Some wooded bluffs (aspen and willow communities) and farmstead shelterbelts are also found in the area.
- Is a Ducks Unlimited water control project of a natural shallow basin that has been in place since 1961.
- A dike system was constructed to create a lobe-shaped pond with a maximum depth of 0.8 m.
- Several goose nesting structures have been erected and the area is managed under a rest-rotational grazing system.

Significance: Local

- Supports a local population of breeding waterfowl and may be used by some species of waterfowl as a staging area.

Sensitivity: Moderate

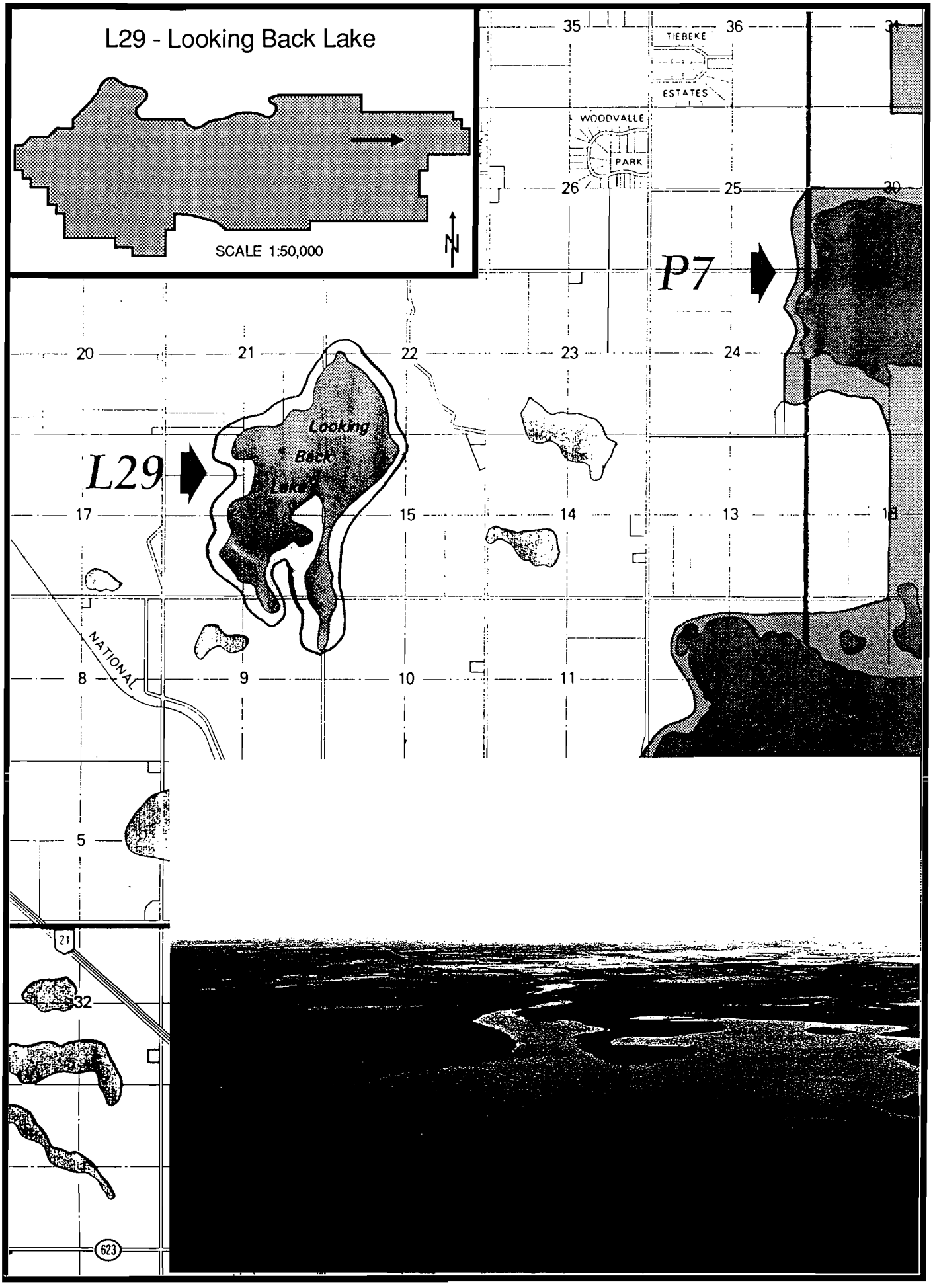
- Marsh may be affected by agricultural runoff (containing pesticides and fertilizers) and may be vulnerable to increased eutrophication.
- Shoreline and aquatic communicates are sensitive to grazing.

Comments/Management Considerations:

- Continued maintenance of a vegetation buffer zone and rest-rotational grazing system around the marsh.

References:

Ducks Unlimited (1985)
Field Notes (1990)


L29 - Looking Back Lake
SCALE 1:50,000
N
TIEBEKE
ESTATES
WOODVALLE
PARK
P7
L29
Looking
Back
Lake
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Looking Back Lake

County of Leduc - ESA L29

Site Location:

- Located approximately 4 km (2 mi) north of New Sarepta.
- 15, 16, SE22-TP50-R22-W4

Land Status:

- Patented

Description:

- Part of large meltwater channel
- Land use around the 154 ha (380 ac) lake is predominantly agricultural.
- Extensive farming around the lake has already impacted the lake considerably through forest cover removal and grazing to the lake shore.
- Northwest side of lake contains a large, relatively undisturbed aspen stand.
- Hay mowing along the lake has eliminated most of the nesting cover available for waterfowl.

