✎If a corridor is long, segments of the corridor are likely to vary in function and importance, influencing the rate of flow from segment to segment along the route. Long, linear routes require segments of larger habitat patches.

✎A corridor must conform to the needs of the species it is designed to serve, but must not compromise the viability of other species in the area. A poorly functioning corridor can do more harm than good because it can become a "mortality sink", siphoning off healthy animals from a source area.

The maintenance of wildlife corridors as a part of the natural landscape within Strathcona County is a critical step towards ensuring the persistence of a given suite of wildlife species in the region. While habitat restoration may be required for some of these identified habitat units, the corridor strategy is fundamentally an attempt to maintain or restore natural landscape connectivity, not to build connections between naturally isolated habitats.

10 PRIORITY WILDLIFE HABITAT UNITS

The primary concern of conservation management in fragmented systems is the development of priorities for remnant habitat retention, management, and restoration. Priority Wildlife Habitat Units have been identified in Strathcona County as habitat remnants which serve a conservation purpose through the retention of representative examples of native ecosystems, the maintenance of species diversity, and/or the preservation of rare and endangered species. The Wildlife Habitat Units in the County, which have previously been described in section 8.0, have been prioritized as to their conservation potential. The criteria utilized in setting these priorities is set forth in the following section.

10.1 Priority Wildlife Habitat Designation Criteria

Each priority wildlife habitat unit examined during the inventory process was classified in accordance with its value or significance to the initiative to apply conservation biology theory to the habitat inventory. Priority wildlife habitats will and do occur in all landscapes but are relative to surrounding land-uses and biophysical conditions (Table 14).

Table 14: CRITERIA FOR PRIORITIZING WILDLIFE HABITAT UNITS (WHUs)

Selection criteria	Priority Wildlife Habitat Unit		
	Priority 1	**Priority 2**	**Priority 3**
Size (hectares)	> 30	10.0 - 29.9	1.0 - 9.9
Function As Buffer Zone	Between lakes and wetlands	Between Priority 1 WHU and Unclassified Land	Between Priority 2 WHU and Unclassified Land
Buffer Zone Width	-100 meters around lakeshores -50 meters around wetlands	-100 meters around lakeshores -50 meters around wetlands	-100 meters around lakeshores -50 meters around wetlands
Function As Corridor	movement conduit and resource use corridor	movement conduit for larger, mobile species	dispersal habitat for sedentary species
Percentage WHU impacted	< 15.0	15 - 30	31 - 50
Wildlife Species Diversity	High	Moderate	Moderate
Percentage of potential native species diversity	> 80	60 - 79	30 - 59
Factors influencing native species diversity	WHU diversity WHU size	WHU diversity WHU size WHU disturbance	WHU diversity WHU size WHU disturbance

Site-specific biophysical conditions influence and are influenced by land-uses which may degrade a valued ecosystem process, for example. As a result, four factors regarding the physical state of the site must be considered when assessing the overall level of significance and, thus, the priority of any given priority WHU: ecological integrity, size, connectivity, and diversity.

10.1.1 Ecological Integrity

The concept of ecological integrity has been in use for some time, as Aldo Leopold introduced the concept in 1949 as follows: *"A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community."* Even though this concept has existed for decades, there remains considerable ambiguity regarding the definition and application of the term. A more recent (and more quantitative) definition proposed by Karr and Dudley (1981) is relevant to the identification and prioritization of wildlife habitats in Strathcona County:

> *Biological integrity is the capability of supporting and maintaining a balanced, integrated adaptive community of organisms having a species composition and functional organization comparable to that of the natural habitat of the region.*

The ecological integrity of each priority WHU is integral to ensure the incorporation of whole viable systems into the County's land use planning network, thereby minimizing potentially negative impacts of extrinsic biophysical processes and anthropogenic activities.

The concept of ecological integrity, as applied to priority wildlife habitats and significant areas, should include the stability and resilience of the chosen, representative ecosystem. As with many other ecological concepts, this one is also open to broad interpretations and applications. Colinvaux (1986) defined ecosystem stability simply as an ecosystem where the chance of a species becoming extinct is low. For an ecosystem to be stable, it must exhibit both resistance, or the power to withstand stress, and resilience; that is, the ability to return to its original state after being subjected to stress. These interpretations of ecological integrity are the ones most commonly applied to conservation scenarios.

Specific factors which contribute to ecological integrity include size, distribution, shape, compatibility of adjacent land uses, watershed completeness, replication, and intended use and manageability. A consideration of ecological integrity is particularly emphasized for the wetland, riparian, and aquatic components of Strathcona County because these wetland ecosystems can function as catchments and receive discharge which can facilitate nutrient transport. Therefore, aquatic resources and their forested buffer zones are integral to viable functioning of ecosystems in the County.

10.1.2 Size

In semi-natural, or fragmented, landscapes such as Strathcona County, it is probably a reasonable maxim that the larger the area of a remnant Wildlife Habitat Unit, the more valuable it will be for fulfilling a wildlife conservation role. Relatively little work has been done on defining the minimum acceptable size for any conserved area and area considerations at any site are further complicated by the fact that they are largely dependent on the inherent biological characteristics of the inhabitants. Griffiths (1992) identified a size of 30 ha as the minimum size required for a Priority 1 WHU, however the size criteria should be secondary to other criteria such as critical functioning. WHUs which serve functions such as buffers or corridors, for example, need not meet a minimum size criteria of 30 ha in order to be considered high priority WHUs. While refuge area has been linked to diversity through the species-area relationship, it is also important to note that numerous researchers have criticized the advocavy of large refuge approaches on both theoretical and empirical grounds. In this regard, connectivity of units is often cited as being a more prudent criteria than the size of the units themselves.