Significance: *Local*

- Proximity to the Ministik Lake Bird Sanctuary and its use by breeding and staging waterfowl make it a locally important wildlife area.

Sensitivity: *Moderate*

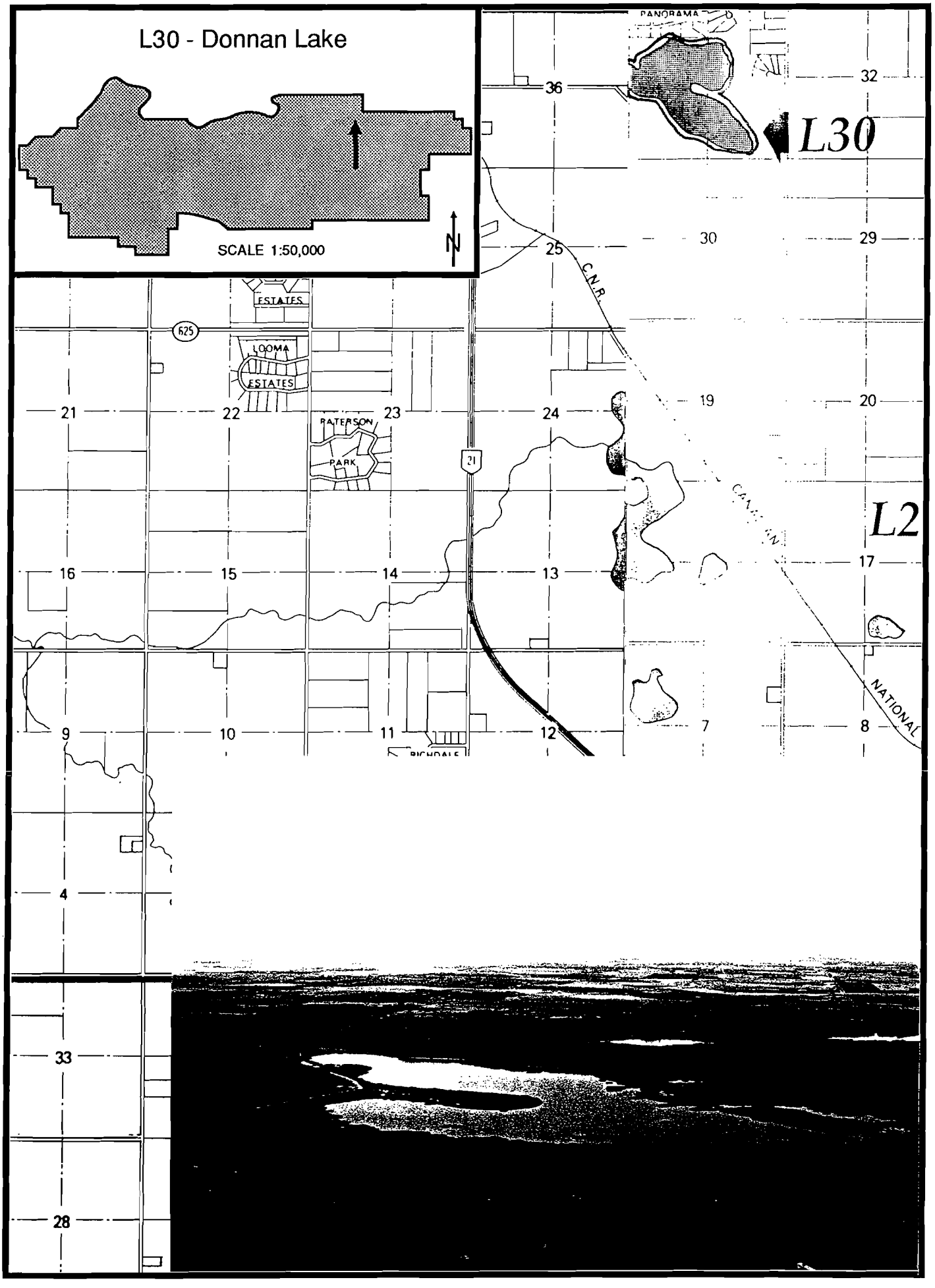
- Susceptible to agricultural runoff containing pesticides and fertilizers and to increased eutrophication.
- Shoreline vegetation community and adjacent uplands sensitive to cattle grazing and to continuous hay mowing.
- Waterfowl nesting use of the area may be disrupted by the frequency of hay mowing.

Comments/Management Considerations:

- Re-establishment of a well-vegetated buffer zone around the lake to minimize the effects of agricultural practices on water quality.
- Eliminate mowing during the nesting season and implement a rest-rotational grazing system for cattle or eliminate grazing by fencing the lakeshore margins.