10.1.3 Connectivity

Connectivity refers to the degree to which absolute isolation is prevented by landscape elements which allow organisms to move among patches. Early in the evolution of the field of landscape ecology, MacArthur and Wilson (1967) recognized the potential importance of a series of small, connected islands, in association with larger islands, because small islands may act as stepping stones between large islands or between islands and mainland, thereby increasing the probability of biotic exchange. This tenet of island biogeography theory has survived to the present day, with recent application to both protected areas and land use planning. The degree of connectivity that the WHU provides, as well as the significance of the WHUs which it bridges, are key factors determining the overall priority or value of a Corridor WHU. Connectivity is not necessarily a function of linear corridors such as riparian habitats and stream courses, although it is definitely the dominant type of connective habitat in the Strathcona County study area.

10.1.4 Diversity

Varied interpretations of the term "diversity" result in a dual application of the term to priority wildlife habitat management and conservation. Ecological diversity, the interpretation being considered here, usually correlates with physiographic diversity. In practical terms, areas with dramatic relief, varied exposures, and heterogenous substrates usually exhibit greater ecological diversity than areas of comparable size that are more homogenous in nature and possess narrower ecological gradients (Beechey 1989). Since topographical relief is minimal throughout much of Strathcona County, the few sites which are characterized by hummocky or undulating terrain are likely considered to be high in ecological diversity, whether it be in regards to floral, faunal, or physical resources. In Strathcona County, such sites have previously been identified as being environmentally significant within local, regional, and provincial contexts by Westworth and Knapik (1987), Griffiths (1992), and O'Leary et al. (1993).

10.2 Distribution of Priority Wildlife Habitat Units

The distribution of wildlife habitat units is influenced by physiography and land-use within Strathcona County. In general, increasingly fragmented landscapes contain fewer high priority wildlife habitat units while relatively undisturbed landscapes are distinguished by the presence of large blocks of high priority habitat. This trend is evident in Strathcona County as well (Table 15).

Table 15: AREAL DISTRIBUTION OF PRIORITY WILDLIFE HABITAT UNITS IN STRATHCONA COUNTY	
Priority Wildlife Habitat Unit	**Area (ha)**
Priority 1 WHU	22 905.4
Priority 2 WHU	10 697.9
Priority 3 WHU	7 332.4

10.2.1 Priority 1 Wildlife Habitat Units

Distribution of Priority 1 WHUs is concentrated in the eastern and south-eastern extent of the Cooking Lake Upland, the southern Redwater Plain, and the North Saskatchewan River ecodistricts. Physiographically, these ecodistricts lack extensive level plains, but have a variety of land forms including sand dunes, strongly rolling moraine, and deeply incised river valleys. Where these land forms inhibit agricultural land-uses, and have not been heavily developed for country residential, transportation, and industrial land-uses, they support extensive blocks of native aspen parkland and boreal vegetation. Extensive sand dune complexes located in the extreme northern portion of the study area comprise a significant block of Priority 1 Wildlife Habitat Units (WHU). Such blocks contain numerous wetlands and encompass large lakes representing the highest priority wildlife habitat in Strathcona County. The distribution of the Priority 1 WHU classified from 1: 30,000 scale aerial photographs of Strathcona County are clearly visible on Map 2.

10.2.2 Priority 2 Wildlife Habitat Units

Priority 2 Wildlife Habitat Units are distributed throughout Strathcona County with maximum occurrence in the Cooking Lake Upland and Redwater Plain Ecodistricts. These habitat units are dominant in areas of moderate country residential and mixed-farming land-uses. Priority 2 habitat is restricted to stream valleys and wetlands within the Leduc Plain Ecodistrict, however, where intensive agriculture is practiced. Priority 2 wetlands and drainage courses are prevalent throughout the County and generally represent WHU that are significantly modified by human disturbance, yet retain many of the designation criteria outlined in section 10.1.

10.2.3 Priority 3 Wildlife Habitat Units

Priority 3 Wildlife Habitat Units are distributed throughout Strathcona County in areas of highly fragmented and converted native vegetation. These WHU's are dominant in the intensively agricultural Leduc Plain and areas of high density county residential development in the Cooking Lake Upland Ecodistrict.

11 HABITAT RESTORATION ECOLOGY AND APPLICATION TO STRATHCONA COUNTY

11.1 Restoration Ecology Theory

Throughout North America, natural landscapes are rapidly diminishing while agricultural, industrial, urban, and recreational areas are substantially increasing. A concomitantly growing human population has considerably changed the global face of natural resources and has necessitated an adaptation in resource management paradigms. Cultivated landscapes in and around Strathcona County are mosaics of agricultural areas, forests, and urban-industrial complexes. As a result, these lands are not immune to the very stresses that currently characterize many ecosystems worldwide. Given that many of the changes taking place are deleterious to the biodiversity of any given region, a major question arises: *"What can we do to remedy these problems and trends towards declining biodiversity?"* Answering this question is what the field of ***restoration ecology and management*** is all about (Jackson 1992). Restoration ecology is growing as a discipline (Cairns 1986, Allen 1988, Jordan et al. 1988), but there are, as yet, few general principles available.

Restoration ecology deals specifically with research and management experimentation to determine ways to safely restore ecosystems and ecosystem components to more nearly natural conditions. For purposes of this project, we define ecological restoration as *the process of intentionally altering a site to establish a defined, indigenous, historic ecosystem*. The goal of this process is to emulate the structure, function, diversity, and/or dynamics of the specified ecosystem.