References:

Field Notes (1990)
Fish and Wildlife Division (1981)
Fish and Wildlife Division (1989)


L30 - Donnan Lake
SCALE 1:50,000
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PANORAMA
L30
L2
ESTATES
LOOMA
ESTATES
PATERSON
PARK
625
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C.N.R.
NATIONAL
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Donnan Lake

County of Leduc - ESA L30

Site Location:

- Located approximately 13 km (8 mi) east of Beaumont.
- 31-TP50-R22-W4

Land Status:

- Patented

Description:

- Approximately 95 ha (235 ac) in size, has an average depth of 0.6 m (2 ft) and 4.8 km (3 mi) of shoreline.
- Found on gently undulating topography and is fed by Stoney Creek and local runoff from adjacent lands.
- Ducks Unlimited constructed seven nesting and loafing areas on the lake which contains good growth of aquatic and emergent plant communities.
- Upland communities around the lake characterized by sedges, whitetop, reed grass, burreed, willow and aspen.
- Canada geese, mallards, scaup, goldeneye observed on the lake.
- Outlet improved by channelization.
- Parts of the lakeshore subject to periodic hay mowing.

Significance: *Local*

- Used by wildlife including muskrat, beaver, shorebirds and waterfowl.
- Good waterfowl production and molting marsh.
- Used for birdwatching and hunting.

Sensitivity: *Moderate*

- Susceptible to agricultural runoff (containing pesticides and fertilizers) from adjacent lands.
- Waterfowl sensitive to disturbances (eg. hay mowing), particularly during the nesting period.

Comments/Management Considerations:

- Maintenance of buffer zone to protect upland nesting cover and minimize potential water pollution from agricultural chemicals.
- Hay mowing should be reduced or eliminated, particularly during the waterfowl nesting period.

References:

Ducks Unlimited (1977)
Field Notes (1990)

Telford Lake

County of Leduc - ESA L31

Site Location:

- City of Leduc
- N1/2 25, NE26, SE35, S1/2 36-TP49-R25-W4
- S1/2 31, N1/2 30-TP49-R24-W4

Land Status:

- Approximately 40% municipally owned; 60% privately owned (patented).

Description:

- Part of large meltwater channel.
- Land use around the lake is dominated by agriculture (approximately 60%) although industrial (sewage treatment) and residential uses are also present.
- The lake, with a surface area of approximately 101 ha (250 ac) at full supply level, is densely vegetated with water milfoil and coontail while dense clumps of cattail dominate the emergent plant community.
- Approximately 50% of the 8 km (5 mi) lakeshore is characterized by an aspen/willow community while the remaining shoreline and about 75% of the adjacent uplands is comprised of native and improved grasslands.

Significance: *Local*

- Serves as a local waterfowl production area.

Sensitivity: *Low*

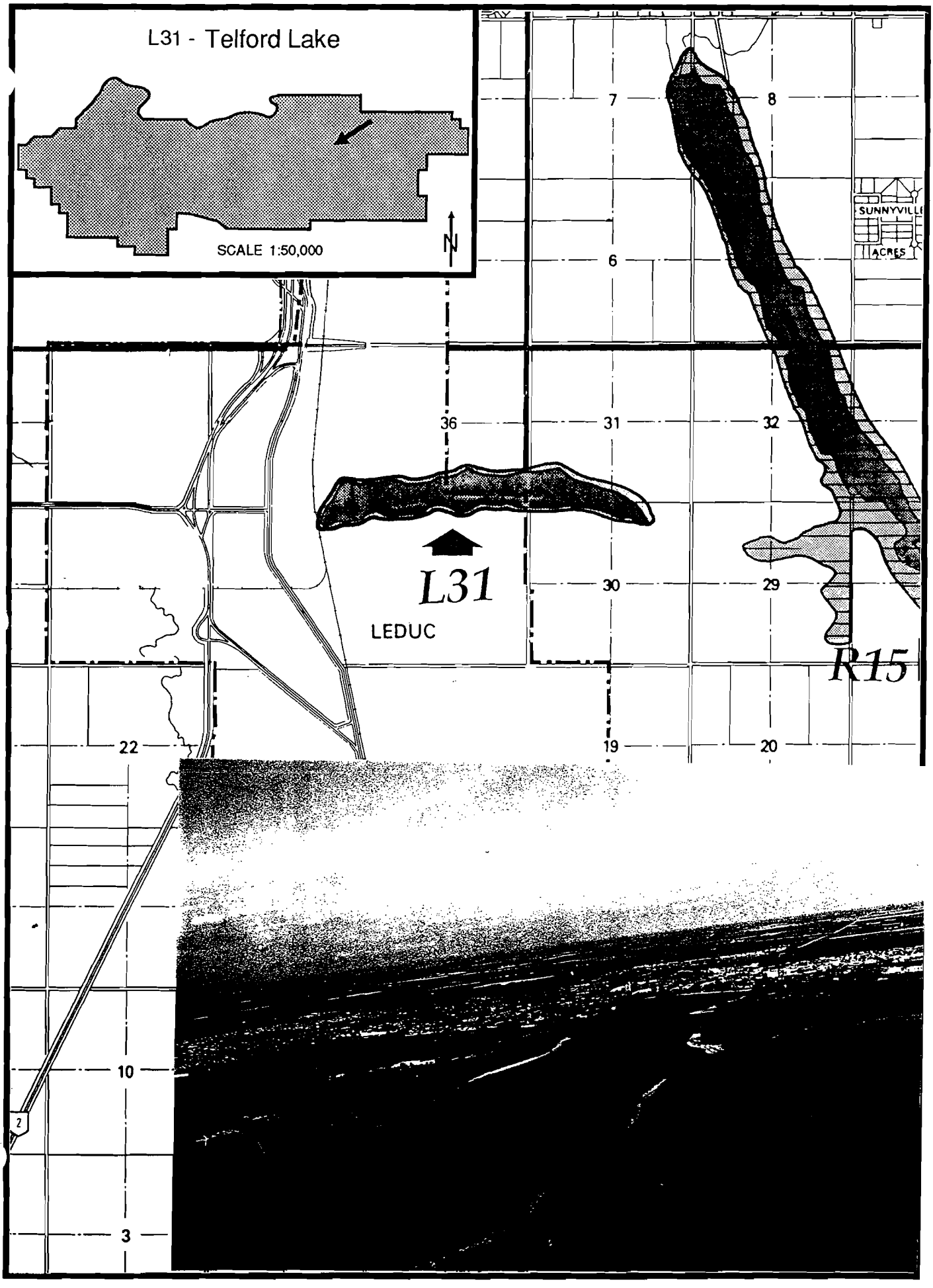
- The lake has already been significantly impacted by current land uses which included a sewage treatment facility, intensive agricultural activities and proximity to the City of Leduc.

Comments/Management Considerations:

- Since the lake is used by waterfowl and Ducks Unlimited is managing the water level (water level control structure erected in 1968), the lake has significant habitat enhancement potential, particularly for waterfowl and other semi-aquatic avifauna.
- Its proximity to a major urban centre also makes the lake attractive for promoting wildlife awareness and education.
- Potential enhancement opportunities include maintaining a buffer zone of at least 100 m in width, seeding upland nesting cover and increasing wildlife viewing opportunities.
- Telford Lake has significant recreational potential as a local and regional resource. Water-based (canoeing, sailing and rowing in summer and skating, cross-county skiing and snowshoeing in winter) and land-based (hiking trail system, parks) recreational activities have been identified as potential lake developments.

References:

Ducks Unlimited (1969)
Filipchuk and LaJambe (1975)
E.M.R.P.C. (1983)


L31 - Telford Lake
SCALE 1:50,000
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L31
LEDUC
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9.0 MANAGEMENT CONSIDERATIONS AND RECOMMENDATIONS

9.1 Factors Affecting Natural Features and Environmentally Sensitive Areas

Across the province, consistent criteria and a uniform approach are being applied to the identification and classification of environmentally sensitive areas. When the environmentally sensitive areas have been identified however, what happens then? It is at this point that the environmentally sensitive areas inventory must reflect the specific planning requirements of the region and municipality.

The County of Leduc faces development pressures and planning requirements that come with being a highly productive agricultural area in close proximity to a large and expanding urban centre. Significant examples of natural landscapes still exist in the county, but for the most part, these areas are associated with marginal agricultural lands. Development and subdivision pressures on these marginal lands and on good or prime agricultural lands presents a double-edged problem.

Conversion of prime agricultural land to non-agricultural uses is a major public in Canada. Over two-thirds of urban growth in this country has occurred on lands that were previously used for agricultural production (Warren and Rump 1981). This results in increasing dependence on a reduced agricultural land base, which must be farmed more intensively to meet the increasing demand for food (Manning 1986). Intensively cultivated lands often face problems of soil degradation, which further decreases the amount of land capable of long-term sustained food production and increases the pressure to bring marginal lands into production. Policies are therefore required at the municipal level, as well as the provincial level, to deal with conservation of prime agricultural lands, development of marginal agricultural lands, and protection of significant natural features. It is important, therefore, that the present environmentally sensitive areas study reflect the specific requirements of the County of Leduc and the Edmonton Metropolitan Regional Planning Commission for strategic and general planning.

Protection of environmentally sensitive areas is a complex and difficult issue because of these additional factors:

- Some shorelines of creeks and lakes are cultivated or grazed to the water's edge because it is not economically beneficial to leave a strip if non-farmed land; these shorelines could become significant natural habitats if allowed to revert to previous, relatively undisturbed condition.
- Most of the environmentally sensitive areas, with the exception of several parcels of crown lands, are on patented lands. These areas are characterized by shelterbelts, marginal agricultural lands and creek shorelines.
- Some provincial government programs conflicting objectives. For example, the Alberta Fish and Wildlife Division operates the Landowner Habitat Program, a Buck for Wildlife Program that encourages landowners to retain or enhance wildlife habitats on their lands with the use of various monetary and recognition incentives. At the same time, Alberta Environment is providing funds to local municipalities and landowners to channelize stream and consolidate wetlands so that drainage is improved and crop flooding is reduced.
- The tax system does not favour the retention of environmentally sensitive areas.
- Developments such as country residential subdivisions, resorts and golf courses are often placed in or near environmentally sensitive areas because of the very qualities that we endeavour to protect.
- There are an increasing number of programs sponsored by provincial and federal governments, or not-for-profit groups that are focusing on retaining tracts of privately-owned habitat areas. While this is very labour-intensive since it involves negotiations with individual landowners, it is proving to be a successful method for protecting significant natural features at the grassroots level.
- And finally, there is an increasing awareness by the general public about the natural environment and potential impacts of various developments on the environment. As a result, it is anticipated that more and more residents in the region will be demanding protection for their favourite natural areas.

9.2 Existing Policies and Framework for Environmental Planning in the County of Leduc

Land use planning and development in the County of Leduc, as in other municipalities in Alberta, is directed by several important legislative Acts and statutory documents. Protection of environmentally sensitive areas can be addressed in the Regional Plan, General Municipal Plan and the Land Use Bylaw. However, it should be noted that internal policies and procedures of a municipality outside of the mandate of land use plans, can, and do impact upon environmentally sensitive areas and on their protection. The following discussion will address the relevant factors and the relationships of various municipal programs so that a realistic plan for implementing the results of the County of Leduc environmentally sensitive areas inventory and a means to achieve some protection for these areas can be developed.

9.2.1 Regional Plan

The planning act requires that a regional planning commission prepare and adopt a regional plan to guide long-term future land use and development in the Region. The County of Leduc is located within two planning commission areas: the Edmonton Metropolitan and Battle River Regional Planning Commissions.

The Edmonton Metropolitan Regional Plan was adopted in 1984 and covers the eastern two-thirds of the county while the Battle River Regional Plan was adopted in 1982 and covers the remaining one-third of the county. The natural environment is addressed in Section 7.0 (Environmental Protection) with four objectives and eight policies. Policies are stated under the headings of "Environmentally Sensitive Areas, Wildlife Habitat, Shorelands and Reserves". Policy 7.1 and Policy 7.2 are specific to environmentally sensitive areas, indicating the types of environmentally sensitive areas to identify and protect and the guidelines to be incorporated into General Municipal Plans and Land Use Bylaws to protect these areas. Areas with environmental values are identified as "Nature Conservation and Recreation" on the Policy Reference Map (Section 12.0) of the regional plan. A review of the regional plan may be undertaken in 1990.

The regional plan does not replace the need for more detailed plans. It encourages further development of local planning initiatives through municipal plans and bylaws. The regional plan is implemented through these local plans:

9.2.2 General Municipal Plan

The General Plan for the County of Leduc was adopted in 1980. The concept of environmentally sensitive areas has only evolved since the General Municipal Plan was adopted ten years ago. Therefore, references in the 1980 plan to wildlife habitat areas, scenic areas and unsuitable sites for development was the extent of the environmentally sensitive area identification and protection at that time.

The importance of the natural environment to county residents is documented in the 1980 General Municipal Plan. The policy under Recreation (page 9) states that "residents of the county attach great importance to the North Saskatchewan River and the county's lakes and creeks. Shoreland use should be carefully regulated and more public access should be provided".

The Environment policy section (page 13) states that "county residents place great value on local wildlife and the natural environment and are concerned about the gradual destruction of habitat, the effects of hunting, and instances of environmental degradation in the county which are thought to be linked with activities such as oil and gas extraction, farming, weed control and the indiscriminate clearing of woodlands".

The direction and support for protection of significant lands is provided in the Environment policy area (page 13): "The county will identify valuable wildlife habitat areas. Insofar as possible, the county will protect and conserve lands with significant wildlife potential, lands with unique scenic value or lands considered to be unsuitable for development by reason of unsuitable topography, soils or other natural conditions and will endeavour to maintain a healthy living environment with the county".

A thorough review of the General Municipal Plan has occurred in the last two years with the objective of drafting a new plan. A report entitled "Issue Discussion Paper"

was prepared (August 1989) as part of the General Municipal Plan review process. Environmentally sensitive areas are specifically mentioned in Section 7.0 (page 8): "Within the County of Leduc there are several provincially, regionally and locally significant environmentally sensitive areas. The main issue concerning these areas relates to their conservation and development while under private ownership, and the means to acquire certain environmentally sensitive lands for the public benefit."

The Policy direction states: "The plan will identify environmentally sensitive lands, contain policies addressing the conservation, development and acquisition of such lands."

The protection of environmentally sensitive areas is also discussed in Section 6.0 (Recreation) in the context of planning recreation activities but is not specifically mentioned in other sections of the plan dealing with Agriculture, Country Residential, Industrial Development, Transportation, Natural Resources or Energy Utilities.

9.2.3 Land Use Bylaw

The County of Leduc Land Use Bylaw No. 1665-83 was adopted in 1983 and is scheduled for review upon completion and adoption of the revised General Municipal Plan later in 1990. Three districts in the Land Use Bylaw include portions of the most identifiable environmentally sensitive areas: the Wildlife Habitat District which includes parts of Ministik/Joseph Lakes shorelands and Big Hay Lakes; the Lake Shoreland District which encompasses the shoreline and backshore of Wizard and Pigeon Lakes; and the Recreation/Open Space District which delineates a corridor along the major rivers (which includes the North Saskatchewan River valley and the Gwynne Channel).

9.2.4 Implications of a Policy Review on Environmentally Sensitive Areas

The undertaking of the present environmentally sensitive areas study for the County of Leduc is well-timed for incorporation within existing planning documents as they are being updated and revised. Recommendations contained in the final report can be incorporated directly into the draft General Municipal Plan, into the Regional Plan and later this year, into the review of the Land Use Bylaw. In

this way, the concept of environmentally sensitive areas identification will be introduced into the three levels of plans consistently and in the framework of overall land use policy development. The timing of the existing plan also allows the public an opportunity to provide input to environmentally sensitive areas policy implementation in the context of the three planning documents.

9.3 Policy Recommendations

Because of the timing of the existing plan reviews for the County of Leduc, there is an exciting opportunity to incorporate the foundation needed for environmentally sensitive areas protection into existing plans immediately. The following ideas and preliminary recommendations are presented for discussion purposes at the draft stage of the three plans.

Regional Plan

Natural Environment: Section 7.0 - Environmental Protection

1. Amend Objectives to reflect:

   - the existence of environmentally sensitive areas within the region

   - land uses planned in consideration of environmentally sensitive areas and in harmony with unique shoreland settings (being an identified environmentally sensitive area)

   - natural habitat areas considered critical or important should be maintained

2. Amend Policy 7.1 to include:

   - the acknowledged definition of an environmentally sensitive area (i.e. the established ten components of the classification criteria)

   - levels of significance (local, regional, provincial, national and international)

3. Amend Policy 7.2 to reflect:

   - environmentally sensitive areas that are hazard lands and should not be considered developable

   - retention of as much natural vegetation as possible in any development in an environmentally sensitive area

   - the possibility of an environmental impact assessment for major recreational, industrial, commercial and residential developments

applying to locate in an identified environmentally sensitive area; the details of the requirements of an environmental impact assessment would need to be defined concurrently with the Regional Plan review.

4. Policies 7.3, 7.6 and 7.8 could be incorporated into the Environmentally Sensitive Areas policy section.

5. Areas with environmental values are currently being identified as Nature Conservation and Recreation areas on the Policy Reference Map (Section 12.0) of the Regional Plan. However, environmentally sensitive areas should be identified separately from outdoor recreation areas on the policy map.

6. Provide opportunities for public review and comment during the review process.

General Municipal Plan

The inclusion of the following recommendations should be considered in the revised General Municipal Plan:

1. Future Land Use Guide - Replace the areas identified as Wildlife Habitat, Critical Wildlife Habitat, Lakeshore, and Recreation/Open Space with two categories: a) Environmentally sensitive areas as identified in the present report and b) Outdoor recreation areas where appropriate. It is important to note, however, that the two categories are not mutually exclusive and are dependent upon the sensitivity of the environmentally sensitive area and type of potential use.

2. Environmentally Sensitive Areas policy section should reinforce Section 7.0 of the Regional Plan with similar wording; the primary use within this area is habitat or hazard and proposals for developments within the area would have to be shown to be compatible with the environmentally sensitive area.

3. A general policy guiding the treatment of development proposals within environmentally sensitive areas should identify a list of compatible discretionary uses which could be allowed within an environmentally sensitive area, subject to an environmental impact assessment.

4. Agriculture Policy - Subdivision of prime agricultural land is an important issue and local concern. Limiting the number of subdivisions and non-agricultural developments in rural areas will benefit landowners and environmentally sensitive areas since there will be less pressure to convert marginal lands (which often represent significant or sensitive landscapes) for intensive agricultural uses.

5. Some activities should be discouraged from locating within environmentally sensitive areas. For example, intensive livestock operations (eg. feedlots, heavy grazing), heavy industrial developments, high recreation impact

developments (eg. golf courses) and country residential subdivisions should not be located adjacent to shorelines or groundwater recharge areas.

6. Country Residential Policy - The policy should encourage developers to retain trees and wetlands in subdivision designs and incorporate wildlife habitat considerations into the development proposals.

7. Acquisition of environmentally sensitive areas should be limited to provision of Environmental Reserves or Municipal Reserves in the subdivision process. There are a number of existing mechanisms available such as land trusts or fee simple interests (eg. the Clifford E. Lee Nature Sanctuary near Devon) that can be utilized if sensitive lands are being offered for sale by private landowners (for more detailed information, please refer to Tingley et al. (1986)).

8. Provide opportunities for public review and comment during the plan review process.

Land Use Bylaw

The following recommendations should be considered for inclusion in the revised Land Use Bylaw:

1. Include definitions of environmentally sensitive areas, environmental impact assessments and developable areas to reflect the intent shown in the General Municipal Plan.

2. Revise the districts and boundaries to reflect the intent shown in the General Municipal Plan (i.e. one Environmentally Sensitive Areas District and one Outdoor Recreation District). An option would be to include environmentally sensitive areas within an Agriculture/Conservation District.

3. Provide opportunities for public review and comment during the plan review process.

9.4 The Problem of Wildlife Habitat Loss

Serious consideration should be given to the continuing problem of habitat loss in the county. Continued clearing of remaining forest cover and drainage or modification of wetlands has, in some parts of the Country, reduced habitat supply to levels where it is no longer possible to support sustainable populations of many wildlife species. While many development activities are contributing to the problem, agricultural expansion or intensification is clearly the major concern. In efforts to increase the cultivated acreage of farm units or to increase the efficiency of farming operations, remnant areas of natural vegetation cover are being cleared at

an unprecedented rate. As indicated in Photos 1, 2, 3 and 4, lands that were previously considered non-arable and consequently secure from a habitat standpoint, including stream valleys, steep slopes, and wetlands, are now being developed.

At current rates of habitat loss, the character of landscapes in the county can be expected to change dramatically over the next 30 years. Even the east and west portions of the county, where natural habitat is still relatively abundant, will undergo conversion to more open, agricultural landscapes. This will inevitably result in reduced abundance of most wildlife species, and some of the more wide ranging species, such as moose, elk, lynx, and pileated woodpeckers, could disappear entirely. The accompanying losses in scenic value, wildlife viewing opportunities, and recreation are inestimable.

Recognition and management of environmentally significant areas will help to alleviate this problem, since many of the sites identified were selected on the basis of their value as wildlife nesting areas, travel corridors, or winter ranges. The problem however, is much broader than this. The criteria that are used in selecting environmentally sensitive areas, even when sites are identified at a local level of significance, fail to include a large proportion of the productive wildlife habitat in the county. Furthermore, the problem is compounded by the fact that a majority of the habitat remaining in the county, including many of the habitat areas that were identified as environmentally sensitive areas, is on privately owned land. As a result, even though policy statements in the General Municipal Plan recognize the need for habitat conservation, there are really no effective regulatory remedies that can be applied at a county level to provide protection to remaining habitat areas.

This problem is not unique to the County of Leduc. Throughout agricultural areas of North America, natural habitat continues to be converted to agricultural uses at rapid rates. This reflects the unfortunate reality that virtually all land management decisions are made on the basis of short-term economic benefits, and wildlife exhibits a very low return to landowners in comparison to most other uses. Many

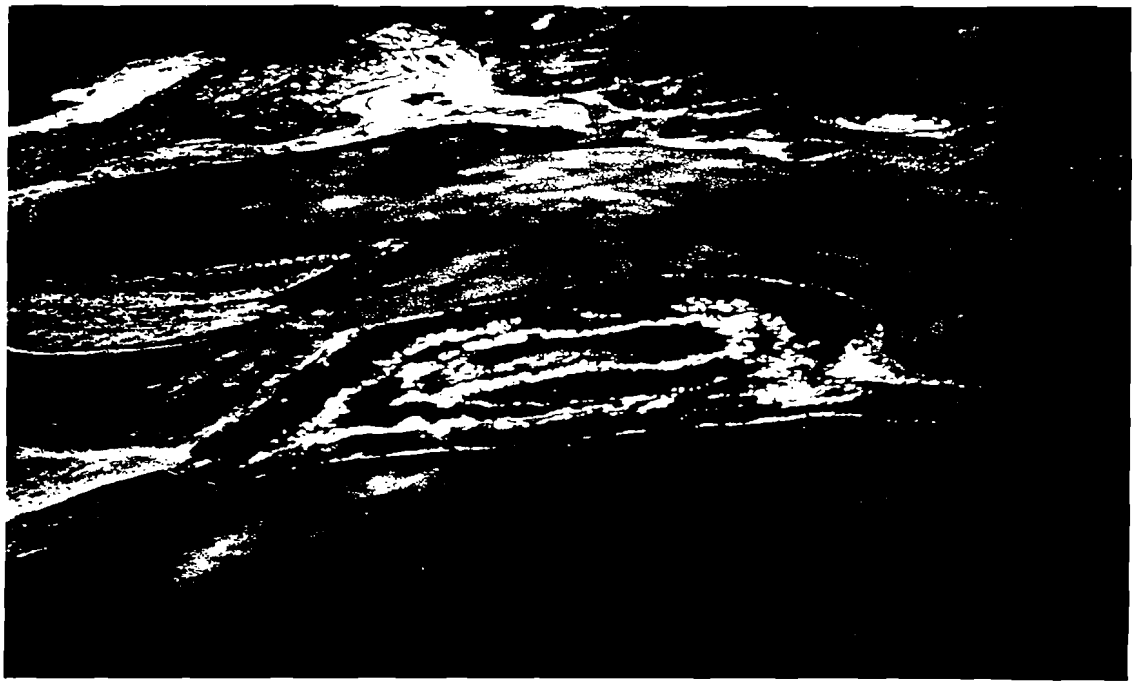

Photo 1. Loss of wetland habitats is having serious consequences for nesting waterfowl in the parkland region of Alberta. This wetland, located east of Kavanaugh, is being prepared for more intensive cultivation.

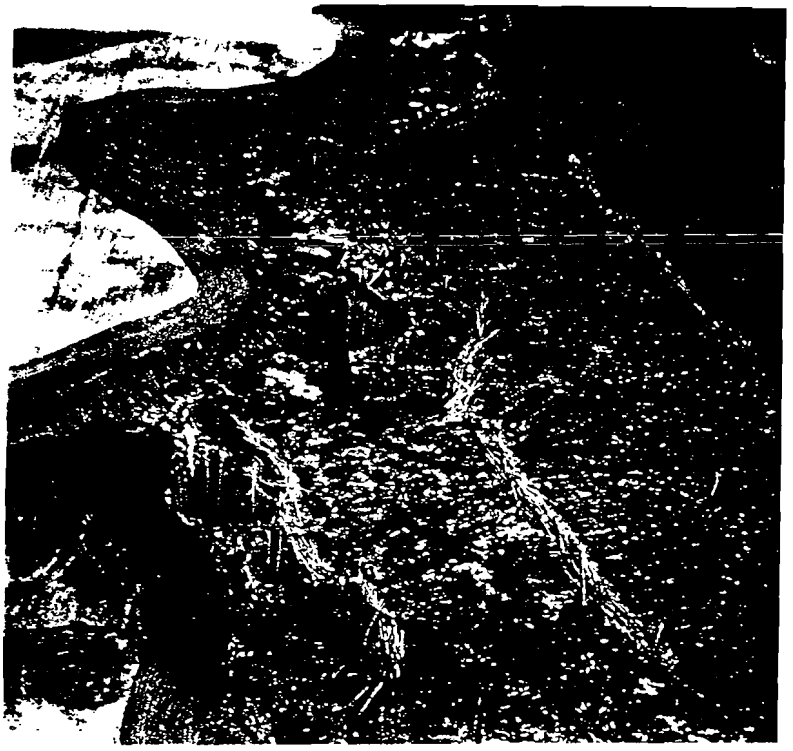

Photo 2. Creeks in the County of Leduc are also being impacted significantly as landowners intensify their agricultural practices. Resulting loss of riparian cover destroys wildlife travel corridors and adversely affects aquatic habitat quality.

Photo 3. Intensive agricultural practices such as forest clearing will continue to exert pressures on remaining natural areas in the County of Leduc. Photo shows extensive tree removal along the margins of Saunders Lake.

Photo 4. Oil and gas activity in the vicinity of Joseph Lake may be affecting water quality in the area, particularly during high water years. The island in the background supports nesting colonies of gulls and Double-crested cormorants.

government agencies and private organizations (eg. Ducks Unlimited, environmental trusts etc.) have been scrambling to find solutions to the problem, but only a handful of the programs and initiatives attempted have shown measurable success from the standpoint of long-term habitat security. These programs and their potential application to western Canada have been reviewed by various authors including Brusnyk et al. (1990), St. Clair-Scarth (1983), and Ewaschuk and Westworth (1983). These reviews suggest that while programs aimed at public education or awareness and voluntary habitat retention can offer significant benefits, at least in the short term, long-term habitat security can best be achieved through land purchase or through mechanisms such as long-term conservation easements or other forms of long-term landowner agreements. In Alberta, the recently-initiated Landowner Habitat Program, operated by the Fish and Wildlife Division of Alberta Forestry, Lands and Wildlife, has been successful in securing a large acreage of habitat by offering agreements to landowners that provide them with an economically competitive rate of return. Similarly voluntary, programs such as the Alberta Fish and Game Association's Habitat Steward Program have proven popular among many agricultural landowners.

Recommendations:

1. There is an urgent need to develop a comprehensive habitat management strategy for the county. The Fish and Wildlife Division should be requested to participate in the preparation of a habitat management plan, which would require as a starting point, an inventory of wildlife populations and habitat within the county. The strategy should attempt to establish priorities for habitat management based both on the importance of particular habitat areas and their vulnerability or likelihood of being lost. For example:

Priority 1 - sensitive or critical habitat

- habitat for rare or threatened species
- nesting areas for colonial nesting birds
- wildlife travel corridors
- important spawning or rearing habitats for fish
- old-growth forest
- ungulate winter range

Priority 2 - other productive habitat

2. Programs or mechanisms should be implemented to achieve the habitat or population goals established under the habitat management strategy. Previous experience in the province has shown that these objectives are not likely to be met by any single program. Since the success of any habitat conservation program is contingent on the cooperation of private landowners, flexibility of program options seems to be an important element (Brusnyk et al. 1990). The best approach might be to support a 'basket' of management alternatives which offer different degrees of protection depending on the priority identified for particular habitat areas. For example:

Priority 1 - requires mechanisms for long-term habitat security and complete control of land use

- land purchase

- perpetual conservation easements

- Landowner Habitat Program

Priority 2 - participation in programs designed to encourage reten on of habitat on private land

- public education and awareness programs (eg.Outdoor Observer, Use Respect)

- voluntary habitat conservation programs (eg. Habitat Steward Program)

- Landowner Habitat Program

3. The Landowner Habitat Program is currently being expanded from its initial pilot project status. Contact should be initiated with the Fish and Wildlife Division to determine the opportunity to include the County of Leduc in the immediate future. Under this program, priority is being given to counties or municipal jurisdictions that are willing to help support the program. Consideration should therefore be given to establishing a cooperative funding arrangement for the program in the county.

4. The County should also contact representatives of the Alberta Fish and Game Association, to determine how the County could support or encourage expansion of the Association's Habitat Steward Program within the country.

Since the program was initiated in 1985 it has proven to be popular among agricultural landowners and has been effective in increasing landowner awareness of the plight of wildlife and providing increased security to remaining habitat.

5. In the very near future, moneys proportioned to Alberta under the North American Waterfowl Management Plan will be allocated to specific wetland

development or conservation projects in the province. Contact should be initiated with the provincial coordinator of the North American Waterfowl Management Plan to determine how this program will relate to the County's habitat management goals and how it can be tied in to other habitat initiatives being supported by the County.

6. The recommended habitat management strategy should include a review of policies and procedures for dealing with problem wildlife. Current practices for nuisance wildlife control may be outdated and can be very costly in terms of habitat loss for non-target species.

7. Problems related to increased access, particularly by hunters, have become a major wildlife management issue in Alberta. An access management strategy should be developed to deal with development of access roads, trails, parking areas, and off-road vehicle use within environmentally sensitive areas.

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APPENDIX I: Sensitive terrain and hazard lands in the County of Leduc